Guest Editorial…

Lessons From and In Curriculum Reform Across Contexts?

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In the past decade, the South African education system has been engaged in the enormous challenge of transformation from a deeply unequal and racially segregated system and curriculum to an integrated system and a new vision for the education and development of all South Africa's learners. The challenge has been at every level of the system, including the structure and functioning of national and provincial departments, districts, schools, and classrooms, as well as the conception and implementation of new policies for curriculum, teacher education, and language-in-education, and for overall funding of education as a public good.

In this short paper, I will look at some of the dimensions of reform in South Africa as they have taken shape in mathematics education. I will point to what I believe are important lessons we are learning, lessons that have wide applicability beyond South Africa's borders. As I have argued in numerous research papers, the South African context brings into sharp relief issues and challenges that are less visible, but equally challenging, in more developed contexts. My discussion is drawn from two research bases: A long-term teacher education research and development project where a group of teacher educators/researchers worked with mathematics, science, and English language teachers to make sense of practice in post apartheid South African education (Adler & Reed, 2002); and a range of critical research that has been undertaken by some doctoral students in the field, including those whose work contributes to this issue (Graven, 2002; Nyabanyaba, 2002; Setati, 2002).

Policy implementation in a context of diversity

National policies are inevitably couched in general terms and thus tend to not engage with the potential and actual consequences of curriculum intentions and their enactment in diverse contexts. Across our projects, we have seen how conceptions of "good" or "best" educational practice can be recontextualized in quite problematic ways. As strategies that work in some school contexts are grafted onto very different contexts and related practices, they can work to undermine the very goals they were intended to address. As we explored teachers' adoption—what we have called take-up—of various practices in support of the new national curriculum, a lesson that emerged for us over and again was that *context matters*. It is a significant challenge for all in education to come to grips with how policies, visions, and goals are themselves a function of how and where they are produced. They will not travel in even ways across different regions and different schooling cultures. Indeed, national policy development needs to find ways of understanding and then promoting diverse practices to meet differing enablements and constraints in diverse conditions.

Language in education policy

I am going to focus on the issue of language in education policy and language practices in multilingual classrooms. While U.S. classrooms might be less obviously multilingual than South African classrooms, linguistic diversity characterizes classrooms everywhere. And linguistic competence is a hidden assumption in the way in which reform in mathematics is being driven. In the U.S., and in related ways in South Africa, mathematics classrooms are to become places where learners engage with rich problems, and they are to do so collaboratively with their peers and their teacher. Teachers are to listen to learners' mathematical thinking and use their verbal and written productions to build on and develop learners' mathematical conceptions.

In bi- and multilingual settings, a specific challenge is immediately visible. How are learners to communicate with each other and the teacher when they do not all share the same main language? In addition, for many learners, their main language is also not the same as the language of instruction and the language in which mathematics texts are produced. We could extend our vision here into all classrooms and ask: How learners are to communicate with each other when there are some for whom clear articulation of

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their thinking is not always easy, and others who might be more reluctant in general to voice their thinking? If we follow this line of thinking, we come to questions like: What are the central purposes for promoting classroom conversation in mathematics? Who is to benefit from this and in what ways? In the fervor that often accompanies visions for change, I believe that we rarely stop to ask: "Is this good for all?" or "Under what conditions, and for what purposes is this 'good'?" Instead, in order to popularize new ideas and ways of working, simplistic panaceas come to frame our discourses.

In South Africa, and in similar multilingual contexts, it is now widely accepted that learners' main languages need to be treated as a resource, rather than a problem. Ways need to be found to enable learners to use their main language as a thinking tool in school. In practical terms, code-switching is advocated as an important pedagogical device. Teachers need to support and enable the switching between learners' main language(s) and the language of instruction. Indeed, this position was explicit across courses in our teacher education program. One of the foci in the related research project was an investigation into teachers' take-up of language practices in support of the new curriculum (Setati, Adler, Reed, & Bapoo, 2002). We worked across primary and secondary schools and across three school subjects—math, science, and English language. We worked with very poor non-urban schools and better-resourced urban schools. And over time we came to see how these level, subject, and regional differences matter, and how differently schools were positioned by what we called their English language infrastructure (Setati, et al.). In non-urban areas, English in and around the school was like a foreign language, used only inside the classroom and rarely heard or spoken anywhere else. We called these "foreign language learning environments", and contrasted them with urban schools where English functioned more like an additional language. In "additional language learning environments", although many learners are not main language English speakers, there is a considerable support in a range of texts in and around the school for the development and use of English. One of the most significant things we learned through the project is just how complex language issues are in non-urban schools. Because there is very limited English infrastructure in the surrounding community on which teachers can build, exposure to English is via the teacher. This puts pressure on teachers to use English as much as possible. Teachers in these schools in the study, particularly across grades 7 to 9, argued quite strongly against frequent code-switching in class. We also found that primary mathematics and science teachers in both urban and non-urban schools feel far more pressure than their secondary colleagues to teach in English because their learners are still in the early stages of learning English.

Further findings from our research also suggested that some of the dominant "messages" in current curriculum documents may need to be reviewed, or at least disaggregated across diverse contexts and settings. For example, one of these messages in *Curriculum 2005* (National Department of Education [NDE], 1997) is that group work is "good" in that it supports exploratory talk and co-operative learning. Code-switching practices facilitate the harnessing of learners' main languages and so facilitate exploratory talk in the classroom. In our research in South Africa, most teachers adopted forms such as group work and so increased the possibilities of *learning from talk* (i.e. of learners' using language as a social thinking tool). Such practice appears to be easily integrated into existing teaching and learning repertoires. However, learning from talk is significantly limited if it is not supported or complemented by strategies for *learning to talk*, i.e. learning subject-specific formal or educated discourses (Barnes, 1992; Mercer, 1995). Across the teachers we worked with we saw unintended consequences of the increasing exploratory talk in class, with teachers either short-cutting or not completing the journey from informal exploratory talk in the main language to formal discourse-specific writing in English. There appears to be a danger that the advocacy of talking to learn and use of main languages is being incorporated or taken up at the expense of learning to talk mathematics or science. In the English language class it may also be at the expense of writing extended texts.

However, in the advocacy for the new curriculum, the issue of how teachers and learners are to navigate the journey from informal exploratory talk (in the learners' main or additional languages) to formal, discourse-specific talk in English, and how they are to do this in contrasting linguistic classroom contexts, is not addressed. This suggests the need for more serious engagement with the possibilities of and constraints on what are typically presented as panaceas for "good practice".

Contexts outside South Africa

There is resonance with this lesson for reform processes and practices elsewhere in research literature that has recently emerged from what are called ESL (English Second Language) contexts in the U.S. In two independent articles reporting research in science and mathematics reform classrooms, Fradd & Lee (1999) and Moschovich (1999) each question whether and how group work and a more facilitative and less

instructive role for the teacher actually promote equity goals. In their shared concern for developing discourse-specific talk and competence in learners of mathematics and science, they ask whether so-called universal good practices actually deny rather than enable learning in ESL contexts.

As previously stated, the different English language infrastructures, levels, and subjects in and with which teachers work appear to be significant for shaping Inservice Teacher Education (INSET) possibilities and constraints. We need to disaggregate schools and classrooms along these three different axes and tailor programs according to whether they are within English Foreign Language or English Additional (Second) Language infrastructures, whether they are primary or secondary, whether they are about language as subject or language for a subject. Our concern is that without such specific contextual attentions we will only exacerbate educational inequalities and leave some teachers and learners "stranded" at some point on their educational journey.

Other areas in which context matters

I have devoted most of this editorial to exemplifying a general claim that context matters by looking at language. In our ranging research foci we have found that context matters in other critical areas of mathematics curriculum reform and related teacher education. Briefly, as in many other mathematics reform initiatives, *Curriculum 2005* advocates connections within mathematics and between mathematics and learners' everyday lives (NDE, 1997). Mathematics needs to become more meaningful for learners, and one way of establishing meaning is by embedding mathematical problems in real world contexts. There is also a strong common sense view that this kind of practice will invite more learners into mathematics and thus reduce the inequalities in mathematics performance we currently see when we compare learners from varying socio-economic backgrounds.

However, recent research in the United Kingdom (Cooper & Dunne, 2000) shows how working class children in England experience more difficulty in mathematics assessments that cross the boundary between mathematics and their everyday lives. Many working class learners performed poorly on these kinds of items. When a small number of learners were interviewed, Cooper and Dunne found that working class learners had more difficulty in realizing when an appropriate response could call on their everyday knowledge and experience, and when they had to turn to more explicit mathematical reasoning in answering a problem.

Thabiso Nyabanyaba (2002) followed up on this line of research in the context of school exit examinations in Lesotho. From his involvement in the examining process, Nyabanyaba noticed what seemed like deterioration in performance as more "realistic" items were included in the examination. His research has gone further than Cooper and Dunne to argue that in contexts where success in mathematics significantly determines life chances (like access to jobs and further study), learners select to ignore contextually embedded examination questions. Learners either describe them as "too hard" or as less likely to produce good scores. Learners' reluctance to engage with these items is not because of the difficulty of negotiating the epistemological boundary between mathematical and everyday knowledge. Their choices and responses are more socially determined.

In both of these examples, Cooper and Dunne and Nyabanyaba give us cause to reflect on whether and how connecting mathematics to everyday life is a "universal" means for improved learning and meaning in mathematics in school. They compel us to look and see whether and how questions embedded in real life contexts can become barriers rather than points of access. In a paper just published, Cooper and a colleague (Cooper & Harries, 2002) have indeed looked further: They have explored how different ways of working with embedded problems in a mathematics classroom can produce different enabling conditions. In this paper they argue that, with adjustments to the way such problems are presented, diverse learners might be more willing to negotiate the boundary and so use their everyday knowledge to enhance their experiences of mathematics in school. Again, context matters here. Mathematics curriculum reform, like language in education policy, needs to be thought through in its potential to create both advantage and disadvantage across ranging contextual conditions.

Mathematics teacher education reform

The third and final example I will briefly discuss relates to mathematics teacher education reform. In South Africa we have new *Norms and Standards for Educators* (NDE, 2000) that details multiple roles and competencies required for teaching. These reflect, and gladly so, an acknowledgement of the complexity of the task of teaching. However, we could see in these guidelines the potential for diminished attention to subject-specific (e.g. mathematical) knowledge and its growth for teaching. At the same time, we have been concerned with a strong message coming from national government and its aligned research project (Taylor & Vinjevold, 1999) that subject knowledge alone accounts for teachers' ability to demand high level

thinking of their learners. We have argued that, at the moment, there is a pendulum swing in teacher education policy in South Africa between a focus on pedagogical strategies and contextual issues without careful links to how these do or do not support conceptual learning, and a focus on conceptual knowledge that ignores the complexities of transforming this knowledge into appropriate opportunities for learning in school classrooms (Adler, Slonimsky, & Reed, 2002). Mathematics teacher education in South Africa faces critical challenges in reconceptualizing what constitutes mathematical knowledge for teaching at various levels across the school curriculum, and how this might be acquired in teacher education.

Graven (2002, and in this issue) undertook an in-depth study of teacher learning involving 18 teachers over 18 months. Working with the notion of learning as participation in a community of practice both theoretically and practically, Graven shows how teachers with varying mathematical backgrounds all benefited enormously from an INSET program organized to produce and then be supported by a community of practice. Alongside this positive general outcome were also quite specific lessons. Teachers' mathematical histories mattered critically in how they were able to benefit from the mathematical learning opportunities in the program. From this and the teacher education research project referred to in the earlier examples, I conclude again that there can be no panacea, no single kind of project that suits all teachers' needs and areas of development in relation to their subject knowledge for teaching.

National education departments will be concerned to demonstrate improvements in educational performance and so seek out what appear as quick fixes or clear notions of best practice. However, these political desires fly in the face of our growing understanding of, and working with, complex and diverse on-the-ground realities. Indeed, if diverse realities are not carefully attended to, then programs in support of a vision for a new educational order might well undermine their own intentions.

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