

CULTURAL BEADS AND MATHEMATICAL A.I.D.S^A:

A critical narrative of disadvantage, social context and school mathematics in post-apartheid South Africa, with reflections and implications for glocal contexts.

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Abstract

Drawn from my doctoral dissertation¹, this contribution serves as a critical exploration of the construction of disadvantage in school mathematics in social context. Applying a narrative-based methodology, CULTURAL BEADS AND MATHEMATICAL A.I.D.S. engages rhizomatically with critical issues in mathematics education and highlights contradictions and dilemmas within different research and pedagogic contexts. It addresses dominant social domain discourses and hegemonic practices in classrooms and communities of practice in terms of 'glocal' relationships and principles of power. More specifically, it addresses issues of universalism, pedagogic constructivism, and progressivism in mathematics education, and how these are recontextualised in local contexts in ways that may contribute to the construction of disadvantage. In particular, progressive education rhetoric of 'relevance' in mathematics education is interrogated in terms of its recontextualisation across pedagogic locations, and how it might facilitate pedagogic disempowerment rather than liberation in situated contexts.

Be kind to strangers for some have entertained angels unaware.

Hebrews 13:2 (New American Standard).

^A A.I.D.S – Acquired Immune Deficiency Syndrome. The title is a double entendre referring to HIV AIDS as well as a play on mathematical manipulatives or aids used for teaching. A staggering quarter of the population of South Africa has contracted HIV AIDS, and more than a thousand people die from the disease daily.

The workshop at the AMESA conference^B was about “making sense of OBE^C through project work: principles and practices”. It sounded like I needed to attend this session. Coming from my most recent teaching experience in a Canadian context where Outcomes-based education has become entrenched and, for the most part, accepted for quite some time now, I thought I might be able to elicit some understandings and insights into how this system (notwithstanding the many political sector-based controversies that have ensued around its implementation in South Africa) may be viewed, interpreted, embraced and critiqued. I hoped to gain some insights into the way in which OBE may be

^B AMESA: *Association of Mathematics Education of South Africa*, Seventh National Congress, directed at a broad audience of mathematics teachers, principals of elementary and secondary schools, mathematicians, mathematics educators, and academics and administrators in general and higher education and training. This congress was opened, in 2001, by the Minister of Education, Kadar Asmal, and Professor Jill Adler, international mathematics educator, and was held at the University of the Witwatersrand, in Johannesburg. Notably, the first congress of AMESA was held at this same university in 1994, the year of the first democratic elections of South Africa, ushering in a new focus for South African mathematics education, and education in general, for the ‘rainbow nation’ (as Mandela commonly referred to it in the context of the aspirations of a New South Africa). The then theme of the congress was: *Redress, Access, Success*. In 2001, the congress theme was: *Mathematics Education in the 21st Century*. The President of AMESA at that time, Aarnout Brombacher, drew a connection between these two themes and the ‘relevance’ that *redress, access and success* have on mathematics education in South Africa *in the 21st Century*. In the congress programme message, he comments that: “Mathematics Education will, in the 21st Century, contribute to transformation in our country through the mathematical empowerment of its people”, intimating that mathematical empowerment is a necessary prerequisite for, and precedes, social transformation. Further, the theme title of “Mathematics in the 21st Century” which alludes to a discourse on progressivism and globalization in education, mythologically casts the discipline of mathematics as a political /socio-economic saviour of ‘the people’ and ‘the nation’. This is on the grounds that its principles and practices afford “access” to the realization of social and political ideals of transformation premised on “socio-economic success” prescribed by the tenets and dictates of global economic systems and capitalist relations of production.

^C OBE: This is the *Outcomes-Based Education* model, which was introduced into South Africa’s education and training system in the mid-1990s. According to Jansen (1999) “OBE has triggered the single most important controversy in the history of South African education. Not since the De Lange Commission Report of the 1980’s [Human Sciences Research Council (HSRC) 1981], has such a fierce and public debate ensued – not only on the modalities of change implied by OBE, but on the very philosophical vision and political claims upon which this model of education is based” (p.3).

“recontextualised” in practices from a recently-implemented national perspective, especially in the South African mathematics education arena.

The workshop organizer is a well-known South African mathematics educator and academic, I will call Rena, whose focus is on issues of democracy and equity. Her research work places emphasis on the implementation in the classroom of ideas from ‘critical mathematics education’. In speaking with her during tea and lunch breaks, she comes across as a person of conviction who cares deeply about issues of social justice in mathematics classrooms and communities of practice, especially in the South African context with its legacy of apartheid education....

We are about the same age. Both of us grew up under this system. For a moment, I think about... wonder about her experience of education in South Africa, probably under the then ‘Indian Education Department’ in the former Province of Natal; mine being under the then ‘Transvaal Education Department’ for Whites. Yet, we are consensually located within a common motivation and at that moment we seem to speak the same language of frustration and commitment, despair and conviction. She talks to me about my research work and my interests, and shows genuine support for my research orientation and what I am personally hoping to achieve en route. She shows empathy and understanding, and can speak back to the frustrations I express to her in my trying to grapple with the paradoxes and conflicts, disjunctures and dichotomies that present themselves at every turn as I move across different locations.

And as I speak of my research route, I notice how it passes through and roots itself within and between shifting contexts. These contexts seem to ‘vibrate’ with the oscillations and elisions of constant reformulations of positions, relativities and colliding texts.² They are the shaky soil of pedagogic analysis and the ontology of ways of knowing, which produce the seeds of a history recast in our collective conscious, and the roots of (re)invention and future possibilities.

In this sense, I am aware that, without falling into the quicksand of social determinism, it is nevertheless *within, across, and in relation to* such evoking contexts that subjectivity and discourse is manifest – as sites of struggle –where context, discourse and subjectivity act as inter-subjective discourses of power and possibility. Context permits the theoretical articulations of and philosophical responses to hierarchies, polarities and paradoxes on the one hand; and, on the other hand - at a material level, serves as the terrain in which lived experience takes place as event and wherein discourse is realized as practice. It is also here that the paradoxes of pedagogy, made trenchant in theoretical arguments, are often extenuated in practice, made ‘normal’ by the ‘noumenal presence’ of ‘lived reality’.

And I notice where my research route has produced filaments, some tenacious as twines, some fine as filigree, amongst aporetic spaces³. These have included mathematics education – the global and the local, diverse classroom situations, research predicaments, environmentally-induced predicaments, and the moral and ethical dilemmas that are situationally invoked as a consequence of multiple overlapping sites of struggle and local, micro, contextual shifts within the broader, macro context of post-apartheid South Africa.

This context in turn is a site of struggle against, and in relation to, the overarching and under-girding, regulative context of global discourses and world economies.

Mine, is an embodied dance within which I find myself in continuous impromptu choreography.⁴ My personal postures, positions and poises reflect, or are informed by, the music of the contextual discourses within which the rhythm of my research and routedness find reference. Sometimes the movements are awkward and discordant; always they come to greater interpretative meaning and lead me to deeper and higher levels of possibility of knowing.

Each is a *stage*, not only in the *temporal* sense of a progressive movement towards a re-invention of ways of being, knowing and creating identity, but in the *spatial* sense of providing performative podiums of perspective, which speak to and across different contextual audiences. Always the movements are inspiring as the music modulates the dance. Rena knows this dance and accompanies me for a short while on my route, and the dance is enriched by the interpretive interaction⁵... I am drawn to her and feel an abiding respect for her person and her convictions. I am looking forward to the workshop....

Outside the elongated paneled window frames of the seminar room, I hear the song of African pigeons as they nest in the shadows between the tall colonnades, emblems of colonial history and the associated ivory tower of Enlightenment. I remember walking the long corridors of this university's Great Hall as a young student, being in awe of the possibilities that this university experience might hold for me as I listen to the sound of

my footsteps echo against the high walls and ceilings which smack of intellectual grace, arcane wisdom and lofty elegance.

I also remember, in visible contradiction *and* yet invisible consonance, feeling a part of the making of history by participating in vociferous revolutionary debates in the *same* Great Hall in those awful early 80s when the backlash against the heightening liberation struggle from the draconian dictates of apartheid regime policies and their brutal implementation seemed to reach a cataclysmic zenith. These academic precincts of stone and granite seemed so interminable and impervious to the vicissitudes and trials of the human experience, oblivious of the volatility of events that occurred within or without its precincts, standing solid in emblematic contradiction to the realities of South Africa, then a nation teetering on the edge of full revolution. It seemed so different now, ... yet the atmosphere and smells within were the same, the song of pigeons in the cool afternoon was the same, the echoes through the corridors were the same, and the Great Hall stood in anachronistic and disinterested loftiness *all the same*⁶.

Rena spoke for a while about the need to approach the learning and teaching of mathematics from a 'critical perspective'. She spoke about trying to bring 'relevance' into the classroom and for the need for mathematics learning to be contextualized within the realities of the experiences and circumstances of the communities in which it is practiced. Further, she saw the mathematics classroom as a site for social change and a space for the consideration of teacher, student and community concerns in a way that would open up a dialogue towards democracy, equity and freedom. This was a

mathematics education towards a *visibly* political purpose ⁷, putatively grounded in lived experience.

I had heard this discourse many times before, as had, most probably, most of the participants in the workshop. Although somewhat decontextualized, and consequently recontextualized by its contemporary situatedness within post-apartheid South Africa, it was reminiscent of People's Mathematics, a sub-category/theme of People's Education discourse, which had become prominent in the 80's as a backlash to the Nationalist government's (Apartheid government's) educational policies and a rejection of a White-imposed, Euro-centric education system on black South Africans.

Rena spoke of the need for bringing the issues and concerns of the community into the mathematics classroom in the form of project work, which could be directed at trying to solve local community problems through the discourse and practice of school mathematics. While we are in an era of post-liberation struggle, she argues to the effect that the legacies of apartheid remain a concern for the full participation of 'disempowered communities' in the democratizing process, and the harsh consequences of the vast inequities in terms of distribution of resources is a daily, lived experience of many in South Africa. As an exemplification, many communities are without access to fresh water, while other communities still have disproportionate access to resources. How can we, through a pedagogy of conflict and dialogue in complementarity, empower the youth of disempowered communities to contest these lived inequities and participate in providing opportunities for their resolution? What should a pedagogy of mathematics education look like for the youth of these communities? What would be relevant?

From a position of activism and in my heart, I concur with the objectives of her analysis on moral grounds and listen to where her argument is going. I am also looking for ‘answers’ to these issues ... how do we address the (albeit politically-referenced and constructed) continuum⁸ of ‘redress, access, success’ in a way which would make the learning of mathematics in the classroom become an experience of empowerment and liberation from the tyranny of material constraints and social injustices that dog⁹ the daily lives of so many of our people in South Africa? How could I disagree with her? From a moral, ethical perspective, how could I doubt this logic? From a position of personal integrity and social conscience, how could one question the motivations or the intentions?

In terms of my own personal position relating the reasons for my engagement in research of this nature, my own efforts were certainly in political alignment and moral accord with both the *ideal* this point of view expressed and the *political exigencies* it addressed. The motivation of my research in mathematics education in South African contexts was whole-hearted and spiritually directed towards these ends. Rena’s motivation was morally just... no question of it! She was clear and convincing, and it was surely no less than an ethical and moral imperative!

Yet, in terms of ‘the how’, the *means* of achieving the expressed aim... some part of me wondered about the speciousness of the argument. Her argument was so obviously right... how could I think this? By daring to question this argument, even in thought, what did this say about me... about where my allegiances lay? But I felt also, that it was not *the motivation* that was in doubt, but *how the ideal*, inferred by the motivation, was to

be realized through *school mathematics*... I needed to know ... I needed to listen...to follow where Rena was going more carefully!

We were to divide into groups to talk about ways in which we could include projects in the mathematics classroom, where students could brainstorm and problem-solve urgent issues in their community... where they could go out into the community and choose an issue and then use mathematics to solve the problem, or to come up with a solution that would benefit the community and improve living conditions. Alternatively, how could you think of issues or ways of being that were relevant to the community or specific to local conditions and bring them into the teaching and learning of mathematics? How could we include an ethnomathematics experience and incorporate indigenous knowledges into the mathematics classroom? ...

In the room, there were mathematics teachers at elementary and secondary school level, administrators, mathematics consultants working in government departments and NGO's, and lecturers. Most, however, were teachers. After introducing ourselves to each other, one person in my group began talking about the need to problem-solve the traffic congestion, at drop-off time and end-of-school day, at his son's primary (elementary) school. Perhaps the students could work on a project to solve this predicament. He begins to draw out a map of the school and the adjoining roads, entrances and exits to the school and flow of traffic.

At the beginning of the group discussion, I felt that I could not make a contribution to ideas for projects (although this was simply a workshop exercise, as Rena rightfully saw

the project ideas as necessarily arising from student brainstorming) in so far as the problems that I might come up with, from my own immediate personal experience, would not fall into the virtual category inferred by Rena's "disempowered communities". Yet, the 'problem' that this group member had introduced was reminiscent of a very similar traffic flow problem at my daughter's elementary school in Canada. This Canadian school community could not be described according to the stereotypical features that register constructions of "disempowerment". This led me to think comparatively about whether a discourse on mathematics education, which viewed the classroom as a site for problem-solving community concerns, would be *possible* in this particular school, and from my experience with the school community, the answer would be a definite 'no'.

From my knowledge of the operations and the ethos of this Canadian school, most likely such a practice would be met with disdain and construed as a 'waste of educational time', if considered at all, and parents would likely complain that mathematics teachers would need to get on with the 'real work' of teaching 'the "hard core" mathematics curriculum' so that the students might be directed towards achieving the necessary scores for entry into 'recognized universities'.^D

Both approaches claim to be 'democratic' by increasing so-called 'access'. What then made the South African learners 'different', even in the virtual sense¹⁰, in terms of what

^D This comparison does not necessarily apply in terms of national contexts. In my experience, a 'critical mathematics' pedagogy as Rena defines it, would not be considered a legitimate or viable pedagogy in many South African schools as well, most especially in contexts of privilege, such as newly integrated, but "historically white" schools. Even as these are sites of struggle for discourses on inclusivity, equity and democracy, so they have less ideological investment in local discourses and act as precinct markers of the maintenance of hegemonic global discourses, especially in reference to economic 'security' and the pursuit of pecuniary advantage for the elite.

was deemed “needed”, “appropriate”, or “relevant” to them? Was this an appreciation of situated learning in context, or a projection onto the communal self of conditions of the “other” as interpreted by the dichotomizing forces of Western hegemonies? Is this an act of decolonization of meanings of the mathematics curriculum in implementation and intent, or an act of isolation, reproduction of the subaltern position and personal redundancy, and self-colonization?

At this moment on my journey, I am engaging in these comparisons for the purposefully-detached analytical reason of providing sociological description so as to offer perspective on and illuminate the ideological agency discursively embedded in such comparisons of the two virtual school contexts.¹¹ Consequently, it is not that this practice of engaging in community-based project work in the mathematics classroom is a ‘bad idea’, or a ‘good idea’ for that matter, per se - quite the contrary - for I am not trying to impose a value judgment on the *principles* of the practice in any way – certainly not at this point of the analysis. Nor am I disregarding the fact that this is merely a symbolic exercise in a virtual practice and that the space (or not) for its realization within particular schools, within particular communities, may be very different than described in this workshop context. Neither am I dismissing the point that a discourse on such practices in this workshop context, in its implementation, is recontextualised into ‘something else’^E.

Instead, what does interest me about this discourse, from a point of analysis, is how it *is*,

^E In this sense, I am reminded of the semiotic disjuncture between language and meaning, transfigured as it moves across locations. Words are like icons as they don’t always speak of what they signify, but often of something else. [See also, Butler (1995) on the performativity of words/speech acts.]

in fact, “recontextualised”, *what* it does become, and what the implications are, in effect, for a discourse on democracy in mathematics education within, and in relation to, the global arena! What discursive resources are recruited in the construction of a virtual community that give ‘truth’ to that construction and which interpolate learners into virtual subjectivities, holding them to these differentiated subjectivities as legitimate conditions of being? What are the ideologically-inferred discourses within the broader social domain which act on local contextual discourses which provide legitimate spaces for one discourse over another, for the reification of one set of ideals over another, and that facilitate the distribution of differentiated practices associated with a hierarchized social domain, concomitantly positioning subjects differentially in accordance with these discourses? How are these subject positions attributed to different groups of learners?

Further, what forms of agency are in performance that allow for this to be achieved in accordance with the dictates of those recontextualized discourses in ways that are associated with the construction of difference and social difference discourses, while at the same time claiming to speak of ‘something else’ ... such as democracy, empowerment, equity and inclusivity?

My mind has peregrinated ... I hear myself asking the group member what he sees as the mathematics that would be used to ‘solve this problem’. He is not sure, he says, but it would have to be something simple because they are primary school children... mathematical modeling and statistics, I am asking, and again he is not sure, as long as it is in the curriculum, and I ask what would happen if the mathematics ‘they needed’ to ‘solve the problem’ is *not* in the curriculum, and he thinks that it should *not* be a project

that is too difficult for them¹².... What if they didn't need school mathematics to 'solve the problem' I ask, ... but they *must*¹³, I'm answered, ... because, he says, it is a *mathematics project*... not a social studies one¹⁴...

Where is the "empowerment" now? Whose "empowerment"? What is it "empowerment" *towards*, in which sense, and in which context? Will these students have achieved 'improved skills in mathematics' with the purpose of gaining the opportunity to engage in what is often referred to as "higher-order thinking" in mathematics (counter-logical to the tyranny of the curriculum)? Would this *be* "empowering"... for whom and in which context? Who decides when the "empowerment" is "achieved" and by what means, and to which ends? Can it be evaluated? Is this a practice that is empowering our students towards social transformation and democracy *through mathematics*? Why *mathematics*?

Is it because it is deemed "useful"? ...But, this is not usefulness in terms of its symbolic content and the specialized skill base that this gives rise to, but because of its *authority of voice* in the social domain. ... Here, mathematics' symbolic content and 'discursive saturation' (Dowling, 1998) is semiotic of its investment in power: The greater the potential for abstraction and generalizing capacity, the greater and wider the power base.

Can we then ask if it is a 'transformation pedagogy' claimed through the rhetorical *use-value* (with socio-political referents) of mathematics capitalizing on its putative *usefulness* (as informed by socio-economic referents through 'science and technology' rhetoric)? Is this 'mathematics as a text for social justice' or 'mathematics as political expedience'? Why is the *mathematics*, (constrained here to the curriculum, made

‘simple’, disallowing the ‘unthinkable’¹⁵, unchallenging,) paradoxically, positioned as the “liberating discourse”, through the text of a discourse on ‘critical mathematics’?¹⁶

I have an image of two virtual school contexts in my mind in one place, a group of children, positioned as “impoverished” or “disadvantaged”, is working diligently and constructively on a “mathematics project” to help their community, attained with, from an ‘international standards’ framework, ‘impoverished mathematics skills’ (see Howie, S, 2001, on results of TIMMS-R for South African context)... In another place, a group of children is diligently^F studying ‘core skills’ in mathematics as well as developing a ‘problem-solving capacity’ (as interpreted through a set of ‘standards’ learning protocols)

^F I am not using this word to effect bias, but to refer to the difference in context on another level. One of the explanations given in the above-mentioned TIMMS-R study for the relatively ‘poor results’ of the South African students was rampant absenteeism. The amount of time students spent at school, doing mathematics, was very low compared with other nations. This is a legacy of a mindset adopted by mostly black students during the anti-apartheid struggle era. This mindset was encouraged through an articulation of a mass rejection of schooling on ideological grounds. It was most prominently articulated through the slogan of “liberation before education”. In the 80’s and early 90’s, this slogan encouraged black students to boycott schools and reject their own schooling entirely. It has been argued that it was a political appeal to martyrdom for ‘the cause’ through collective self-sacrifice. As ‘liberation’ has not (as yet) provided immediate, tangible, widespread examples of where ‘success’ in schooling has realistically generated visible opportunities for employment or a ‘better way of life’, the disconnections remain, the ‘lack of hope’ continues to be contextually internalized and self-reproducing, and the alienation from school and its educational ‘promises’ persist. South Africa’s post-liberation unemployment rate has risen to almost 35%, incommensurate with the economic election campaign promises made by the ANC (African National Congress, the contemporary post-Apartheid government).

Further, it was reported in TIMMS that South African students were not exposed, in general, to sufficiently challenging mathematical problems to enable them to develop ‘high logic’ competencies, and were not granted sufficient opportunities to persist with challenging problems. This could well be argued, from a historical perspective, that this is attributable to the consequences a Nationalist (Apartheid) government policy of Bantu Education, followed by the implementation, (where it took place) of People’s Education (including, People’s Mathematics), whose sole focus was on education towards an explicitly political objective (and a rejection of the traditional/formal curriculum perceived as a ‘white’ curriculum). Please note, that although I have used the word ‘diligently’, I am not attributing blame, or claiming the opposite condition of ‘slothfulness’ or ‘lack of effort’. Students cannot be blamed for lack of exposure to the kind of education as validated by an international ‘standards’ framework, lack of opportunity to be exposed, or for being the pawns of political process.

in a classroom which will ‘maximize the number of university-entrance scholars’ (in quantitative-educational, policy-oriented lingo)¹⁷ and advance many of them on their way towards entry into a place of higher learning, ... and which then, ironically, may provide them with the ability /opportunity to *think the impossible* and provide the requisite skills ‘to solve’ (or responsibly *address*) a difficult community problem *mathematically*^G, ...BUT, ... and this is the fundamental difference in political premise, ... they never *do* get to do a project which will help their community!!

Both ‘ideals’ are trying to “advantage” their learners, albeit with different ideological emphases and socio-economic premises... both place emphasis on mathematics learning in schools for “social advancement”, (a spoken-of ‘democratic’ ideal), either through individualistic upward social mobility in a truly globalizing, economics-oriented framework, and modernistic, neo-liberal style, ... or through mobilizing a collective ideal of “empowerment” by means of a pedagogical focus on “empowering the community”, carrying a more inclusive, community- based, social justice sensibility.

However, the dominant discourses within the broader international and post-liberation, national contexts articulate a view of mathematical literacy as a *prerequisite* for technological advancement, economic growth and the improvement of socio-economic

^G It is difficult, or even problematic, to claim to know whether a community problem was solved ‘mathematically’, or not. What criteria do we use, then, to demarcate and classify what is essentially or sufficiently ‘mathematical’? [Boundary-work again! (Gieryn, 1983)]. Perhaps it is sufficient to say that if there are recognizably mathematical elements, then the solution to the problem can be deemed ‘mathematical’. Unfortunately, and ironically, this again sustains the mythologizing gaze of mathematics that colonizes social or other non-mathematical elements into its realm. In an attempt to circumvent this dilemma, we could perhaps, as an alternative, substitute ‘mathematically’, in the sentence, with ‘using more advanced mathematical competencies’.

conditions for the ‘greater well-being’ of a nation’s citizens and the maintenance of the nation state... a neo-liberal ‘master narrative’ on ‘democracy’ situated within a ubiquitous, ‘cause-and-effect’, positivist framework, providing its own defining ‘recognition rules’ and ‘realisation rules’ (Bernstein, 2000) for contextually-attained ‘success’ or ‘failure’. The dominant messages from the social domain mark out the rules for ‘success’ according to a well-delineated continuum, providing separations and attritions in congruence with a Social Darwinianist model of survival of the fittest, most able, most ego-driven, most individual-focused, most advantaged. Within this paradigm, to be able to ‘succeed’, the linear, process-based, ‘progress’ model must be followed, from *individual* as ‘unit’ towards a *collective* ideal of ‘nationhood’ – individual achievement towards sustained social-economic growth and competitive global advantage.

However, the flaw in the rhetoric of the ‘progress’ model ideal is that, for it to be successful within the capitalist mode of production, the ‘success’ of some is necessarily premised on the disadvantaging and constructed failure of ‘others’. Here, the moral imperatives recruited in constructing an inclusive, community-based pedagogy for mathematics education in the first, ‘impoverished’ school context are displaced and weakened by the strength of voice of rampant, neo-liberalism and its appeal to nationalistic, technologically-premised, socio-economic progress.

Placing local community needs as a *pre-condition* or at the *forefront* of the educational process, serves as a prolepsis within the ‘individual—nation-hood’ continuum. These set of ideals are differentially positioned outside of the master narrative and rendered

obsolete by the force of the utilitarian, ‘economic globalization’, ‘process’ model on mathematics education and the instrumentalist exigencies they dictate under the auspices of a fervent discourse on ‘democracy’. As sequitur, in this global competitive economic framework, with its proverbial overarching emphasis on *pecuniae oboediunt omnia*^H, it is almost trite to ask: who then is the winner and who is the loser? ... What does “empowerment” then *actually* mean, for whom, and ... who is actually “empowered”, for whose benefit ... *at all*? I am reminded of Bernstein’s (1993) remark: “in whose interest is the apartness of things, and in whose interest is the new togetherness and new integration” (p. 122).

And yet, mutating the position of our vantage point, one can argue that such notions of ‘empowerment’ which we bandy about as membership logos to our projects of activism, are complex, ideologically-situated and nuanced, and can command no universal understandings of the emphases of the social and political agendas they necessitate. This is most poignantly exemplified in a conversation I recall having, at an international education conference in Beijing in 2002, with a ‘black’ South African teacher, I will call Moses, working in a so-called ‘impoverished’/ ‘historically black’ secondary school in Soweto.

Moses asks about my research and what my research intention is. After listening to my explanation for a while, and hearing me use the word “empowerment” on several occasions, he responds politely, but directly (in a recognizably cultural ‘South African’ manner) with: “Empowerment ... empowerment ... empowerment! They tell us we have

^H Latin: literally: “all things yield to money”.

a lack, that we are supposed to be here”, he gesticulates a movement suggesting ‘progress’, “and that we need to be here, and then here. They tell us that we are disempowered and inform us what must be relevant for us to be empowered. I *don’t feel* disempowered, but I am *told that I am* disempowered and what I have *to be* to be empowered.”

The full weight of his response and the power of its implications for positions of activism, including my own, are tremendous. Again, as happened many times in my research journey, I am *humbled in health* – gifted with a vital space for personal growth, identity-development and spiritual and philosophical enlightenment... a ‘becoming’. As much as Moses’ statement is profoundly provocative, it concomitantly provides a powerful self-learning opportunity and opens up a critical, revelational space for self-interrogation that questions the epistemic locations of our activism and the ontology of knowing, not only what ‘truth’ is, but what is fundamentally ‘right’ and ‘just’, and *who authors this*. The all pervasive assumption that a principled person, motivated by personal integrity and moral conviction, acts *ex aequo et bono*¹, (according to what is just and good), begs the question of the nature of moral rectitude – of what defines ‘goodness’ and ‘justice’; *how* can it be known and *what* does it mean to *whom* within *which* political landscape? Given the dilemmas of perspective it proliferates in relation to principles of power, what, then, are the referents for defining, or judging, the ethics of an action?¹⁸

And then... on yet another hand, is it not our duty to examine, as researchers, the judicable nature of those referents, even if we can never fully know with any absolute

¹ Latin: equitably, or, according to what is right and good.

authority, the right or wrong of the perspectives that are generated and produced through an ethically–fraught action, ... and, at the same time, without falling into a vortex of relativism and indeterminateness?

And so I ask, what is Moses' location and what are the set of stimuli producing this articulation of his position on 'empowerment'? *Who* is "telling" Moses that he is disempowered? What is the source of these messages? Why is he personalizing this perspective on disempowerment? Is it so coercively embedded in the fibre of social context and the dominant discourses in the social domain, that even as he contests it, it carries the authorial voice of the "deficit" metanarrative in such a way that it holds the production of meaning ransom, even as it *precedes* any verbal articulation of it?

Yes, I am humbled by Moses' contestation of the extraneous gaze (semiotically recruited through my articulation of "empowerment") which produces and reifies positions of disempowerment for him and 'his people' in ways that categorize, objectify, essentialize and homogenize communities, oppressively holding them to these descriptions through the language of disempowerment.

But, even as I am humbled, I also feel obliged, from a sociological perspective, to question the connections between his 'way of looking' with respect to the structural conditions that produce 'disempowerment' and the subject positions he is locating in relation to this discourse. And so, again, I must ask, is Moses perhaps trying to distance himself from the community in which he teaches, so that he is not painted with the same brush of 'poverty'? At face value, he certainly does not fit the mold of 'impoverishment'

or ‘disadvantage’ in the stereotypical sense (except through the construction of ‘race’ whose historical imperatives have tied it to the latter constructions, especially within the Apartheid context). For one, he is studying for his Masters in Education and is presenting a paper at an international conference in China, while maintaining his position as teacher within a Sowetan school. Yet, in contradiction, he makes remarks in general conversation to the effect that he is “just a Soweto boy”! Why does he feel he needs to do this and how does it relate, via the principle of power in the processes of positioning and posturing, to his remarks on disempowerment? Are they apparently paradoxical, yet analytically congruent? What can we conclude then? Is he insider or outsider? Can we... may we make a judgment? Is he speaking from a position of privilege or disadvantage?

Consequently, is he resisting being positioned as ‘disempowered’, or is this a legitimate ‘disempowered voice’ speaking back to the referential gaze that produces constructed ‘disempowerment’? (Notice how our language eludes us ...constructing even as we attempt to deconstruct it). In the interests of a critical analysis which addresses the politics of power and makes available the referential gaze which produces the relativities of power which produces it, is it then *permissible* to ask if Moses is ‘entitled’ to make this call as an *insider* or is his ‘rebuttal’ more to do with resistance to a perceived subject position ... a desire to be an *outsider* on ‘disempowerment’ rather than a socially

enforced *insider* through the localizing discourse on Moses' 'race' and his location^J of work in relation to apartheid history?

I notice how I am well into a deontological argument now, where the political and the moral are blurred. I also notice that in the process of asking the fore-mentioned questions, I am caught up in binaries and oppositions ... all socially constructed.

A modernist, positivist, dualistic framework informs my questions, even as I am attempting to divest myself of its influence. It speaks more to "the way we see" and "the way we look", (hooks, 1995, p.4) than it does to speak the 'truth' on *legitimate spaces of being* regarding Moses' insider/outsider dichotomy. Which is real and which the fake, if at all, or are both possible, collapsing all distinctions? Perhaps I am caught up in using simulacra^K in an attempt to understand complexity. Lather (1994) tells me that: "Using

^J This could be regarded as a pun. A South African reading this text may well view it as such. The term 'location' was used in the old apartheid era as referring to a black township. A formal black settlement that was segregated, although often adjoining 'white' areas, was referred to as a 'location'. Soweto would have been referred to as a location, carrying all the original apartheid associations of the word – poverty, race, segregation, including political boundaries in general, limitations and, most particularly, hardship.

^K Here I am using simulacrum, or the simulacrum has been created through the narration, and may serve as a constructive contribution to contesting essentialized/ing discourse (as consistent with Lather's point of view). However, I have argued elsewhere that the production of simulacra is a consequence of the colonizing gaze which produces it, and therefore destructive. Consequently, from my perspective, simulacra can be viewed as either 'positive' or 'negative' depending on the context in which they are used/ created, and in the extent to which they facilitate, or not, working through contentious arguments. I would add, however, that a simulacrum left uncontested, is likely to carry the dominant/colonizing voice of hegemony, so that it represents the silence of what it is not, or is the signifier of a latent silence, or voicelessness. A simulacrum created for the purposes of contestation of hegemony, to symbolically act against master narratives, serves a different voice... although it is still the representative shell of what it is not, yet it carries the critical voice of counter-hegemony. From a position of advocacy, it is therefore up to us to ensure that through the use of simulacrum as means, it is not a *hollow* voice, (in all senses of this word) ...

simulacra to resist the hold of the real and to foreground radical unknowability, the invisible can be made intelligible via objects that are about nonobjecthood” (p.41). Perhaps, I am now engaged in a leap of faith in that which is insecure and unpremiered, unknowable but accessible to description if not representation, legitimate in its absence from ‘truth’. This is what Lather refers to as nomadic, dispersed or *ironic validity* – a validity achieved, paradoxically, through foregrounding and describing the impossibility of representation through its “failure to represent what it points toward but can never reach” (Hayles, 1990, p. 261, in Lather 1994, p. 41). This engagement with ‘ironic validity’ is a deconstructive mode of research practice resisting simplistic representation and simple reversal or replacement:

by inscribing heterogeneity within an opposition so as to displace it and disorient its antagonistic defining terms ... to subvert it by repeating it, dislocating it fractionally through parody, dissimulation, simulacrum, ... that mocks the binary structure... (Young, 1990, p. 209, in Lather, 1994, p. 41)

It is with this commitment to complexity and the destabilization of authorship of the legitimate spaces that define the oppositional terms from which our moral compass finds reference, that I tentatively draw a connection. It is a connection with the simulacrum I have putatively created regarding Moses’ distancing himself from his community with its concomitant referents of ‘poverty’, and that of *similar* teacher discourse I noticed in the ‘impoverished’ Cape schools in which I undertook my research. Here, there were resonant discourse indicators in which the teachers highlighted class distinctions and reinforced distances from the learners they taught. I notice this congruence even as I grant consideration to the relational nature of their positioning of me in context and my

reciprocal gaze on them, and how this shapes and selects the discourse. Nevertheless, it is my interest to note reciprocity between - the procedural and indifferent methods often employed in mathematics teaching in these classrooms – and the ‘distancing discourse’ preceding these contexts of learning that inform and reinforce the *poverty* learning within them. ... Or am I, again, imposing a notion of ‘disempowerment’ on this context, unable to see or provide pre-authored referents to articulate, in contrast, the possible spiritual and social, if not economic, *wealth* (again, I am forced into the binaries of noticeably antonymic language; ‘poverty’ set against ‘wealth’) embedded in the context and for which it provides its own resistant validity, as highlighted in Moses’ words to me?

Or are these then simultaneous, yet hybrid ‘truths’, complementary if incompatible, that reside with each other, uncomfortably, but ever dialogical even as they refuse closure? Are they valid positions of presentation, paralogical against the sophistry of master narratives, disruptive, dissensual and incommensurate, yet ever interdependent and reciprocally validating in co-existence?

My stream of consciousness has led me through rhizomatic pathways away from the roots of my argument but having the source of such ever present as a resource for expressing complexity, heterogeneity of perspective, and interconnectedness. I have unsettled my own position as I have unsettled and subverted the linearity of formal logic and ‘process-driven’ rigour. Albeit tentatively and questioningly, I have uprooted a notion of the ethical as stable, and rhizomatically proliferated forms of knowing and truth-production that serve to counter traditionally ‘valid’ epistemologies.... But this is no place to rest! To rest here would be to become hemmed in by the overgrowth of

uncirculated thought. Being unable to settle in the unsettled, find solace in the disconcerting, I journey on to search the filaments of networks that weave the argument, even as they thread their hybrid cloth according to their own internal pattern, apprenticing themselves in/into the process.

And now my consciousness dwells for a moment on the metaphor of rhizomes as it informs my research, how the filaments have nodes of ideas and concepts, clusters of thoughts, which hang together tenuously, yet vividly, and then slip into ever possible ramifications, ... thoughts and threads of arguments I could choose to follow or not... and upon arrival, each node is different and pregnant with hybrid possibilities¹⁹... and I must choose the next thread or find a return path with glistening nodes of possibilities all about me, ... similar, perhaps, to a string of bright Zulu beads, each colour having its own meaning, its own message. And, like African cultural beads in commodified contexts, which visually inform interpretive 'difference' through exoticism and mark out the existence of 'culture', I question too their purpose in the production of 'culture' as simulacrum... and I am led back to remembering classrooms in the impoverished schools I researched and the *discourse of distance* which some teachers invested in ... and I realize, like an epiphany, that it would take much more than *a string of cultural beads* to bind them to their students!!

The 'cultural beads' serve as a mnemonic to the variegated argument I have engaged with in attempting to illuminate the power principles, dichotomies and discontinuities in discourse on democracy in school mathematics classrooms in localized contexts. In continuation of my peripatetic research journey, I am back in the workshop with Rena ...

The sunlight has changed as it glances through the windows, softer and less secure as the afternoon moves on. As we sit and talk in our group, I notice another workshop participant that I will call Kabelo get up from her chair and walk over to where my daughter is sitting reading by a window at the side of the room. She sits in the chair opposite her and smiles. I hear her calling my daughter ‘Loreto’, meaning ‘love’ in Sotho, the nickname of endearment given to her by a group of delegates at the conference. The profiles of Kabelo and my daughter are in relief against the light of the window and their differences in ethnicity have no visual distinction at this moment. All I can see in silhouette is their connection as they smile and laugh as they talk. I notice my daughter handing her Alice band (head band) to the participant who takes it graciously, thanks her and returns to her seat.²⁰ The light in the seminar room has moved again and dusky shadows begin to play mischievously, like tokiloshies^L, in the corners of the room... perhaps even playing tricks on my own perception²¹...

The time for each group to present their thoughts on the project idea has come. After our group presentation, Kabelo stands up with the borrowed headband to represent her group. She shows the workshop participants the Alice band, a product of our land, woven carefully in bright and colourful beads, with repeating patterns of slowly diminishing triangular shapes ... a recognizably Zulu pattern of beadwork found on many beautifully handcrafted objects of indigenous art.^M

^L Tokoloshie: An African folklore spirit who is a trickster and harbinger of bad luck, similar to Raven in some First Nations’ lore.

^M I am aware that I may be accused of romanticizing Zulu culture here through the description of beadwork. I would argue, however, that my description, whether deemed a romantic interpretation or not, arises, more importantly, from a somatic and spiritual connection with the people, the land of my birth, and my pride of place.

Kabelo begins to explain how she sees her students doing a project that examines “the mathematics in cultural beads”. She starts to provide examples of how this could bring ‘relevance’ in the classroom and make the students feel ‘counted’.²² She then explains how the students could look at the patterns and notice how they repeat themselves ... the beads could be used to explain ... counting, and perhaps multiplication²³ ... but actually the lines are not parallel, so you would have to make them parallel ... the students would just have to imagine them parallel, otherwise the maths starts to get too complicated ... she hears me asking if the condition of non-parallelism could not be used to initiate a discussion on non-Euclidean geometry ... perhaps the fact that the lines are divergent could be used as a fertile moment to investigate other geometric forms ... but she thinks this will be too hard for elementary kids to understand²⁴ ... it won’t be ‘relevant’ to them ... so we will have to stick with what counts Multiplication! They could practice their multiplication tables!!

I feel completely deflated and confused! I hear myself asking, tentatively, trying to hide my exasperation, whether or not this is about mathematics at all ... that in trying to create ‘relevance’, the mathematics became trivialized ... the process was reductionist²⁵, and I ask how this is empowering? I want to say more ... that I think it is patronizing and a mis-use of mathematics, diminishing its creative power yet using its semiotic authority in the broader global domain for the creation of ‘otherness’ in the classroom under the auspices of an emancipatory pedagogy. This is mythology at its ultimate, the warping of meanings to achieve incompatible ends. This was sophistry at its best!

But in this context I suddenly feel alienated and alienating... I am conscious of the interpretation my criticalness presents within this context; how it could be viewed 'in performance' and taken up by this participatory audience. A questioning of the use of a cultural artifact as a mathematical tool towards empowerment and cultural emancipation (and even as I enunciate it, the syllogistic argument seems spurious and 'illogical') might easily be infused into/ confused with, the multicultural discourse which views the classroom as a site of struggle against hegemonic / colonizing discourses, and a place for contestation and (re)creation of 'new' social and national identities through 'new' stories. And, of course, this is critically important!

And so, this human endeavour of mine is shaped and given meaning through the specific social, cultural and historical setting. It is a context with its own system of signification and recognition rules for appropriacy. I can feel here that something which is seen as speaking against the ethos of "cultural embrace" pervading this context, may well be viewed as colonizing discourse, *even if* the underlying interests are to make visible the *colonizing agency* through the commodification of a cultural artifact in the mathematics classroom. This, again, has become an issue of propinquity with respect to my personal motivations and analytical viewpoint in relation to Rena's, and there is the threat of distance within this proximity.

Where the ubuntu^N now? I don't want to come across as undermining Rena's efforts or sound 'culturally distinct' or divisive. I am conscious of not wanting to sound autocratic

^N A reminder of the meaning of ubuntu: the African concept of brotherhood or sisterhood, and is fundamental to indigenous African 'ways of knowing' and living, in the truly spiritual African sense. I have also heard it expressed as 'living within each other's spirits'!

in the style of scenarios which repeated themselves ad nauseam in the Apartheid South African context... a white person telling a black person how to think on a particular issue, ‘showing’ them how they are being ‘illogical’^O, providing ‘illumination’ to their ‘benighted’ plight. And doing this, oblivious of the situational or cultural contingencies within the ‘other’s’ sphere of lived experience by which personal or collective understandings are achieved and ‘ways of looking’ and ‘knowing’ are constructed.

I do not want to be perceived in this light, speaking within the governmentality of whiteness (McLaren, Leonardo and Allen, 2000), lacking in reflexive understanding or empathy.²⁶ Further, I am aware that it may well be my own ignorance that disallows me appreciating this proposed ‘ethnomathematical’ method and that I am unable to appreciate the full implication of its benefits through my own untempered ‘way of looking’. Perhaps, through the inordinacy and force of my own commitment to what I deem to be ‘a mathematics of empowerment’, I have, instead, achieved intransigence, “fix”ation and ignorance, instead of enlightenment. Perhaps I am even ignorant of my own ignorance, so, I say no more...

And then, the chreodic path moves on again, ... I hear Rena, who has also apparently ‘seen’ the dilemma, respond to my comment and acknowledge the difficulty with “this kind of work”, but she goes on to affirm that, in her opinion, it *does* have a purpose in trying to give the mathematics a connection with “the students’ culture” ... something that “they need”! ... I am silent, but it is a silence that speaks in dilemmatic discontent...
The wind has shifted the leaves...

^O The “white is right” principle of patriarchy.

Who am I to talk about whether or not this connects with “student culture”; how can I (or Rena, for that matter) even know what “student culture” really means, speak about its ‘relevance’ on students’ behalf, or pontificate on what their “needs” actually are! I remember a conversation with a faculty member in my university’s Curriculum Studies Department, Walt Werner, in which he spoke about his frustration with student teachers in the Teacher Education Program, in the sense of how his student teachers always spoke about what the students ‘needed’. “I always ask them”, he says, “how do you know what your students need? How can you presume ‘to know’; how can you speak for their needs and think you are teaching accordingly?”

And I see how pertinent his comment is in *this* context of speaking for what is purported to be ‘relevant’ in these South African students’ lives ... their hopes and fears, their consensual relationship with or alienation from school perhaps, or even their possible daily issues, or not, with domestic violence or a mother dying from AIDS – all reduced to a *string of cultural beads*, reified as ‘relevant’ through the ideology of a discourse on ‘critical mathematics’. And this discourse is sustained by the powerful voice of *mathematics* itself, as supported relationally by globalizing discourses in the social domain and as institutionalized within schools! Surely, this mathematics pedagogy cannot be emancipatory if it is telling them what they must be, (Is this what Moses meant?), what that must look like ‘culturally’, what their ‘needs’ are – through a pedagogy on school mathematics?

I believe it is unethical in that it provides false hope. It suggests that mathematics can provide liberation and create ‘relevance’ in their lives, while lying to them that it can empower them, and while simultaneously denying them, through such practices, the recognition and realization rules of school mathematics in general as defined through a standards-based curriculum. It is a pedagogy that beguiles - offering ‘relevance’, while providing disconnections in the exposition of mathematics discourse, disallowing the discursive elaboration of the esoteric domain of mathematics, which permits generalizations and the possibility of the impossible...

This ‘relevance’ mathematics, instead, ties them to the bounded, impermeable, simplistic interpretations of an impoverished school mathematics that cannot provide the tools for liberation or empowerment as it professes to do, but holds them to the mundane in mathematics – *mere multiplication tables!* And it does it under the auspices of liberation in a particular ideological way so that other ways of being are never made available to them – claiming “success”, through the sale of ‘relevance’ in the guise of a *strings of bright beads*, while permitting only reproduced “failure”!²⁷ Oh, what a great, expensive, unaffordable cost, in the name of national identity-creation, cloaked and commodified in the *rhetoric of relevance!*²⁸

And how *irrelevant*, to a South Africa in change, to use commodified representations of culture^P that fossilize, essentialize and stagnate, and that recruit notions of the past for present cultural validity.²⁹ The ‘cultural beads’ represent an artifact that invokes notions

^P Note that the headband is not a ‘truly’ indigenous object in the historical, tribalistic sense. The beadwork in Zulu culture was used for adorning pots, urns and other utensils of daily use, as well as writing love letters and other forms of communication. The beaded Alice band is a

of culture as tribalistic, producing a self-othering by romanticizing and exoticizing ‘own culture’. How dangerous, the hidden self-colonizing pedagogy it obfuscates! This ‘ethnomathematics’ practice creates “consensual rituals” (Bernstein, 1973, p. 55)³⁰ to create group identity, yet at the same time invokes differentiating/ dissensual rituals (ibid.) to make this practice relevant to a group, a ‘cultural’ group, and therefore exclusive to it. With *exclusiveness* comes pedagogic *exclusion!* In the process, the mathematics becomes trivialized and the students are localized within the public domain of mathematics practice (Dowling, 1998); held to the mundane (Bernstein, 2000), left out in the cold, away from mathematics’ generalizing practices and the illuminations (albeit only mathematical illuminations) it may generate.

This is made all the more problematic by its *acceptance* as mathematics, and by claiming it to be emancipatory. I am un-nerved, and I begin to wonder if this is not a representation, albeit in a different guise, of what Khuzwayo (1997, 1998) has referred to as an “occupation of the mind”. In his study of the history of mathematics education in South Africa, Khuzwayo showed how mathematics education followed the Bantu education objective of preventing social advancement for Black people in South Africa. He quotes H. Verwoerd’s, now famous, statement in his address to the South African Senate in 1954, as proof of this intended “occupation of the mind” policy:

When I have control over Native education I will reform it so that the Natives will be taught from childhood to realise that the equality with Europeans is not for them (...) People who believe in equality are not desirable teachers for Natives

European/Western commodification of the cultural practice of indigenous beadwork for solely commercial purposes (usually sold to tourists). It is therefore a decontextualisation of a cultural artifact, or even a simulacrum.

(...) What is the use of teaching the Bantu mathematics when he cannot use it in practice? (cited in Khuzwayo, 1997, p. 9)

I shudder at the possibility that insidiously infused in the *acceptance* of the trivialized mathematics, is Apartheid's "occupation of the mind" of the people, still alive and well! Is it, again, the Freirian concept of the oppressed/colonized learning to oppress/colonize themselves, perpetuating the conditions of oppression subconsciously by not making visible the invisible pedagogies of oppression and poverty^Q, whilst promoting a "pedagogy of liberation" in its name, thus maintaining the status quo? Is it that, in the Lacanian sense, "a letter always arrives at its destination"? Gerofsky (1996) describes one of Slavoj Žižek's (1991) interpretations of this Lacanian aphorism symbolically to imply that "the sender always receives from the receiver his (sic) own message in reverse form", and "the repressed always returns" (p. 12)?^R

^Q Although poverty and oppression are, in fact, extrinsically *visible pedagogies* in the sense that they have clear, self-evident hierarchical distinction from privileged codes of power, here I mean that they can also operate *invisibly* within context (intrinsically) in their construction of meaning, in that they are often insidious, self-circulating and localized. This either prevents a broader, reflective perspective on the modes of operation within poverty pedagogies, or, even if multiple consciousnesses are available, to those situated within these contexts, the means to 'make/do otherwise' is not always available. In Bernstein's (2000) terms, this could be spoken of in terms of *recognition* and *realization* rules of a practice. Either both recognition and realization rules are not available, or the recognition rules for empowerment/success are read, but there is no access to the means, i.e. the realization rules. In both cases, positions of alienation result. This is the engagement of power relations, so that the power to provide perspective or means, and to halt, reverse or contest the modes of operation of such pedagogies, are not always available within positions of poverty and oppression. Here in this sense, I am not using visible and invisible pedagogies in precise accordance with Bernstein's use of them, which are more specifically defined in accordance with his sociological theory of pedagogic codes and their modalities, and how these relate to his concepts of the 'classification' and 'framing' of discourses.

^R This is in alignment with the policy of Apartheid as a whole and the reverberating consequences of the enactments and implementation of this policy for South Africa. Žižek explains how the letter that always arrives at its destination, says more than what was intended, and only when the consequences are enacted can the effects be known. In this sense, "there is no repression previous to the return of the repressed". The architects of Apartheid mailed off the unintended effects of Apartheid to a nation, the dire and destructive consequences of which returned to haunt them like a multi-headed hydra... for every head lopped off, a myriad more

For a fledgling democracy, attempting to incorporate democratic principles of learning within our educational structures, where does this sit? In our haste to democratize our educational practices, are we, contradictorily, *reducing* democratic possibilities for our nation's people through a socio-cultural recontextualizing of mathematical practices ad absurdum^S ... thus continuously 'mailing off' the operations of a Bantu education doctrine as our destiny/destination? ... As both senders and addressees^T, *oh, woe is us!*

I am reminded of Skovsmose's and Valero's (2001) words:

a mathematics education that is committed to democracy cannot simply rest on the intrinsic qualities of mathematics or the conceptual constructs of the discipline itself. Instead, many social, political, economic, and cultural factors have to be seen as constantly directing and redirecting its development. (p.43)

growing in its place. The message has returned in the letter of Bantu education, but it returned addressed to us all!

^S Latin: meaning 'to absurdity', much like a "reductio ad absurdum" argument. "reductio ad absurdum" means 'reducing to the absurd', most often used in mathematical proofs. It is however, considered the weakest form/method of proof, as it proves a statement/condition to be true by making an initial false/contrary assumption which would then, when followed to its logical conclusion, result in the condition/statement being impossible, i.e. by reducing it to the absurd. In the context I have used this Latin, perhaps the opposite premise applies, i.e. "absurdo ad reductum", a recontextualization of mathematical practices towards the "relevance" of the everyday/everyday culture until the point of *absurdity* is reached, resulting in the *reduction* of the mathematical principles at hand.

^T It can be further interpreted that a letter always arrives at its destination, because that is where the letter arrives. Hence, wherever the letter arrives, is its destination. Even an unsent letter arrives at its destination, being the address of the sender. From a perspective which views how 'silence' operates, one could say that what was not sent, also has meaning as it is a message sent in reverse, i.e. 'returned to sender'. Further, one could argue that what was not sent in the letter in the form of Apartheid policies was also returned to sender... The disempowerment and 'silencing' of the majority of South African citizens on the basis of their ethnicity (socially constructed in terms of 'race' and 'culture') has returned in terms of an all-pervasive disempowerment of our nation. Hence, both sender and addressee are implicated, in every way.

At one level, how correct this is! Mathematics, in my opinion, has little *intrinsic resonance* with democracy. In fact, it could and has been argued that school mathematics, through its “mythologizing gaze” and its investment in the politico-ideological objectives found in “boundary work” (Gieryn, 1983) within the discipline of science, which also incorporates rampant technocist utilitarianism, is the most divisive and fundamentally undemocratic subject on the school curriculum. This has had dire consequences for those on which it has impacted in its extrapolation to the world of work, or non-work, as a lived reality (most especially in the South African context where the unemployment rate runs above 35% of the ‘employable’ population).

Unfortunately, it is a brutal reality that the world is divided unmercifully into those who “can” and those who “cannot” ‘do’³¹ mathematics. These divisions have ramifications in areas beyond the applications of mathematics but in whose authority the further lived realities of the ‘cans’ and ‘cannots’ rest. Rather than just being unavailable to democratic principles through its aloof appeal to objectivity and the clinicism of science, I would argue that mathematics education, for the most part, displays profound *dissonance* with democratic principles,^U despite arguments in critical and progressive mathematics education which testify to “better” or “improved” practices. The reality is that, throughout the world, mathematics education practices have, and still do, produce divisions synonymous with divisions of labour, in which further divisions of gender, ethnicity, social class, able-bodiedness and intellectual ‘ability’ inhere.

^U In this regard, Skovsmose and Valero (2001) argue: “Breaking political neutrality demands deliberate action to commit mathematics education to democracy” (p. 53).

But, it is the second point that Skovsmose makes that concerns me! Again, it is not the problem itself that is being contested, but *how* one arrives at the/a ‘solution’. Or, to abort the tedious, unhelpful continuum of problem-Solution, problem-Solution,³² ... perhaps it is how we seek *resolution*, instead of *solution*....

It is Skovsmose’s point about the need for the socio-political *redirecting* of mathematics education that carries a subtle weakness in its simplification of argumentation^V, for it is the very *instrumentalist* nature of mathematics education that is the problem here. To apply an instrumentalist philosophy upon an instrumentalist philosophy,^W made problematic by its very instrumentalist nature, is to use the means of the perpetrator to perpetrate. It may well be argued, that ‘the means supports the ends’, but if ‘the ends’ rest on an uncontested acceptance of the moral rightness of that ideology, even if it is purported that that ideological premise is a ‘democratic’ one, then, contradictorily, *democracy*, which foundationally rests on openness and dialogue, is undermined through the process.

No, ‘the ends’, do not, *carte blanche*, support ‘the means’! ‘The means’ need to be thoroughly contested, each step of the way, so that ‘the ends’ do not *silence* the means!

^V The appeal to democratize mathematics education is often embraced without full consideration of the defining principles of democracy which make such a process necessarily complex and difficult. To imply that this is a simple matter of redirection of the ideological tenets underlying its implementation and practices, is naïve and unproductive, and simply holds mathematics education to ransom and disempowers rather than liberates thought. In other words it suffers from its own internalism. I am again reminded of Umberto Eco’s (1979) words: “A democratic civilization will save itself only if it makes the language of the image a stimulus for critical reflection – not an invitation for hypnosis.”

^W See Ernest (1991) for broad discussion on the philosophy of mathematics education.

How we arrive at a democratic education is more critical than arriving there^X. For we may well find out that in the process of ensuring its arrival, through forcing it to our will, we may be applying the very terms of the enemy (authoritarianism, dominance), thereby undermining our objectives, so that the product of our actions/advocacy looks very different from what we expected it to... In fact, it may very much begin to look like *the product of the enemy itself!*³³

And so, in my journeying, I move on to another, different, yet similar, place...

Elliot Eisner (2001) bemoans the trend towards pluralism in art education, which suggests that art is dead or, at least, elitist, and needs to be made “more socially relevant to the real needs of students in the 21st century” (p. 7). Here, the ‘study of art’ for its own sake, whatever form this takes, is to be substituted for ‘the study of visual culture’.

While Eisner accepts that the orientation towards placing visual form in its socio-historical form is an appealing one, and that he agrees that students should be encouraged to recognize that the aesthetic judgment of art, across different genres, has been utterly arbitrary, bourgeois, and has bourgeoned social consequences, he also expresses discomfort at the reductionist orientation of viewing art, merely as a political product.

Rather than viewing ‘the fine arts’ as “dazzling or even high human achievements”, they

^X It can easily be argued that we can never ‘truly’ arrive at a democratic education, in any event, as such a ‘destination’ is utopian by definition. I argue that democracy is an ideal or a collective orientation of mind (much like the concept of ‘mindfulness’ in Buddhism) to which we aspire and direct our efforts, borne out of moral conviction and social conscience, despite and beyond knowing that this ideal may never be fully realizable. Rather than this making democracy education annihilative or pointless, it creates an inchoate, generative and creative space of purposefulness, while continuously allowing for a ‘coming to be’ rather than residing in a condition or state of being. However, I believe that it should also be recognized that the utopian objectives of democratic education, when forced into the accountability modes of standards-driven reform and the technocist, rationalized evaluation approaches these necessitate, create an ideological disjuncture and, consequently, a discursive gap which situates students (and teachers) in positions of alienation or disadvantage with respect to these discourses.

now become viewed “as products representing what those in power choose to praise” (p. 8). Eisner feels that the value of art in the form of the “joy” of doing art, and the teachers’ sharing this joy with students as a “quality of life experience”, is compromised by this political orientation. Further, the unanticipated, surprising opportunities that unfold in the generative process of creating art, and “making judgments about relationships that are rooted in one’s own somatic experience”, have value beyond the spectator approach of viewing art merely as an object for political analysis. Eisner says of this:

I would not like to see such opportunities compromised because from my perspective they stimulate, develop, and refine among the highest and most sophisticated forms of human cognition; they marry thought and emotion in the service of meaning. They help us learn to see and to feel what we see. The arts are eye openers. (p. 9)

In Eisner’s opinion, the form of pluralism that “relativizes the value of art into political analysis of anything visual” (ibid.), is reductionist and ties art, art education and teacher practices to a narrowly-defined, politically interpreted concept of ‘relevance’, and diminishes the contributions which art and art teaching can make to a wider scope of understanding of what it means to be human.³⁴ As with mathematics education, so with art education, where are the possibilities of ‘the beyondness of thought’ now?

The analogous relationship between art education and mathematics education in terms of the trend towards a critical theory perspective which necessitates a consideration of these knowledge forms in terms of their ‘relevance’, is, no doubt, manifest across the disciplines. However, it is more pronounced in certain disciplines in comparison to others, and more visibly engaged with in certain contexts compared to others. The socio-

political context in which the discipline is practiced or taught informs the mode and expression of these practices, or the degree to which this orientation is embraced, or not. But the *nature* of the knowledge form or discipline, its internal structure and relationship with other discourses, is implicated in the way it is recontextualised by this orientation.

Basil Bernstein's (2000) arguments asserting the incommensurability of *vertical* and *horizontal* discourses, strongly informs this debate³⁵. Bernstein argues that vertical and horizontal discourses are structured completely differently, as are their modes of production. Here, mathematics education is strongly implicated, in the sense that the discipline of mathematics is a vivid example of a vertical discourse, possessing "high discursive saturation" and enjoying great prominence in the "social division of labour of discourses" (Bernstein, 2000) within schools. The critical perspective on 'relevance' in mathematics education is a mode of practice that will have mathematics behave as a horizontal discourse, compounding the discursive disjuncture that is produced through the incompatibility of these two knowledge forms. It is within this silence-producing discursive disjuncture that disadvantage is (re)produced for students and teachers caught within the 'falling spaces' of misaligned knowledge forms whose different modes of production produce learning objectives which work at cross-purposes with each other.

Davis (2003) makes a similar connection as Eisner between art for its own sake and its place in political context, and, as I have done here already, views this as analogous to similar trends in mathematics education. Davis says:

What is, ideally, more explicitly (re)produced then is the discursive structure that frames the object that counts (or fails to count) as art. In different terms, what is

(re)produced today is the *place* of art rather than a series of obviously exemplary aesthetic objects (cf. Žižek (2000)). This means that a strong line of distinction is drawn between the object and the place it occupies, the effect of which is to draw attention to the specificity of the place that frames art. (p.4)

Davis sees a similar trend occurring within the mathematics education field, fuelled by global trends in “pedagogic constructivist” principles which reinforce the claimed need for mathematics to be held to reproduce meanings within ‘everyday’/’non-mathematical’ situations, for its progressivist validity. This orientation is set against the outmoded ‘traditionalist’ approach which left the learner disengaged and alienated from the discourse. Davis sees the emergence of pedagogic constructivism as similar in effect to the contemporary trend which allots art meaning by its being “made to function to (re)produce the place of art”. By extrapolation, the “non-mathematical is mathematically meaningful if it enables the (re)production of the place of mathematics” (p. 5). Viewing this trend historically, its legitimacy premised on the rejection of the mechanical and ‘empty’ (re)production of the ‘traditional’ mode of pedagogic regulation in mathematics teaching and learning, Davis avers: “So, just as the beauty-in-itself came to be rejected as a criterion in the judgment of art, explicit mathematical expression-in-itself came to be rejected as a reliable index of the (re)production of mathematical thought” (ibid.).

Consequently, the vehement rejection of the traditionalist approach in its entirety, opened the door for an entirely new pedagogic regime which attempted to fill in the gap, as its main premise, created by the ‘disconnections to real life’ which the traditionalist approach inferred. This opening gave the “global move to constructivist-inspired pedagogies a foothold in official curricula in South Africa” (p. 5).³⁶ Where now the

‘relevance’ of local contexts and situated accounts in the (re)production of pedagogic practices, when globalized by the regulatory principles of pedagogic constructivism and its universalisms? In very damning terms, and in contravention of the freedoms inspired by our fledgling democracy³⁷, Davis notes:

What the South African pedagogic constructivists did not take into account in their critique of “traditional” mathematics education was how they were opening the door to a utilitarian restructuring of the curriculum that they would be unable to resist and which would ultimately assign to them the role of vanishing mediator between apartheid mathematics education and the utilitarian “mathematical literacy” of Curriculum 2005. The pedagogic constructivists were doomed the moment they opted to exploit the popularist ideological hook that goes by the name of “relevance”. (ibid.)

How now the mathematical empowerment of the people in the name of “liberation”?...

I am projected a little way into the future... I am sitting in a classroom in “Visserman’s Baai Laer” (Fisherman’s Bay Elementary). The teacher is teaching ‘fractions’ to a group of fifty grade 7’s. There is no pedagogic constructivism here. There is only the traditional mode, a highly abbreviated transmission mode³⁸, given in Afrikaans: “This is a fraction... it has a top and a bottom. The top is the numerator, the bottom is the denominator. Five over ten equals one over two. This is called an equivalent fraction.

Now find the following equivalent fractions by working in groups... ”. A list of fractions is written on the chalkboard while the class is asked to keep still. They are already ‘still’.

A girl student is ordered to the office to get some paper. She is confused. What kind of paper? She doesn’t know what the paper is for. She has never been requested to do this before. The teacher tells the girl to tell the secretary that the paper is for ‘group work’ and, in the same breath, she reprimands her for dilly dallying. The girl’s delay highlights that this is not common practice for the teacher. The girl’s confusion is embarrassing her.

The teacher is conscious of my presence in the room, and because of her subjective positioning of me, she feels obliged to attempt at least one modality of ‘progressive teaching practice’ – group work! The class is told to sit still while we are waiting for the paper. The paper arrives... two sheets of paper for each table. The students look at each other. Some, all girls, start to write down the fractions listed on the board on one of the pieces of paper, but they don’t know what to do next. The teacher reprimands them for not working. I sit down at a large desk with one of the groups.

Next to me is a boy resting his head on his arms, his head turned inward toward the desk so that his face does not show. Some other students have now done the same. Perhaps it is because they don’t understand what is required of them and this is a way of ‘disappearing’ from the room and the context, unavailable for being reprimanded for not ‘participating’ and ‘doing the work’.³⁹ Nothing is done about it. They are not attended to or even noticed. They become invisible bodies. The teacher continues her class as if this were a usual, ‘natural’ part of the fabric of the daily life of the classroom. And it is. I,

myself, have grown accustomed to it in this context. I know that if a student had placed their head on a desk in my classroom when I was teaching, I would have stopped the lesson to attend to that student before all else... was the student well? Could I do anything for them? Would they like to go home? Here, it was commonplace, and the teacher ignored its occurrence.

There were many students that participated in this practice of withdrawal... it was a commonly accepted form of signification that permitted the student's right to invisibility. In an elitist school a few kilometers away, the context would not have legitimized this practice of corporeal withdrawal. Here, the students held their bodies erect, sat upright, they moved to raise their hands or stood up to participate in a classroom discussion or to walk to the board to make a contribution. They were vocal and their bodily well-being and energy was evident in their physical movements. In the "impoversished" school, the somatic performances were very different and governed by lethargy. The students contributed nothing to classroom debate. Debate was almost non-existent as it was not elicited by most teachers. They must listen to the teacher.

The invisible bodies were scattered about the room now, and the remaining bodies went on with their work as if 'the invisibles' did not exist. It was tacitly understood that these children might be faint with hunger and could not participate in learning, or that they may have AIDS and not be feeling well. This was an accepted norm. This was daily life, the way it was, the way it is.

The little boy next to me raises his head from the desk. I look into his eyes. There is ‘something wrong’. I’m thinking, perhaps it is fetal alcohol syndrome or AIDS dementia? It is probably AIDS. The statistics are so high: a fifth to a quarter of the class on average, across the nation, is likely to have AIDS. In this “impoverished” context, it may well be more, in compensation for the elitist school down the road where the presence of childhood AIDS is highly unlikely. But these are invisible children and the world looks away.

I have heard of what happens to the brain when child dementia from AIDS sets in. This little boy has the confused, glazed look of someone ‘who has it’. Are you all working, is the teacher’s voice. The boy sits and looks at me. Will he get into trouble if he doesn’t participate, I’m thinking, now that he has raised his head to look at me? What is he thinking when he looks at me? Does he want me to communicate with him? But the rules of the classroom in this context have defined the nature of what that conversation would have to look like.

I pick up one of the papers and write down the first fraction: 7 over 14. Do you want me to help you? He nods. In Afrikaans, I ask how many sevens are in fourteen. He doesn’t know. I find it ironic. This was the example given by the headmaster to me to express his concern for the new ‘progressive methods’, where children didn’t even know their seven times table and had to reach for a calculator. There are no calculators in this classroom. I haven’t seen any calculators in the school, except on the secretary’s desk and in the private possession of one or two teachers. And this was *not* ‘progressive education’.

I begin to count out as I draw fourteen little beadlike circles and divide them into two equal groups of seven each. Perhaps the ‘cultural beads’ might have helped now as ‘mathematical aids’ to his learning! But what is the purpose? Where the ‘relevance’ here? Whose ‘relevance’ and ‘relevance’ for whom? Did he need to know this to be a contributory citizen to the socio-economic wellbeing of this nation, to participate in the new ideologies of state premised on global markets and capital, to be gainfully employed on arrival at manhood? There would be no manhood! There would not ‘be’ at all! What promise could be given to this child about his future? What forms of extrinsic motivation could be used to recruit him into learning about fractions, when he has only a fraction of his life left to lead. What utilitarian argument could be used now to explain why he needs to know this material? Where are the traditionalists and pedagogic constructivists now? Where the ‘relevance’ of any of this at all?

I think of the lesson I gave to my “Diversity” cohort student teachers in an elementary mathematics methods course at UBC, premised on Kieren Egan’s work of teaching to imagination and emotion. It was an inversion of the now most commonly understood premise of constructivist educational practice and thinking: *starting from what the student knows*. Instead, I premised the lesson on “what the student can imagine”, in Egan’s terms, as the principle for educational inquiry⁴⁰. I called the lesson “starting from infinity”, as a challenge to the developmental, building block approach of beginning with counting from ‘one’.

While infusing the lesson with the artwork of Escher and his varied visual representations of infinity, we made möbius strips and cut them up along their lengths in different proportions, relishing the wonder and fascination of the unexpected – in the number of interlocking möbius strips and proportional lengths that were produced. I remember the ‘ooh’s’ and ‘aah’s’ when my students made their discoveries, and have enjoyed the wonder and joy on their faces, as if for the first time, over the many years that I have done this classroom activity with students, children and adults alike.

I wish I could give this little boy the joy now ⁴¹... even if he did not fully comprehend the mathematical principles relating to fractions underlying the activity. Nevertheless, I believe he may have a better chance at understanding through joy and engagement than the means of acquisition which has now been applied, which smacks of deprivation and poverty. Is this what is ‘relevant’ for him? That which reinforces and reproduces the mundane, the disenchanting, the ‘lack’. Is the fascination which comes with the realization of the mysteriousness of mathematics by exposing students to ‘concepts of infinity’ in this way not relevant to him?

Is it relevant to students in the elitist school, who might have the luxury to explore these concepts, purportedly at another ‘level’? Or is this unavailable or not relevant to them as well because of the urgency with which they need to gain access into a university program so that they do not fall into the category of ‘wasted humanity’, as has this little boy?

There would have been enough paper available for making Möbius strips for each student in the room. It has little to do with material resources. It has everything to do with will, motivation and the resourcing (Adler, 2001) of knowledge – reformulating its internal power so that it might liberate.⁴² As mentioned before, the only time I ever saw this teacher using the one photocopier in the school was to photocopy job descriptions from the provincial education gazette. She never photocopied notes, worksheets or activities for her class during this research period. All she wanted to do was to find a “better” job, away from this impoverished context with the ‘difficulties’ in the community and these ‘difficult’, impoverished, dirty children. She resented, she implied, being positioned as ‘culturally the same’ in the interests of being more socially ‘relevant’ to these children because she was the same ‘race’. She and other teachers reminded me many times that they were not *from* this community, distancing themselves from their students’ circumstances of ‘poverty’ and the degradation associated with it.

The little boy looks at me again. I have stopped talking. Other children are looking at what I’ve drawn on the sheet as if I hold some magic to which they wish to be privy. The little boy nods as if to say he understands but I cannot claim it as any level of ‘understanding’ as he may merely be doing it to be polite. Perhaps it is more a nod of gratefulness because I am paying him some attention, or perhaps it is merely an ingrained habit, what he usually does to his teacher.

I accidentally brush his hand with my own as I reach to give him a pencil. It is warm in the room and the sun is shining brightly outside, but his hand is deathly cold. My heart

aches but my body and mind are numb. I continue to try and teach the group of children the concept of equivalent fractions until the class ends, but it is mechanical and disenchanting... the form of the exposition has been pre-determined for me by the context. The tone has been set. I am in it. I cannot start again. I am in it, but I am alienated within it. I, myself, have become an invisible body. I am living out a teaching towards deathliness. There is no joy of learning here. There is no spiritual reward. This is not a transformative pedagogy of Hope.

Outside I hear the wind shift the leaves again. A breeze uneventfully stirs the blue-gum beyond the door of the classroom. I hear the creak of the boughs. A dog barks nearby. It has no meaning. It has nothing left to symbolize, except eternal lifelessness.... Perhaps the “starting from infinity” is not so much a philosophy of “starting from what the child can *imagine*” after all. This little boy will soon experience ‘the finite’ and beyond that ‘the infinite’. Might it even be that I am entertaining an angel unaware, I wonder? Perhaps ‘infinity’ is more ‘relevant’ than I originally thought... Ironically, I think that, as a mathematical aid to understanding the experience of AIDS in the mathematics classroom, it outdoes the ‘cultural beads’ for ‘relevance’. ...

Perhaps for a little boy with AIDS, “starting from infinity” is, in all ‘relevance’, “starting... and ending... with what the student *knows*”...

CONVERSATIONAL RHIZOMES

1

DISSERTATION SUMMARY

VOICES IN THE SILENCE:**Narratives of disadvantage, social context and school mathematics
in post-apartheid South Africa**

Voices in the Silence is a critical exploration of the construction of disadvantage in school mathematics in social context. It provides a reflexive, narrative account of a pedagogic journey

towards understanding the *pedagogizing of difference* in mathematics classrooms and its realizations as *pedagogized disadvantage* in and across diverse socio-political, economic, cultural, and pedagogic contexts.

Fieldwork occurred within the Cape Province of South Africa, in schooling communities with socio-economic, cultural and historical differences. Research took the form of interviews, discussions, narrative-sharing, and participant observation, in a recent post-apartheid context.

In resistance to perpetuating hierarchized, linear or scientific approaches to research within traditional social sciences and mathematics education, I embrace an arts-based methodology. Through narrative and poetry, I engage with the socio-political, cultural and pedagogic implications of the social construction of disadvantage in school mathematics practice. The dissertation, therefore, offers interdisciplinary approaches to critical concerns of inequity and access, calling on the emotive, spiritual, embodied, and personal domains of experience in problematizing the (re)production of disadvantage.

The concept of *silence* is introduced to interrogate the interstitial/intertextu(r)al places of ‘lack’ and ‘deficit’, and competing ideological positions and discourses of power that inform the lived realities of “disadvantage” in mathematics classrooms within different contexts. *Moments of articulation* within fieldwork define utterances and somatic performances embedded within narrative contexts, and instigate an analysis of the multiple ways in which disadvantage takes root/route. These *signpost* where ‘voices in the silence’, in discourse, context, and the subjectivities they (re)produce, may be recognized, problematized, and rearticulated through narrative.

Consequently, I broaden the scope of interpretive possibilities to encompass interrogation of dominant discourses and universalizing ideologies within the social domain, which colonize meanings. These include globalization, neo-liberalism, neo-colonialism, and aspects of progressivism and pedagogic constructivism, in the way in which they compete for hegemony within mathematics classroom contexts as sites of struggle for meaning, informing discursive positions of disadvantage, delimiting practice and disempowering students constructed in terms of social difference discourses such as ethnicity, gender, class, race, poverty, and ability, amongst other positions. The incommensurability of certain social domain discourses produce disjunctions, paradoxes, contradictions and dilemmas, experienced as a lived curriculum of

pedagogic disadvantage in the lives of students and teachers within contexts of *constructed disadvantage*.

This dissertation offers an original contribution to curriculum studies and mathematics education internationally in its methodology, theoretical engagement, and focus. It contributes to the field through a strong emphasis on local, situated and marginalized contexts, such as ones of ‘poverty’, and examines the way in which hegemonic social domain discourses are reconfigured in pedagogic practice in these locations. Narrative and arts-based approaches to mathematics education issues are rare, and the dissertation makes an important contribution in this respect and in its integration of interdisciplinary perspectives. While research took place in diverse South African schooling contexts during a period of unprecedented socio-political change, this helps to reveal certain oppressive pedagogies and practices that often are obscured by a veneer of overall greater socio-economic ‘wellbeing’ and ‘stability’ in other contexts. The implications for international contexts are made explicit, and have particular relevance for marginalized, multicultural, and aboriginal schooling contexts. Nevertheless, the dissertation emphasizes *resolution* over the traditional research objectives of proposing *solutions*.

The major contribution this dissertation makes is to open up spaces for dialogue with(in) silence through a reflexive narratizing. Ultimately, *Voices in the Silence* is an invitation to a dialogical pedagogic journey that seeks to provide roots/routes of engagement with the ideals of social justice and an egalitarian society. It attempts to find narrative moments within the difficult terrain of research work and lived experience where constructed and pedagogized disadvantage can be re-imagined and transformed into transcendent pedagogies of empowerment and hope.

DISSERTATION STRUCTURE

This dissertation is comprised of four sections, represented by the quarters of a circle. These sections represent four phases of a cyclical journey, metaphorically represented by the four phases, or quarters, of the moon. This is also in keeping with a more ‘circular’, or ‘elliptical’, narrative-based approach synonymous with some African indigenous epistemologies.

Each *section/phase* begins with a preface, walking the reader through that phase of the journey. This provides the reader with some background as to what to expect. It is metaphorically similar to explanatory travel notes in a photograph album or an entry in a journal of an expedition.

Throughout the dissertation, FOOTNOTES and CONVERSATIONAL RHIZOMES appear. FOOTNOTES (referenced *alphabetically*) refer to shorter commentaries, explanations, translations, or definitions. CONVERSATIONAL RHIZOMES (referenced *numerically*) refer to more in-depth theoretical discussions and critiques, or offer some alternative perspectives to parallel/ divergent/ convergent discussions or rhizomatic routes to the pedagogic journey, much like Deleuzian “lines of flight” (Deleuze & Guattari, 1987). While the ‘conversational rhizomes’ provide context and theoretical grounding, the narratives can stand alone.

ABOUT THE NARRATIVE

Cultural Beads and Mathematical A.I.D.S is the last of four major narratives reflecting the ‘full moon’ phase of the pedagogic journey. It explores critical issues in mathematics education and highlights contradictions and dilemmas within different research contexts. Principles of recontextualization are explored in terms of ‘glocal’ relationships, social domain discourses and hegemonic practices that may contribute to the construction of disadvantage.

ABOUT THE DISSERTATION

This doctoral dissertation and research, completed in 2004 at The University of British Columbia, has been honoured with four major international and Canadian awards in Curriculum Studies and Qualitative Research. These awards honour the lives and shared narratives of the research participants, community members and all those, including friends and family, that made this research possible. The research was funded by a doctoral fellowship award from the Social Sciences and Humanities Research Council of Canada, for which I thank this federal agency gratefully. I dedicate this journal contribution to the research participants, my family, and all my students across the years and across two continents.

² In describing subjectivity as ‘vibrating’ through multiple ‘realities’, I am, in fact, describing the relationship between life and language in general and the production of meaning in particular. ‘Vibrating’ suggests that subjectivity is not static or ponderous, but pulsating, dynamic and constant only in inconstancy. What I am trying to describe through reflexive narrative is that research of a qualitative nature reflects or imitates life itself in that it is vibrant and palpable. The notion of ‘vibrancy’ is further expressed in the next sentence which speaks of the ‘shaky soil of pedagogic analysis and the ontology of ways of knowing’, carrying the added metaphor of nature and growth to support the connections with ‘life’. Although it can be argued, with relative ease, from a critical ethnographic perspective that the work of Benjamin Whorf (1956) is problematic

in its essentializing, or ‘naturalizing’ mode of description, it nevertheless makes some insightful contributions to understanding lesser known, non-Western, cultural practices and expressions. Whorf speaks of the “subjective realm” (in context of the Hopi culture), in *Language, Thought and Reality*, as “intensely real and *quivering* with life, power, and potency” (p. 60, emphasis inserted). His descriptor of ‘quivering’ is similar to what I mean by ‘vibrating’ here.

³ Aporetic spaces: Here I personally mean spaces that are informed by and produce ‘difficult knowledge’. These are spaces of self-doubt, difficulty and dilemma, but which force consideration of the elements of contexts and situations which give rise to them, thereby eventually yielding transformative possibilities and meaning through engagement and persistence.

⁴ Dance is a valuable metaphor for me to use as it draws on my own personal experience as a dancer. From my perspective, the similarities between research and dance are vividly clear. In advocating for arts-based educational research, Eisner (1993) refers to the work of Suzanne Langer. He says: “In a work of art such as dance, she argued, actual physical realities such as place, gravity, and muscular control disappear as the viewer apprehends elements such as ‘the moving forces of the dance, the apparent centers of power and their emanations, their conflicts and resolutions, lift and decline, their rhythmic life’ (Langer, 1957, p. 6). These are the virtual realities of the ‘semblance, the composed apparition’ that is the dance.” (p. 73). The dynamic images are not ‘given’ but are continually (re)created and (re)choreographed by the dancer in cooperation and collaboration with others within the same virtual space. Here, ‘dancer’ infers a role that acts as both performer and choreographer.

⁵ Following on from the metaphor of ‘dance’, I am incorporating a notion of research as ‘embodiment’ here; that research is an embodied act and an embodied cultural product and performance. I believe that the metaphor of ‘performance’ is an appropriate theme to this research in expressing the multiple subjectivities, conflicting realities and context-specific paradoxes, which are the fibre of life itself. Bakhtin (1981) views language as a performance that produces multiple coexisting possibilities. All forms of discourse are, according to Bakhtin, “dialogical” and produce utterances that are “heteroglossic” in that they evoke multiple forms of signification. The performance of language implies individual interpretations shifting within cultural contexts that are continually in flux, and speaks to the complexity and generative nature of context in relation to discourse and subjectivity.

This notion of performance does not dichotomize artist and audience. It collapses the ‘proscenium arch’ notion of ‘theatre’ and presents more fluid spaces for performance that are virtual, and yet infused with the realities of the everyday. Garoian (1999) says: “Thus, cultural performance is not limited to an essentialized program of aesthetics. Part of a complex cultural system, it represents the ‘acting out’ of spectator’s/ student’s subjectivity, a metaphor that distinguishes theatre from the ‘social dramas’ (Turner, 1986) found in everyday life, the cultural and prosaic actions, rituals, and events that affect responses in our bodies and our understanding of reality on a daily basis. By calling attention to and acting out the effects of culture on the self through performance, the (artist’s) body is transformed from being the resigned object of culture to a reflexive subject, from mere consumer to that of a critical producer.” (p. 54) This does not only apply to the student/ spectator relationship, but to the researcher/ participant one as well. In this sense, the researcher becomes an artist in performance, whilst participating in that which she observes, merging the roles of audience and performer, ‘subject’ and ‘object’.

⁶ This metaphorically marks the consonant dilemma of a country that has undergone tumultuous and far-reaching change but which is still dogged, to quite some degree and in certain sectors, by the legacy of apartheid. The debates, problems and issues in Education in South Africa today, relate directly or indirectly to the existence of non-synchronicity of change phases and metachronisms in the process of social transformation. From my vantage point, post-apartheid South Africa reflects a chiaroscuro of illuminating/illuminated images of progressiveness, dynamicism, innovation, creativity, democratization, hope and light, contrasted and at the same time infused with non-reflective places of regressiveness, stubborn intransigence, inertia, oppressiveness, demoralizing poverty and anomie, desperateness and lightlessness. *

* (I use the term ‘lightlessness’ here rather than ‘darkness’, which evokes colonizing images of an evil and ‘dark continent’, as depicted in Joseph Conrad’s *Heart of Darkness*. ‘Lightlessness’, instead, suggests places to which light has left and may come again, or has still to come, and so illuminates possibilities of dialogue towards social change, rather than extinguishing the potential for these places to ignite political, social and spiritual incandescence. These ideas are reflected in pedagogies of hope rather than ones of fear and despair, and are evidenced through metaphors of imminent light and dawn in the final paragraph of Alan Paton’s *Cry the Beloved Country*, written in 1948 of the apartheid context in South Africa. These images coalesce around the main theme of the book, which is as Alan Paton puts it: “a story of comfort in desolation”. He concludes his tale:

Yes, it is the dawn that has come. The titihoya wakes from sleep, and goes about its work of forlorn crying. The sun tips with light the mountains of Angeli and East Griqualand. The great valley of the Umzimkulu is still in darkness, but the light will come there. Ndotsheni is still in darkness, but the light will come there also. For it is the dawn that has come, as it has come for a thousand centuries, never failing. But when that dawn will come, of our emancipation, from the fear of bondage and the bondage of fear, why, that is a secret.)

Further, to return to the original paradox in the description of ‘The Great Hall’, this metaphor speaks to the issue of the colonizer/colonized dichotomy as being ever present and unresolvable, but needing constant attention in the decolonization process. This is also in the sense of our need for a collective awareness of the ways in which neo-colonialism may continue to find root, and vie for power, within our discourses of reconciliation and transformation.

In this sense, on another level, it also semiotically locates the understanding that social change in South Africa which incorporates a celebration of local or African indigenous knowledges, an expansion of Africanisation and a greater Afri-centric focus, will likely be in response, reaction, or in relation to, Euro-centricism and the hegemony of global/ Western discourses for a long time to come, (if not forever). From a position of activism, it is necessary for us to acknowledge that within contestation, transformative / counter-hegemonic / counter-narrative discourses inhere the master narratives as referential points of power, so that while a new “center” is being born, the centre of this creation is motivated by, and *lies at the heart* (in all senses of the word) of its relativity from the centre of hegemony.

⁷ I assert that mathematics education, its discourse and practice, *is*, by its nature, intrinsically and extrinsically political. The scientific discourse that reifies it as apolitical or ‘neutral’ is itself ideologically premised and is testimony to the existence of the antithesis. This is an *invisible* pedagogy however. The act of openly drawing a connection between mathematics education and ‘the political’ (as I *myself* have done here, albeit differently premised to the way in which Rena has done) can be viewed as a *visible* pedagogy, where the referential relations assisting in the construction of such a ‘political’ discourse on mathematics education are not hidden, (see Bernstein (2000), for his related interpretation of *visible* and *invisible* pedagogies or practices.)

⁸ The continuum of ‘redress, access, success’, infers a linear process model where redress precedes access which then results in success. However, social change is messy and complicated and ‘success’ may occur in small ways in local contexts, or ‘access’ may lead to ‘redress’ etc. in

certain locations under conditions conducive to this. This highlights an important issue that needs addressing in contexts of “poverty”, where “poverty education” continues to be rooted in *conditions of poverty*. What then needs to be addressed first? However, this question educes the agency in the operations of a ‘cause-effect’ model. More productively, we need, instead, to ask how they work together *concomitantly*. Perhaps, what requires consideration, in terms of “improvements” to mathematics education (and education in general) in these contexts, is how one can turn around, what is often referred to in South Africa in terms of post-liberation consciousnesses, a “mentality of entitlement”, political inertia and bureaucratic attitudes of ‘*waiting for resources*’, towards an ethos and pedagogy of “re-sourcing” practices and self-empowerment. (See Adler’s (2001) work on resourcing teacher practices. Adler draws attention to international reports that indicate that even in schooling contexts where the availability of material resources is not limited, teachers complain about lack of resources, pointing instead to the need for a resourcing of practices. This mindset is then not only endemic to situations of poverty where the lack of material resources is obvious and directly limits the potential for learning to take place (Adler notes that 23% of schools in South Africa are without running water or toilet facilities), but transcends contexts where notions of entitlement are present fed by consumptive progressive mathematics education trends in practices that demand “more” resources. It is a mode of argumentation which situates educational challenges within a ‘deficit’ mode, giving credence to conservative and neo-liberal agendas that have mapped out legitimate spaces of social structure in accordance with the correspondence principles of ‘material access’ implies ‘success’, and ‘lack’ implies ‘failure’. Consequently, assumptions about the linear relationship between increased access to or availability of material resources and “better” practices remains largely unproblematized. As an extension of this, Adler advances: “There is a tension between an uncritical (re)distribution of resources to meet equity goals and how such resources are and can be used to support mathematical purposes across contexts” (p. 187).

⁹ The image of ‘dog’ is a powerful metaphor in South African cultural contexts and the various popular phrases that include this metaphor give life to its multiple and ambiguous meanings in context. Just as I have expressed the experiences of disempowered communities as being ‘dogged’ by injustices, so in contrast, a popular expression, ubiquitous in conservative (usually ‘conservative white’) society, is that the country, in its post-liberation state, is ‘going to the dogs’. The metaphor of ‘dog’ in South African society, most often seems to infer degradation. The well-known South African author, Breyten Breytenbach, exploited this interpretation in his novel *Dog Heart*, (published in 1999). On the dust jacket of South African author, J.M. Coetzee’s Nobel Prize winning novel “disgrace”, (published in 1999), there is a picture of a mangy and emaciated

dog, in semiotic affirmation of the title. On hearing of his daughter's pregnancy after her being gang raped, the father in the novel remarks to himself: "What kind of child can seed like that give life to, seed driven into the woman not in love but in hatred, mixed chaotically, meant to soil her, to mark her, like a dog's urine?"

Anjie Krog, also a well-known South African writer, poet and journalist, uses this image of 'dog' effectively to portray a brutal violation of human rights in *Country of my Skull: Guilt, Sorrow, and the limits of forgiveness in the New South Africa* (published in 2000). She describes how a shepherd by the name of Lekotse tells the story, at a Truth and Reconciliation Commission (TRC) hearing, of how the security police broke into his home at night with dogs, wrenching open closets, throwing his family's personal belongings on the floor and chasing his family members out into the cold. Lekotse uses the comparative analogy of a jackal and dog to explain his feelings of the experience. He says that even a jackal when he gets in among the sheep does not behave like this. Lekotse attributes the vicious behaviour of the security police to his own experiences of a dog, comparing it with the more 'purposeful' traits of a jackal. Lekotse describes how a jackal attacks silently and kills cleanly, devouring the various parts of a lamb, but, from his observations, a dog is different. For Lekotse, "a dog in among the sheep, biting to left and right, causes a tremendous cacophony of barking and bleating. And if a dog kills, it won't eat" (p. 287). Therefore, the innuendo associated with these characteristics of a "dog" and the associated violence, disgrace and degradation inferred, provides the expression to "dog the daily lives of so many of our people in South Africa" with deeper implied meaning. Interestingly, Alexandra Fuller (2003) wrote a powerful autobiography of her childhood growing up in Zimbabwe entitled: "Don't Let's Go to the Dogs Tonight: An African Childhood." The ironic significance of the title to this discussion is not lost.

¹⁰ I am aware that this practice might also not have 'legitimate spaces' of possibility in reality in context of the South African school referred to, and that this group member might be 'fabricating' it as a potential legitimate, virtual practice through the force of circumstance in having to contrive a project idea in the workshop context, or that he might not be aware of the potential spaces of possibility or legitimacy at that school. This is not the analytical concern. Rather, what I am concerned with is *what* the contextual elements are that are being recruited as resources in establishing an '*ideal*' practice and the '*ideal*' student in association with that practice. Context too becomes an 'idealized reality', albeit that the idealized reality is assumed to be one of

poverty, a semiotic indicator, in this workshop context, of a particular understanding of the broader context of South African schooling in general.

Further, Rena's idea of *contextualizing* the practices of mathematics within the so-called 'lived experiences' of the students and connecting this conviction with activist discourse on equity and 'lack of resources', ironically serves to homogenize those 'lived experiences' within the confines of 'poverty' and 'lack', which becomes read as 'the local', as in 'local conditions'. It also delimits the range of subject positions available to students engaged in this practice, holding them to putative 'conditions of poverty'. The 'traffic flow' problem which transcends contexts of poverty, (as expressed in the Canadian school comparison), is then a *decontextualisation* of Rena's constructed ideal, rather than a purported *contextualizing* practice. The motivating tenets of Rena's 'relevance' practice asserts a virtual set of homogenous conditions which controls the internal messages of the practice, locking them within discursive boundaries of poverty and fossilizing these conditions as ever-present, ever-real and ever-'relevant'.

¹¹ This speaks to the nature of journey, as I have used it metaphorically to describe my research process. This process involves an account of ever-changing distal and proximal relationships to research objects over time, as inhering in a view of research as a process of journeying and storying. It is like taking a moment to pause and stand in *a space at the side of the road* and assess the path one has taken and those that travel on it. I am borrowing this metaphor of 'a space at the side of the road', from Stewart (1996) who uses it as a theme to view the process of research in terms of a complicatedness inferred through travel and story. In fact, my constant peregrination as I 'work through' dilemmas and grapple with the paradoxes, positions and perspectives of research, is probably best described in Stewart's remark on the difficulties of cultural re-presentation: "Whatever its plans and ideals, it finds itself caught in something like a space on the side of the road, scurrying back and forth looking at one moment for illumination and at the next for cover." (p. 40).

¹² In dramatic irony, this is intended to act as a pedagogy informed by PDL, *principles of democratic learning*, (See Hyslop-Margison and Graham (2001) for their use of and definition of PDL). The intention is clearly to 'empower students'. One of the major objectives of the project work is that the students achieve *autonomy* through choosing the projects themselves for their communities. Here the need for the projects to conform to the requirements of the mathematics curriculum, monitored and policed by the teacher, mitigates against this objective and, it can be

argued, reinforces the students' position of 'disempowerment' rather than liberates them from the tyrannical constraints of the curriculum, and poverty education as its adjunct. It realigns pedagogic outcomes with the acceptance of the dictates of a lack-lustre curriculum, recontextualizing "democratic" principles into a "return-to-poverty" practice. This is an autocratic, yet beguiling, discourse on school mathematics that constrains and disempowers while 'in performance' of a pedagogy of social justice and democracy.

¹³ In noting the use of the imperative here, we could view articulation in terms of a Marxian view of the division of labour, where commodity exchange takes place. The 'solution to a community problem' has socio-cultural, and political capital (most especially in the contemporary South African context), for which the 'authority of mathematical voice' can be exchanged. The non-negotiable of 'mathematics' rather than 'social studies' is not only established because *the context necessitates* that mathematics be used (as a consequence of the workshop being embedded in a 'mathematics education conference' context, as opposed to another conference coalescing around other discipline issues), but because, in the social division of labour of discourses, mathematics has more *exchange value* given its authority/dominance of voice in the hierarchy of discourses. The 'exchange relations' metaphor, one which Dowling (2001) would refer to in its pedagogic implementation as "market text", is *one* such interpretation of the imperative implied in the use of "but they *must*" here.

¹⁴ Notice how this group member's language demarcates mathematics from non-mathematical disciplines, premised on the pre-existing demarcation of the school curriculum along the lines of these disciplines, recruiting, and at the same time, fuelling the power of mathematics as supreme in the "social division of labour of discourses" (Bernstein, 2000) within the broader social domain, and setting it against other considered 'non-scientific' disciplines. Here mathematics is allowed to speak for other disciplines, knowledge bases, ideologies and social activities, in so far as it mythologizes them as 'mathematical activities'. However, in this context, these social activities are granted no legitimacy in themselves as activities, outside of their reference to mathematical ones. The binaries which Mathematics constructs in Western discourse abounds.

This is analogous to Thomas Gieryn's (1983) notion of "boundary-work", the ideological use of language by scientists to demarcate their work out as 'science' by comparison with 'other', considered 'non-scientific' work. This boundary-work has not merely to do with analytical categories, but serves as an investment in the material opportunities and professional advantages

provided to scientists only, as ideologically premised and maintained in global discourses (and even here there are sub-categories and demarcations related to ‘credibility’ and ‘credentials’, centralizing ‘scientific’ power and privileging Western, masculine, ‘First World’ issues and contributions). By extrapolation, we can see this boundary-work as resting on notions of science, and mathematics in particular as ‘queen of the sciences’, that hold it up as supremely important and as possessing cultural, social and symbolic capital beyond its applications.

It is also interesting to note that this group member would not accept the limitations of mathematics in facilitating a transformative pedagogy, and resorts to an *impositional pedagogy* to achieve this... In other words, you simply ‘*must*’ use mathematics in the projects, even if it has no obvious use-value, as the projects are *about* mathematics! This is a fascinating interpretation of ‘relevance’, [what Dowling (2001) would refer to as “mythically localized ‘relevance’ ”] and the democratic education ideals that support a discourse on ‘relevance’! Here ‘relevance’ is imposed, and does not arise ‘naturally’ from its context, a contradiction in terms (assuming ‘relevance’ *can*, in fact, arise *naturally* from context, unless it is another variation of the social construction of ‘truth’ and ‘reality’, or the discursive ‘place’ where socially constructed ‘needs’ of students are purportedly met). Here, mathematics *dominance* affords it the ‘right’ to *dominating* practices. This is analogous to what Gouldner refers to as the “egoism, barbarism and *limits of science*” (in Gieryn, 1983, p. 783).

¹⁵ In the Althusserian sense, a pedagogy of liberation would mean that: “to make the thought possible, one occupies the place of the impossible” (1990, p. 209). For Derrida (1978), “the impossible” is the creative space and catalyst of invention, where the unthought might be thought. Foucault’s (1980) premise in considering knowledge as power, posits that in working against oppression, we need to ask how we might inhabit the moments outside of our historical consciousnesses, in places which are historically “impossible” to be. Dowling (1995) grasps at the “impossible” or “unthinkable” by alluding to the ‘discursive gap’, which arises through the incommensurability of language and thought. He says: “Uncertainty does not arise out of the gap between a yet-to-be-grasped truth and the misrepresentation of that truth within a given activity. Rather, the unthinkable may be construed as the inevitable incompleteness of articulation and the ultimate ineffableness of the non-discursive with respect to the discursive” (p. 5). Bernstein (2000) speaks of the construction of success in school contexts in terms of the classification of knowledge (‘strong’ or ‘weak’ boundaries), access to principles of generalization, and the ‘permeability’ of knowledge. He says:

The successful have access to the general principle, and some of these – a small number – those who are going to produce the discourse, will become aware that the mystery of discourse is not order, but disorder, incoherence, the possibility of the unthinkable. (1993, p. 122)

Nevertheless, he warns us that: “the long socialization into the pedagogic code can remove the danger of the unthinkable and of alternative realities” (ibid.).

My personal position follows the arguments of these thinkers in that I believe that psychological, physical and spiritual liberation is achieved via a pedagogy of practice which seeks to attain access to the ‘beyondness’ of common thought, that generates possibilities other than itself, and casts a virtual, creative and generative space for unthought and for the possibility of the impossible. Through my own life experiences, I am aware that the potential to break the boundaries of our historical knowledge structures and re-cycled, language-bound, and multi-authored thoughts depends entirely on the inventive and productive possibilities of context, the personal motivations within these, on the generative moments in the interstices between language and thought, and on the legitimation of ‘unspaces’ between spaces created by principles of power. To live the possibility of thinking the unthinkable and making possible the impossible is, for me, about journeying towards *becoming empowered!* It is on this fundamental philosophy, personal belief and moral conviction that my entire thesis is premised.

¹⁶ One of Lather’s (1994) requisites of a counter-hegemonic methodology, which ruptures the masculine authority of traditional social science, is an approach that “creates a questioning text that is bounded and unbounded, closed and open” (p. 52). Through such an approach, ‘voluptuous validity’ may be achieved. I have purposefully used a questioning text here, with reams of continuous questions, and in other places of my narratives, to desist from the ‘all-knowing’ and ‘answering tone’ that is the assumed right of a privileged position as researcher. However, I use poetic license in that these questions are, for the most part, rhetorical. They neither need nor command *answers*, only *responses*. Consequently, the range of possible responses is what evokes the questions themselves.

By analogy, my research intention is not to find answers to difficult questions. I am not trying to find *solutions* as much as I am trying, instead, to journey towards *resolutions*.

¹⁷ I am not advocating that this approach is ‘better’, quite the contrary. I am noticing the set of difficulties with each approach, especially as they locate different ideological codes and emphases. This particular approach I recognize as having credibility within a neo-conservative context painted over with a token veneer of progressivism, as “packaging”. Underneath this packaging are, problematically, some very traditional teaching practices supported by Capitalist economics model utilitarianism and validated by a ‘standards’ framework.

¹⁸ Lather (1994) refers to the textual strategies that create oppositions to power and authority, and which achieve ‘validity’ through a generative, counter-hegemonic methodology, as: transgressive validity. In her checklist of the forms of validity produced by such texts, she refers to ‘voluptuous validity’ (previously mentioned). A further tenet of voluptuous validity is that it “brings ethics and epistemology together” (p. 52). According to this definition, it is therefore a *voluptuous validity* in which I further engage, perhaps even with some risqué abandon...

¹⁹ As Charles Garoian (1999) speaks of Bakhtin’s (1981) notion of “heteroglossia” (p. 272), where individual utterances and their cultural and contextual interpretations are constantly in flux, he also uses the notion of “node” to explain the function of an utterance in relation to a “non-matrixed system of discourse” (Garoian, 1999, p. 55). My use of “node” here in relation to the development of my narrative would have reciprocity with Garoian’s concept of “node” as he relates it to the Bakhtinian use of speech genres and utterances. Garoian further explores analogies to these ‘nodes’ within ‘non-matrixed discourse’ by noting their similarity “to the reticular structures of Ivan Illich’s ‘learning webs’ (1971, p. 76), Nicholas Paley’s rhizomatic system of learning (1995, pp. 8-9), and Richard Schechner’s ‘performance web’ (1988, pp. xii-xiii)”, (in Garoian, *ibid.*), which are consistent with my use of the term ‘nodes’ as well.

²⁰ Viewing this textual event as *artistic performance* helps us notice how it vividly acts out its own internal contradiction. On one level, the silhouettes of Kabelo and my daughter create cameos-in-relief of their ethnicity, making the ‘negative spaces’, in the artist’s parlance, of the illuminated window as background become foregrounded. Here context, represented by the window, which frames the action, is therefore dominant over ethnicity. The visible sense of personal connection between Kabelo and my daughter, and my daughter’s innocence of her role in this sociological performance, backgrounds the principles of power associated with ethnic difference within this social text. However, the focus changes as it does with stage direction changes in illumination or ‘stage lighting’. The act of Kabelo’s requesting to borrow my daughter’s Alice band, places the action in the foreground, re-evoking ethnicity as a historical

component of power in the process. It is therefore ironic that Kabelo requests the Alice band from my daughter, who does not visibly represent Kabelo's 'culture', so that 'permission' for 'embracing of culture' and justification of it, symbolically resides outside of Kabelo's own cultural context, represented by a commodified/ commercialized object.

In terms of performance theory, the reactions of the body provide non-discursive, somatic, interpretations and expressions of cultural experience. These enactments, whether intentional or not, are symbolic ways of viewing the interpretive basis of the actions. Garoian (1999) discusses Bernard J. Hibbitt's notion of "performatizing" with respect to the practices of Hibbitt's own discipline of law, and relates it to pedagogy as a whole. Garoian notes that: "Performance invokes academic and aestheticized culture for the purpose of making it 'accessible to human understanding' within the context of contemporary culture. In this way, performance 'transforms the ordinary into the extraordinary, the self into the other, and the transient into the timeless'" (pp. 56-57), although I would argue that the transition from the 'transient' to the 'timeless' constantly mutates with multiple interpretations.

²¹ There are also playful aspects of performance, and the interpretive relationship between audience and characters in performance heightens its ludic, parodic and ironic qualities. The disjuncture between characters' awareness of their actions and the audience's awareness/ perception of the meaning of these actions is performance's contribution to the 'imaginary real', playing tricks with the mind so that the 'real' and the 'imaginary' are often, intentionally blurred. This is, perhaps, how I felt about the vignette, and I wondered how closely it approximated what could be considered 'real' and how much was 'created' through my personal perception of the events by my placing it in terms of performance.

²² This is a dramatic irony, and lies in the ambiguity of language. It is the old Jacobean theme of 'appearance' versus 'reality', again. While the term 'counted' recruits emancipatory and celebratory discourse, it signifies the precise opposite. Later the engagement with mathematics becomes reduced to basic principles of arithmetic... mere 'counting', hardly emancipatory in effect! Consequently, the latter interpretation is reinforced in superseding the former.

²³ Dylan William (1997) makes a very powerful point in his article, *Relevance as MacGuffin in Mathematics Education*, highlighting the absurdity of using certain contrived 'real life' metaphors to explicate the mathematics - metaphors which have little to do with the mathematics itself. Williams, describes Hitchcock's use of MacGuffins to facilitate the continuation of the plot, but

which have no relevance to the plot itself, merely holding the reader in suspense. Williams shows how in many word problems, or in mathematical expositions in the classroom, metaphors, quite absurd to the mathematical context, are used to create a sense of everydayness or relevance to ‘real’ life of the mathematics being explicated. In this way, what we refer to as ‘realistic mathematics’, often has very little to do with ‘real’ life and is merely a MacGuffin so as to facilitate (and often it hinders or confuses!) the acquisition of mathematical concepts. In the same way, ‘culturally appropriate mathematics’ and its referents may act as MacGuffins, but do little to enhance acquisition of the mathematics or facilitate transfer.

²⁴ It is interesting that learning outcomes are ever present as the main objective for the learning. In other words, the argument follows the path of asking how the problem being discussed conforms to these objectives, so that closure has already occurred before any potential dilemmatic engagement with the problem. Problem solving *must* have an answer! Mathematical learning *must* be towards stated curriculum objectives, so that the curriculum not only prescribes, but also delimits and inhibits. Gerofsky (1996) speaks of early closure in problem solving in terms of an already deadness. She uses Early’s (1992) work to speak of the implications for mathematical problem solving in terms of “death by solution”. In advocating for “dwelling with ambiguity” she avers:

School math classes work at the level of ‘taking problems literally’, fixing meanings and binding them in time, specifically to avoid the recurrence of the Real, the ambiguous, the messy space of living. The desire to solve or dissolve the problem without allowing a space for play involves shutting down the space to think mathematically, to struggle with the ambiguities of the Real, to have patience and courage, and to know as a mathematician that no problem is ever more than provisionally solved. (p. 3)

For Gerofsky, to dwell in ambiguity is to be alive, whereas early closure is a death. It could be argued then that a desire for early closure is synonymous with a desire for nirvana. How does this then relate to Freire’s (1999) notion of an oppressive pedagogy as necrophilic?

²⁵ The mythologizing gaze of mathematics, in certain situations, often still prioritizes the esoteric domain of the discourse, such as in certain school-based examples that recontextualize shopping practices (see Dowling, 1992, 1993, 1995, 1998), where the domestic or ‘real life’ context is incidental to the mathematics. However, in *this* context, the mathematics is not prioritized and is subordinated by the ‘situated’ context evoked. Here the political is given immediate and uncontested priority. Hence, the mathematics is incidental.

In reference to the incorporation of ‘everyday’ practices in the mathematics classroom in order to validate ‘relevance’ in this context and consequently establish an equivalence between the ‘everyday’ and school mathematics (as manifested in the National Qualifications Framework document for South Africa), Ensor (1997) notes:

School mathematics thus elaborates a projective and introjective gaze upon the world – a projective gaze which looks upon the world and describes it in mathematical terms, and an introjective gaze which recruits exemplars from the world and brings them into the mathematics classroom. Everyday activities may recontextualise aspects of school mathematics as a resource in their elaboration, but mathematics becomes subordinated to the contingencies of the context and the specific subjectivities marked out. (p. 10)

Here, Ensor speaks to the distortion of mathematical elaboration, so that generalizing principles become inhibited by the public domain recontextualising of mathematical principles. Ironically, the usefulness of the mathematics in any other setting other than a school mathematics context (and a limited one at that) is dubious, to say the least, far less politically empowering. But there is a further concern. Unfortunately, however, Ensor’s words highlight another distortion of the interpretation of the ‘relevance’ rhetoric in the South African educational policy arena in relation to its implementation in this ‘critical mathematics’ context. The cultural beads represent not only ‘cultural relevance’, but ‘relevance of the everyday’. The beads take the place of the ‘everyday lived realities of the lives of students’ and in so doing, create a further distortion in the transfer between an exotic concept of ‘culture’ and ‘the everyday’. Consequently, the mythologizing gaze of mathematics and the myth of relevance interact to create a double distortion. No wonder the mathematics that comes out of this is the most ‘algorithmic’, and trivial. The multiple action of the mythical recontextualising has flattened it completely!!

²⁶ McLaren, Leonardo and Allen (2000) speak about the colonization of meaning in terms of ‘territorialism’ and its spatial manifestation, the ‘governmentality of whiteness’, drawing on Michel Foucault’s use of the term ‘governmentality’ and how it relates to discourse and power. They say: “The social spaces of whiteness are those of power, territories that confer privilege and domination for whites. As such, the actual social and spatial rituals that form white racial identity in global capitalism might best be revealed through the politically and spatially focused lens of human territoriality.” In this sense they define territoriality as “essential to understanding the construction of any type of domination at the level of human interactions since it is the spatial practice of attempting to control the materials and discourses of others.” Consequently, governmentality is “a territorial strategy for the control and disciplining of bodies and thoughts on

a microgeographical scale”, so as to achieve social compliance and the surrendering of meanings to the interests of whiteness (pp. 110-111).

²⁷ It can be argued that rather than achieving relevance and grasping the lived realities of these ‘cultural practices’, the mathematising of ‘culture’, in fact “constitutes a mythical plane which occupies a space outside of both mathematics and the quotidian. The students are objectified by the mathematical gaze and recontextualised as homunculi which inhabit not the everyday world, but the mythical plane” (Dowling, 1995, p. 11).

²⁸ To add to the debate on relevance, Sethole (2004) draws attention to practices in the mathematics classroom that refer more to ‘dead mock reality’ than ‘meaningful (learning) contexts’. He describes some problems and disjunctures in a situation where school mathematics is recontextualized from everyday practices into the classroom. Sethole elaborates on a study where two mathematics teachers attempt to negotiate the emphases of mathematics and the everyday in incorporating the everyday into school mathematics, as the new South African curriculum requires. Their attempts at accommodation of these discourses highlight the many practical challenges in attempting to satisfy the objectives of the curriculum. The mythologizing of mathematics by attempting to incorporate the ‘non-mathematical’ into the ‘mathematical’, he avers, potentially acts as an unhelpful distraction to the learning of mathematical concepts so that access to these concepts is denied or inhibited. He concludes: “the task of making mathematics relevant is a challenging one. The expectation that the incorporation of the everyday into mathematics will occur unproblematically seems simplistic” (p. 24).

²⁹ Dowling (1995) in critiquing the professed emancipatory pedagogy proposed by Paulus Gerdes, in his use of ethnomathematics and mathematical anthropology, and the mythologizing gaze of mathematics to achieve this, says:

The gaze can recognize only exotic forms of itself. The European constructs the other as the public domain of its own expression. This public domain is constructed as a mythical plane on which African homunculi participate in their everyday practices according to principles which European culture can divine, even though they may go unrecognized by the participants themselves. (p. 7)

The difference between Dowling’s description of Gerdes’s anthropology and the existing context is that it is not, literally, a ‘European’ who constructs ‘an other’... would it be unfair, then, to say that it is a form of self-othering, achieved through taking on the guise of a “European”? Also,

unlike Gerdes's Africans who are purportedly 'doing' mathematics in their weaving, even though they are apparently unaware of it, here no claim is being made to the beadwork as an act of 'doing mathematics'. The beadwork is already a dead form, merely exploited as an essentially arbitrary object, through its claim to being a cultural product, for the purposes of mathematical imposition. [See Gerdes (1985, 1986, 1988a, 1988b)].

³⁰ As Bernstein (1973) says of "consensual rituals": They "recreate the past in the present and project it into the future" In this way, "they facilitate appropriate sentiments towards the dominant value system of the wider society" (p. 55).

³¹ The idea of 'doing' mathematics is a whole area of investigation in itself. It could be interpreted as referring to the discourse on kinesthetic approaches to learning mathematics through 'doing' or inquiry-based approaches, where concept development is often encouraged through the use of tools (or manipulatives) which assist in concretization of concepts (see the work of Paul Cobb, as one example). The research orientations associated with these approaches tend to have a cognition-based focus to learning, often include Piagetian developmental frameworks, and have a constructivist premise. Most often, these approaches tend to advocate a move from the informal, local and context-specific towards the formal, abstract or generalizing principles of mathematics. This could be described otherwise as the student's being *apprenticed* into mathematical knowledge via the public domain.

This would be consistent with the work of Lave, Smith and Butler (1989) where the teaching of mathematics towards non-school contexts, rather than a move from the concrete to the abstract, is argued to be theoretically and empirically unsound (as well as morally dubious given its utilitarian motivation), but that the enterprise of teaching should be focused on apprenticing students into mathematics, into the practice of mathematicians.

Ensor (1997) argues that: "To ensure apprenticeship into mathematics, the esoteric domain of school mathematics, must structure a public domain, more loosely classified in terms of content and expression, which it does by casting a recontextualising gaze upon other practices such as shopping, domestic arrangements, leisure sports and so forth. These become structured by the principles and grammar of school mathematics itself" (p. 10). However, at some point, the context-specificity needs to be subordinated to allow for the emerging elaboration of the esoteric domain of mathematics. While it is most useful and more accessible to students in general for the

mathematics to arise from context, a movement away, at some stage, from context-specificity is required towards the generalizing principles of mathematics for its full acquisition (and, I would argue, for mathematical empowerment to be possible). Ensor quotes David Pimm (1990) in arguing that to learn mathematics requires suppression of the metaphorical and of context. He avers that: “in order to function as a mathematician, it is important to be able to suppress the external (metaphoric) content of whatever is being attended to, in order to automate symbolic functioning fluently”, (p. 200, in Ensor, 1997, p. 11). The crucial problem which arises is not in the mathematics learned or understood as it is manifest in context, but in its *transfer* to other contexts, or the formal context of the classroom. The work of Lave (1988) and Lave, Smith and Butler (1989) are testimony to this dilemma. More problematically, the problem arises when the mathematics becomes a decontextualized pedagogy, which is then reconfigured within the mathematics classroom to “fit” the curriculum, so that ‘relevance’ to context is, in fact, *lost* rather than gained.

Other interpretations of what it means ‘to do’ mathematics, also abound. Unfortunately, most often, what is being implied when people refer to ‘doing’ mathematics is the notion of mathematics as a set of skills and procedures, rather than a pedagogy of engagement with mathematical concepts at large. Otherwise, ‘doing’ mathematics may also elicit certain stereotypes of mathematics and mathematicians, which lock ‘others’ (such as artists for example) out of the ‘doing’, i.e. *mathematicians do* mathematics, not artists or others.

Consequently, this raises further questions about what it means ‘to do’ mathematics, what it means to do mathematics *for whom* and how this is evaluated. Both Lave and Pimm have spoken about doing mathematics ‘like a mathematician’. What does it have to look like, then, to be able to claim that one can ‘do’ mathematics? Does one always have to look like a mathematician, behave as such to make that claim? What, then, does ‘doing it like a mathematician’ mean? Albert Einstein required a friend of his, a school mathematics teacher, to help him find the equation $e=mc^2$, perhaps the most famous mathematical equation of all time. He understood the scientific concepts behind the equation but could not find the exact mathematical equation itself. Was Einstein *doing* mathematics, *behaving* as a mathematician, or not? Could he ‘do’ mathematics? Who decides?

Further, as previously inferred, *doing* mathematics and *understanding* mathematics could very well be two different things with their own foci and ideological emphases? And there could be

other ways of being in relationship with mathematics outside of this dualism, such as who *appreciates* or *enjoys* mathematics, what kind of mathematics, school mathematics or ‘other’ mathematics, (ethnomathematics included), or perhaps even mathematics attained /appreciated through self-discovery? Ian Stewart (2001) wrote a fascinating book called: “What shape is a snowflake?” He begins with this question, and through reticular pathways or chreods (“developmental pathways in space-time”, or canalized “developmental reactions” coined by Waddington (1956, p. 412)), he explores many theories, concepts and fascinating phenomena in nature to try and explain the mathematics of the shape of a snowflake. After venturing into chaos theory, the shape of the universe, the artwork of Leonardo da Vinci, the beehive, stripes on a zebra, conic sections in shells, fractal geometry and Fibonacci in nature, amongst other topics, all without a single mathematical equation, he finally produces “the answer”. After philosophizing about the experience and its implications to our knowledge and appreciation of the “frozen reality” of the snowflake, and in a dramatic defiance of the traditional mathematics teacher’s/researcher’s absolutist notion of mathematics and obsession with “the answer”, he ends: “What shape is a snowflake? Snowflake-shaped” (p. 214).

Not having a ‘precise’ mathematical-looking answer to the originally posed question, by no means detracts from the calibre of the mathematics in the book. In fact, it validates a greater ‘truth’, that it requires a deeper investigation, experience, understanding and expression of mathematics to find ‘the answer’, which is that there is no right answer at all! Accessible to a broad audience, it can easily be argued that any student who reads this book would have a much greater/ richer understanding/ appreciation *as well as* ‘content’ knowledge of mathematics, as well as its intrinsic fallibility, despite the book’s apparent lack of identifiable mathematical ‘symbolic content’, than the entire K-12 school curriculum of any country. In relation to the previously mentioned tensions between school mathematics and democracy, *this point cannot but make one think!*

³² In a similar vein, according to Morson (1986), Bakhtin’s most radical contribution to his theory of language is his rethinking of traditional opposites and linguistically constructed dichotomies of “individual to society, of self to other, of the specific utterance to the totality of language, and of particular actions to the world of norms and conventions “ (p. xi). He advocates for dissolving these linguistically constructed dichotomies as a way out of “the endless oscillations between dead abstractions.” The problem-Solution continuum is another one of these traditional dichotomies, which is sustained through positivist paradigm creation within academia

and upheld by the discourse and authority of traditional/ ‘classical mechanical’ Science. Even as I say this, I am aware that one of the exogenous ‘expectations’ of my thesis (for the spoken-of purposes of academic criteria such as ‘rigour’, ‘credibility’ or ‘validity’), imposed/defined by the traditional academic research field within the Social Sciences, is that I attempt, at least, to provide some answers, pose a solution, supply a set of possible prescriptions for ‘improvements’ to practices/policies, as a consequence of my research results. As I argue that all options are contingent, paradoxical, multi-faceted, complex, controversial, politically problematic, ethically fraught and dilemmatic, so I attempt to move beyond the problem-Solution paradigm, towards a dynamically informed, narrative-based, personal *resolution*, the commitment to such a position of which needs to be assessed as a moral, reflexive, contextual contribution, for each *individualsociety* or *selfother* to make choice(s) on accordingly.

³³ There has been some criticism from certain quarters that despite the very democratic and progressive ideals of the ANC’s document (African National Congress, A Policy for Education and Training, (Johannesburg: ANC, 1994)), the voice of this document occasionally takes an impositional tone, albeit unintentionally. This is, perhaps, an example of irreconcilability of ‘the means’ and ‘the ends’, at a policy level – the idealism of social justice principles in diverse contexts versus their universalized implementation across all contexts. Most importantly, this authoritarianism is particularly noticeable with respect to the issue of ‘relevance’ in mathematics and science education, and explicitly connects educational objectives to the world of work... a functionalist, technicist perspective, carrying a strong utilitarian voice in the name of democracy. An example of this is an entry in the document which says:

... science and mathematics education and training, both school-based and work-based, must be transformed from a focus on abstract theories and principles to a focus on the concrete application of theory to practice. It must ensure that students and workers engage with technology through linking the teaching of science and mathematics to the life experiences of the individual and the community.

Dowling (1995) says of this entry and others:

The document repeatedly announces a commitment to the integration of education and training, of the academic and the vocational. The existing curricular provision is claimed to lack relevance and science and mathematics education is too abstract and theoretical... (...)...It would be disingenuous to claim that the ANC document is deliberately dogmatic and authoritarian. This is far from being the case. Nevertheless, and its status as a discussion document notwithstanding, there are strong suggestions of the non-negotiable. (p. 2)

Chris Breen (1997), of the University of Cape Town, in asking what our responsibility is to a teacher education program in mathematics education in South Africa, and what this should look like, makes comment on the ‘new South African syllabus’ (inferred by the ANC document and Curriculum 2005). He says of it that “in shades of past domination rhetoric, it has started a process of trying to formulate learning outcomes for all stages of the education system. Much of this is praiseworthy. But when we start to look at teacher education in terms of learning outcomes, inevitably the task becomes prosaic to say the least. Forget about the relaxed mind, what we are here to do is to get students to show the ability to...”, (p. 1), left incomplete and requiring no further explanation., as the list of ‘be able to’s’ are potentially endless as prerequisites to constructed ‘success’ in mathematics education.

Clearly, the objectives which tie mathematics education outcomes to the professed exigencies of a nation and its economic “success” as non-negotiable, cannot claim democratic means, albeit democratic ends may be rhetorically established, as a means to justify ends.

As Skovsmose and Valero (2001) succinctly puts it: “Despite the democratic discourses that justify its permanence in school, Mathematics education fulfils social functions of differentiation and exclusion” (p.41).

³⁴ I am aware that Eisner’s perspective here is not representative of the perspectives of many or even most of the research community focusing on issues in visual art education. I am merely using his standpoint as a template with which to reflect critically on these issues in the mathematics education arena. Nicholas Mirzoeff (1999) views the visual and cultural life as being inextricably interconnected and informative of each other. Counter-logical to Eisner’s point and in noting the emergence of the field, he says: “there is now a need to interpret the postmodern globalization of the visual as everyday life. Critics in disciplines ranging as widely as art, history, film, media studies and sociology have begun to describe this emerging field as visual culture” (p. 1). For Mirzoeff, his hopes for the study of visual culture, is to “reach beyond the traditional confines of the university to interact with peoples’ everyday lives.” In this way, “visual culture would highlight those moments where the visual is contested, debated and transformed as a constantly challenging place of social interaction and definition in terms of class, gender, sexual and racialized identities”(p. 2). Mirzoeff’s art is one with a distinctively social purpose. This is not an art for art’s sake!

³⁵ Bernstein (2000) distinguishes horizontal from vertical discourses based on their features and modes of operation. Horizontal discourse represents discourse of the ‘everyday’, constituted from a reservoir of local and communalized segments that have variance in the context in which they are used. This knowledge is less explicit and often implied by the context within which it is produced. However, ‘vertical discourse’, is constituted as a ‘coherent, explicit and systematically principled structure’ that is hierarchical and/or specialized as in the sciences or social sciences (p. 157).

³⁶ As Ensor (1997) notes: “Utilitarianism, the celebration of “relevance” and the notion that schooling should serve to develop a useful toolkit of knowledge and compartments for implementation in other contexts is as old as schooling itself.” (p. 1). Nevertheless, its more recent inclusion in the ‘progressive education’ model of learner-centred, constructivist pedagogy, is *contradictory* in its claim to produce greater learner autonomy and mathematical empowerment through encouraging independent logico-mathematical thinking, whilst, at the same time, tying mathematical concepts to the ‘everyday’, the ‘culturally relevant’ and the unproblematic construction of the learner’s ‘previous knowledge’. The ideological claim to greater autonomy and democratic principles of learning is undermined by the flattening effect of the ‘relevance’ principle on the vertical discourse of mathematics and the inequitable array of social constructions this popularism necessarily proliferates in accordance with existing social hierarchies.

³⁷ Drawing on Bernstein’s dichotomy of vertical and horizontal discourses, Dowling (1995) puts the issue of relevance and access in the following terms:

Academic, or vertical, practices have been systematically distributed on class and racial lines, however. This has entailed the effective exclusion of the majority of the populations of both South Africa and Europe from the academic. This is variously achieved via the non-existence or inadequacy of schooling provision or, more subtly, by the insistence of the inclusion of the everyday and the relevant in terms of participative mythologizing. (p. 12)

³⁸ I am reminded of Robyn Zevenbergen’s work, similar to my current and previous research work, which describes the relationship between discourse and practice and how “constructed disadvantage, begets pedagogic disadvantage” (Swanson, 1998; 2000; 2002; 2005). Zevenbergen’s work is more psychologically framed than my own, more sociologically premised research, but she, nevertheless, highlights the pathologizing effect of deficit model thinking and the implications of the self-fulfilling prophecy on students constructed by their teachers in terms

of socio-economic ‘disadvantage’ and ‘low-ability’. Zevenbergen (2003) notes: “Teachers who hold beliefs of students from socially disadvantaged backgrounds based in deficit models may engender practices that reinforce the status quo and social reproduction” (p. 149). Consequently, Zevenbergen’s research points to how teachers interact differently with students who they perceive to be of ‘low-ability’ and/or from ‘low’ socio-economic circumstances. These assumptions have profound ramifications on teaching and learning practices, which serve to delimit possibilities for those already without access to the discourse and/or who have been alienated from it.

³⁹ Skovsmose and Valero (2001) refer to an important aspect of the power invested in mathematics which highlights its intrinsic dissonance with democracy. This is where mathematics teaching is used as an obedience tool, designed to coerce students into observing teachers words and showing ‘respect’. As an exchange relation, the teacher ‘gives’ the mathematics to the students which is purported to ‘empower’ them one day later in life when seeking a job or applying for a place in a post-secondary education program. This is a deferred ‘empowerment’ which fits the pre-determined requirements of the socio-economic needs of the nation. Naidoo (1999) explains how regimentation and threat used by some novice teachers in the South African context, is premised on this understanding, and that, in certain teaching contexts, it often leads to violent and unbalanced relationships between teachers and students, on the grounds of the mathematics that ‘has to be learned’ in school.

⁴⁰ As Egan (1997) avers: “the common principle of ‘starting with where the student is’ may be both inadequate and restrictive in ways little observed” (p. 1). Egan professes that humans, most especially children, have fertile imaginations and it is this mental asset that fosters critical thinking, - what I would refer to as the ‘beyondness of thought’ and what Bernstein might refer to as “thinking the unthinkable”.

⁴¹ John Mighton (2003) captures the real failure of the international mathematics education system in not offering opportunities for experiencing joy and wonder to students in their school mathematics learning, thus disempowering them psychologically, spiritually, and consequently, socio-economically as well. This failure, related to the drive of entrenching the ideological principles of global capitalism, perpetuates the myths about ‘ability’ in mathematics education, and ensures the continued reproduction of failure. In this regard he says: “Failure in this system stands as irrefutable proof, even for the person failing, that one was born not to succeed.” (p. 19).

In describing ‘the lack’ of infusing joy and wonder into school mathematics learning, Mighton transfers the blame from the student, as the object of ‘lack’ and victim of failure, to the educational system where it rightfully belongs. As he so convincingly states, using a powerful ecological metaphor:

If schools were allowed to build walls around our national parks, and the majority of children were prevented from entering on the grounds that they lacked the ability to appreciate or understand what was inside, we might say something had been stolen from those children. And if the majority of children were convinced by their teachers that there was nothing beautiful or moving in the sight of a snow-capped mountain or a sky full of stars, we might be concerned that they had been stunted in their emotional or spiritual growth. But an equally beautiful part of nature has been made inaccessible to almost every child, and no one has noticed the loss. (p. 51)

⁴² As Jill Adler (2001) avers:

...whereas new practices entail “more” resources (new resources and/or different uses for existing resources), more resources do not relate in an unproblematic and linear way to better practice. There is a tension between an uncritical (re) distribution of resources to meet equity goals and how such resources are and can be used to support mathematical purposes across contexts. (p. 187)

Importantly, I would argue that a resourcing requires a spiritual and psychological commitment on the part of the pedagogic community, which knowledge as power and teaching as an act of engagement with knowledge does not always (readily) permit within context. Resourcing means a willingness of heart as much as a resourcing of the constraining elements of context to deflect its colonization of pedagogic practice and thought.

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