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What do we know about teaching and learning in South African primary schools?

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Abstract

This article reports the findings of a review of classroom-based studies in order to discern what the existing knowledge base around teaching and learning is in South African primary schools. Educational research on classrooms has been criticised on a number of grounds, including the fact that it is generally small-scale, qualitative and that it lacks methodological rigour. Although these criticisms would appear to be valid, and there certainly are methodological limitations to the majority of these studies, this article highlights two strengths of the literature when viewed cumulatively. The first is that there is a remarkable consistency across studies regarding what is going on (and generally going wrong) in classrooms. The second is that the research has recently begun to identify very specific features or dimensions of classroom practice, which appear to affect student learning. In other words, the research has moved a long way from broad characterisations, such as 'learner-centred' and 'teacher-centred', to produce interesting insights on particular aspects of classroom life. In this way, a comprehensive picture of classroom life emerges. The article also points out some of the limitations to existing knowledge and suggests plausible directions suggested by the literature – including attention to appropriate research methodologies and a focus on educational knowledge.

Keywords: Pedagogy, classrooms, primary schools, classroom research methodology

Introduction

This article reports the findings of a review of classroom-based studies in order to discern what the existing knowledge base around teaching and learning is in South African primary schools. Educational research on classrooms has been criticised on a number of grounds, including the fact that it is generally small-scale, qualitative and that it lacks methodological rigour (Deacon et al, 2009). Although these criticisms would appear to be valid, and there certainly are methodological limitations to the majority of these studies (Ensor and Hoadley 2004), this article highlights two strengths of the literature when viewed cumulatively. The first is that there is a remarkable consistency across studies regarding what is going on (and generally going wrong) in classrooms. The second is that the research has recently begun to identify very specific features or dimensions of classroom practice, which appear to affect student learning. In other words, the research has moved a long way from broad characterisations, such as 'learner-centred' and 'teacher-centred', to produce interesting insights on particular aspects of classroom life. In this way, a comprehensive picture of classroom life emerges. The article also points out some of the limitations to existing knowledge base and suggests plausible directions suggested by the literature.

This review draws on peer-reviewed, published material in tabling existing findings on primary school classrooms in South Africa. It covers literature related to teaching and learning in primary classrooms in South Africa. It focuses on those studies that consist of observations of classrooms rather than derived findings from interviews or other methods. Many of the studies considered have significant

methodological limitations, and are limited by the small sample sizes of many of the research projects on which they are based. School and classroom effects have been difficult to discern confidently in research, especially given the lack of longitudinal studies that are able to reflect the cumulative nature of learning. The lack of sufficiently large samples also makes generalisation to larger populations difficult. Nonetheless, given these limitations, we have generated through research a relatively clear picture of the dominant forms of pedagogy, as well as some of the factors that we might pay attention to in future large-scale studies.

The article begins by locating the study of classrooms in South Africa within broader international trends in classroom studies. It also considers the relatively short history of classroom-based studies in South Africa. It then goes on to discuss a range of local small and larger-scale studies, drawing out the empirical findings of these studies. The paper concludes with some of the implications of the current knowledge base – both empirical and theoretical – for further research.

International context

The tradition of classroom-based research really began in the United States with Flanders and in the United Kingdom with the ORACLE study. Flanders developed perhaps the first coding scheme for classroom interaction (Amidon and Hough 1967) by introducing pre-specified 'systematic' coding schemes based on verbal behaviour in the classroom. The ORACLE study drew on and developed the scheme offered by Flanders (Galton and Simon 1980), and was the first large-scale, longitudinal classroom observation-based study in Britain. ORACLE set out to consider the relative effectiveness of different teaching approaches in primary school classrooms, and was particularly interested in the effects of the progressivism of the Plowden report on classroom practices. Although the study was ultimately able to do little more than give insight into the organisation of classroom interaction (Alexander 2001), it initiated an understanding of 'pedagogical asymmetry', or the ratio of teacher talk to student talk, which would later become galvanised into the distinction between two teaching styles: teacher-centred and learner-centred. Later these systematic classroom observation protocols of the Flanders type were used to link classroom behaviours to student outcomes as part of the school effectiveness type studies.

Another approach that emerged in the 1970s was the socio-linguistic tradition, and was specifically concerned with the analysis of discourse and patterns of classroom interaction. The work of Sinclair and Coulthard (1975; 1992) was key in this regard. They identified the IRF (initiation, response, feedback) or IRE (initiation, response, evaluation) pattern in classroom interaction. These were forms of analysis that began to move away from analyses of teaching styles to a consideration of knowledge exchange. Here the evaluation of statements, which marks classroom speech productions off from that of everyday discourse were privileged. Finally, interpretivist studies, asked questions related to broader sociological, linguistic and cultural aspects of classrooms in small-scale, in-depth and largely ethnographic studies.

These three major approaches in the 1970s – the systematic, the socio-linguistic and the ethnographic – have endured, in various guises, and with enduring debate around the merits of different approaches and what they are able to tell us about teaching and learning. In the 1990s, especially, there was an increased interest in the issue of time, and more crucially time-on-task and 'opportunity-to-learn', which had been found to be compromised by the more flexible structuring of time in progressive classrooms. With international, standardised testing, such as TIMSS and PIRLS, there was also an increase in cross-cultural comparative studies (Anderson et al 1989; Stigler and Hiebert 1997; Schmidt et al 2001; Alexander 1999), which raised issues around the inter-relatedness of the schooling system, where classrooms were conceived as nested within schools, systems and particular socio-political set-ups. And, finally there was a plethora of school effectiveness studies.

There have been a number of reviews of these school effectiveness studies published in recent years, which summarise the classroom and teacher variables associated with higher achievement (Creemers 1996; Scheerens 2004). Rowan et al (2002) present an explanation for the wide variance in the results of studies into school and teacher effects. They show that differences in the claims of different studies can largely be attributed to differences in the methods used to estimate effects, and differences in how the findings are interpreted (2002:1536). Further, as pointed out by Brophy and Good (1986), teacher effects persist in varying greatly across grade level, subject and type of pupils, and this variation is exacerbated by the fact that teacher effects are additive and cumulative, and, generally, not compensatory (Darling-Hammond 2000). Further, school effectiveness research is deficient in that it places too much emphasis on the notion of progressive school management as the dynamic of change. It fails to take full account of the characteristics of the education system as a whole, shows little regard for issues of social class and it has little to say about issues of curriculum content and pedagogy (Chitty 1997; Slee et al 1998). In short, the school effectiveness tradition gives us very little insight into what goes on inside classrooms, and how teaching works.

This broad and highly simplified overview of trends in classroom research provides the context for a discussion of South African classroom research.

The South African classroom-based research tradition

The tradition of empirical classroom-based research in education in South Africa has been limited. In the early 1990s, Chisholm (1992) argued that, at the school level, there was very little research that probed educational problems with any sophistication. This was partly explained by the legacy of apartheid, which generated hostility towards educational researchers on the part of education departments, and school management, and teachers. This made access by researchers to schools difficult. Muller's (1996) review confirmed that there was a paucity of empirical, school-based sociological enquiry prior to 1996. Of the relatively insubstantial work in the sociology of education in South Africa up until this time, most had concentrated on policy studies.

Insights around classroom practices prior to the 1990s were, therefore, generated largely from accounts from in-service teacher education projects, or gleaned from reports of school inspectors (Bot and Schlemmer 1986; Thembela 1986). These early studies were able to characterise prevalent teaching styles and forms of interaction in black classrooms, summarised by Chick (1996:21) as 'teachers adopting authoritarian roles and doing most of the talking, with few pupil initiations, and with most of the pupil responses taking the form of group chorusing'. Many of the early classroom studies sought explanations for these classroom interaction patterns and fell broadly within the sociolinguistic approach referred to above.

One of the most notable early studies was the Threshold Project (MacDonald 1990), examining the nature of the language and learning difficulties that black Std 3 (Grade 5) children experience when they change from their mother tongue of Sepedi to English as a medium of instruction and learning. The study showed how learners had about 700 words at most in English, while the curriculum required them to have at least 7 000. However, what also made it impossible for students to read with meaning or learn effectively was that they did not have a sufficient grasp of the linguistic structure of the English language. The sudden transition to English as a medium of instruction resulted in most learners resorting to rote learning content, which they did not understand. MacDonald argued that students experienced a loss of meaning: 'The children are likely to be alienated by what they have to learn, and only dimly perceive the implications and linkages between the concepts they are presented with' (1990:143). The study made connections between this pedagogical experience of learners and the very high dropout rate of learners at the Grade 4 level, at the time.

Another early socio-linguistic study was that of Chick (1996) who argued that the chorusing and rhythmic chanting in classrooms, and absence of individual, evaluated performances (what he terms 'safe-talk') was a strategy to mask both teacher's and students' poor command of English and their lack of understanding of academic content. In a sense, it represented a form of learning that enabled them to hide the absence of substance.

Although also broadly located in discourse analysis, the study of Muller (1989) attempted to relate communicative routines, or classroom interaction, to social arrangements. In his analysis of two science classrooms he eschewed the notion that drill and rote procedures in classrooms are rooted in culture or personal preference, but rather that these related to the former restricted learning of teachers. Black teachers, he argued, had little opportunity to 'internalise the grammar of science' to teach it appropriately. Thus rote-learning routines were an 'exigency resorted to by people operating within a particular communicative contract' (1989:320). Muller also attempted to link authority relations in the classroom to particular ways in which knowledge was treated, and which derived in part from an analysis of the social status quo under apartheid. Walker (1989) related teaching practices to teachers' own schooling and training and their socialisation into their practice. On the basis of her research she argued that

African teachers will have internalised a particular understanding of teacher behaviour which they then act out themselves in their own classrooms. So the dominance of transmission teaching with its concomitant emphasis on teacher-talk, drill and practice and rote learning continues to hold sway and few questions are consciously posed by teachers regarding what and how they teach, and in whose interests' (1989:20).

After the transition to a democratic state in 1994, and the implementation of a post-apartheid curriculum in 1998, there was further press to understand what was going on in classrooms, especially given anecdotal reporting of an on-going 'breakdown in the culture of teaching and learning'. In an attempt to address the lack of classroom-based research, a project entitled the President's Educational Initiative (PEI) was undertaken in 1998, which aimed to interrogate issues of teacher practice, curriculum, and the use of teacher and learner materials. The results of this initiative, which consisted of 35 small-scale studies, were reported in Taylor & Vinjevold (1999). The authors claimed convergence in these studies around a number of issues, most importantly around teachers' extremely poor conceptual knowledge. They also found that teachers lacked the knowledge to interpret the new 'Curriculum 2005', and were unable to 'ensure that the everyday approach prescribed by the new curriculum will result in learners developing sound conceptual frameworks' (Taylor & Vinjevold, 1999:230). Many of the research projects conducted for the PEI Report also showed that little reading and writing was being done in classrooms, and that reading and writing was constrained by a lack of textbooks. Researchers found that, although teachers were implementing forms of 'learner-centred' practice and co-operative learning, very little learning was taking place. This was confirmed by some of the PEI studies that assessed learner achievement.

These studies were problematic, conceptually and methodologically (Taylor et al 2003; Ensor and Hoadley 2004). Nonetheless, they foregrounded a range of issues in classroom-based research as a field of study and provided valuable insights and training for researchers in subsequent investigations in this area. Since the PEI project small-scale, qualitative studies have predominated. However, there has subsequently been an increase in the number of larger-scale studies. Below an overview of both is provided.

South African school effectiveness studies

The South African school effectiveness tradition of research is relatively new. It is, however, growing with the broadening of standardised systemic testing and the availability of data on student performance. In

particular, the availability of large-scale student test data at the grade 3 and grade 6 levels has led to the possibility of conducting school effectiveness studies in primary schools in the South African context. As in the international studies, the central significance of home background has been confirmed in several large-scale South African studies (Anderson et al 2001; Crouch and Magoboane 2001; and Van der Berg and Burger 2002). Although many of these studies suggest the importance of management factors, they have, as yet, not been able to distinguish between school and classroom level factors and their effects on student performance. For this reason, what exactly makes the difference in schools and especially classrooms remains elusive in this form of multiple regression study?

Although there have been few school effectiveness studies that have looked at classroom level variables, those that exist offer some insights into the dominant factors affecting achievement. One of the first studies was the Pupil Progress Project (PPP), a cross sectional study undertaken in a 90 primary school stratified random sample in the Western Cape. Looking at three levels – the home, the school (management) and the classroom (teacher practices), the study was unable to identify teacher effects in the research. Taylor (2008) offers the following reason for this, which he attributes to a more general methodological problem in measuring the effects of pedagogy:

since children's learning is subject to a new set of teachers every year, demonstrating teacher effects empirically requires time series data, which relates the teaching practices of a particular teacher to any learning gains exhibited by her pupils over the time period in question (2008:13).

The PPP had only one point of data collection. There are also more general problems in production-function studies with showing the effects of variables on performance, especially when these are multiple as they are at the level of the classroom (Van der Berg, Burger & Yu, 2005). We have some way to go before we are able to establish the appropriate construct for the accurate measurement of classroom effects on student achievement.

In a smaller study of 24 poor schools, also in the Western Cape, Reeves (2005) and Reeves & Muller (2005) show that their particular construct of 'opportunity to learn' – a composite of content coverage by cognitive demand, content exposure as well as curriculum coherence and pacing – held a significant positive relationship to achievement in mathematics at the Grade 6 level, whereas teaching style, learner-centred or teacher-centred showed no such relationship. Teacher feedback on student responses showed a significant positive correlation with improvements in learner scores.

Taylor (2007) summarises the classroom factors from a broader range of studies, which have been shown to optimise student learning; this includes pace and its differentiation, curriculum coverage, and providing feedback to learners, i.e. on-going assessment for learning.

More recently, Carnoy et al (2011) examined learning gains in a comparative study of Grade 6 students in North West province and Botswana. The study confirmed some of what we know, in particular the significance of the coverage of content at the appropriate grade level, time on task and appropriate pacing. Teacher knowledge (as measured on a test) was also significantly and positively related to higher student achievement.

School improvement studies

Unlike school effectiveness studies, which have been few in number, there have been a plethora of school improvement projects in South Africa. Taylor (2007; 2008) has done extensive work on identifying the elements of successful programmes (Taylor 2007; Taylor 2008). Rather than seeking out causal relations, he tried to establish statistically significant relationships between various interventions and an improvement in test scores. A number of these projects give some insight into the classroom factors that make a difference in the South African context, and some of these are reviewed here. Imbewu

encouraged a change in teacher practices consistent with those stipulated by Curriculum 2005, which included learner-centred methods and other progressivist teaching tenets associated with outcomes-based education. Schollar (2001) showed that despite teachers' greater understanding of Curriculum 2005, no learning gains in reading, writing and mathematics were registered, confirming that differences in teaching style have little measurable effect on student performance.

The Khanyisa Education Support programme (Taylor and Moyane 2004) baseline study focused on 24 rural primary schools in the Limpopo province, generating a number of interesting insights into classroom practices, and generally confirming findings elsewhere in the literature. 39 teachers teaching three numeracy and literacy lessons on consecutive days were observed. Forms of classroom interaction approximating chorusing, low levels of cognitive demand, weak forms of assessment, slow pacing and the poor quantity, and quality, of reading and writing were aspects that were known, but confirmed in this larger sample of classrooms, at the Grade 3 level.

One of the most startling findings of the Khanyisa project was that in only 3 per cent of literacy classrooms and in no mathematics classrooms did students interact individually with books. Not unlike practices in the past, and consistent with other studies, the most common form of reading consisted of the teacher writing up three or four sentences on the board and the students chorusing these after the teacher. Similarly, very little writing was done in these classes, and when writing was done it generally consisted of writing lists of isolated words rather than sentences.

The studies cited above, often based on self-report or poorly defined conceptions of 'good practice,' suffer serious challenges to their reliability and validity. Nonetheless, they have generated a number of insights around existing classroom practices that have been explored in a deeper and more theorised way in small-scale studies. The factors that emerge from the school effectiveness and school improvement studies conducted in South Africa are summarised in Table 1 and Table 2 below, identifying those that describe the average classroom, and those factors associated with improved learning outcomes for students.

Table 1: Dominant descriptive features of primary school classrooms from medium and large-scale studies

FINDINGS	KEY STUDIES
<ul style="list-style-type: none"> • Lack of print material in classrooms, especially textbooks • Lack of opportunities for reading and writing (oral discourse dominates) • Classroom interaction patterns that privilege the collective (chorusing) • Low levels of cognitive demand • Weak forms of assessment and lack of feedback on students' responses • Slow pacing 	<p>Taylor & Moyane, 2004</p> <p>Taylor & Moyane, 2004</p> <p>Taylor & Moyane, 2004</p> <p>Taylor & Moyane, 2004</p> <p>Taylor, 2008</p> <p>Taylor, 2007</p>

Table 2: Classroom factors associated with learning gains in medium and large-scale studies

FINDINGS	KEY STUDIES
<ul style="list-style-type: none"> • Teachers adjusting pace to pupil ability • Greater curriculum coverage • Greater content coverage by cognitive demand • Improved and appropriate pacing • More appropriate assessment and providing feedback to learners • A focus on reading and writing text. 	<p>Taylor, 2007</p> <p>Carnoy et al, 2011</p> <p>Reeves, 2005</p> <p>Reeves & Muller, 2007</p> <p>Taylor, 2007</p> <p>Taylor, 2008</p>

Small-scale studies

The descriptive and empirical findings identified above have been deepened and theorised in a number of small-scale studies. Following on from the PEI study, efforts to investigate teachers and teaching in small-scale studies continued, notwithstanding the issue of their generalisability. These studies provide useful and illuminating insights into classroom practices. There has also been significant work in the interrogation of theories of pedagogy which guide the exploration of classrooms.

There are a number of crucial aspects to the classroom environment that emerge from smaller scale studies that are beginning to be developed at a much greater level of theoretical sophistication, and which would merit further investigation at a larger scale and using alternative methodologies. These include the issues of time, language and teaching styles and knowledge in the classroom. We elaborate on these below.

Time

Many of the small scale studies focused on time concentrate on the crucial variable of pacing. A number of studies have reported on the extremely slow pace at which learning happens in classrooms. In considering the use of instructional time in a social class comparison of schools, Hoadley (2003) found that pacing in working-class classrooms was extremely slow, and was also undifferentiated. In other words, the class generally worked at the pace of the slowest learners. Ensor et al (2002), Ensor et al (2009) and Schollar (2008) found similar patterns in classrooms in their studies: a lack of differentiation and an extremely slow pace of learning. Slow pace crucially is detrimental to coverage of the curriculum. But coupled with a more general erosion of instructional time, it makes this coverage unlikely in many schools. The qualitative dimension of the Educator Workload Project (Chisholm et al, 2005) focused on ten teachers, shadowing them across a school week and documenting in detail how time was spent. Focusing on academically engaged time, the study showed the ways in which instructional time was eroded, both by official and unofficial school activities. In summary, the study showed that time spent on actual instructional activity ranged from a low of 6% to a high of 56% of the total official school time available.

The issue of time is especially pressing when one considers the implications for students coming from low income households. Because there is, in general, less learning and less support for learning in these homes, the school, as a site for learning, becomes more crucial, and more time is required for these children to master the curriculum. Time wastage and slow pacing in poor schools is thus even more problematic given that the amount of time allocated to the task of enhancing these children's educational outcomes is already too little (see Shalem and Hoadley, 2009).

Language and literacy

The importance of language to student performance has been raised consistently in the research literature (Taylor et al 2003; Fleisch 2008). A number of studies have described the strong relationship between student performance on standardised tests and exposure to the test language at home (Howie et al 2007; Reddy et al, 2006). The nature of the relationship is, however, far from conclusive. Fleisch (2008) is concerned with identifying the 'generative mechanisms' or the actual causal links between school language practices and academic performance, and he finds a number in the research, all derived from classroom-based studies (Heugh, 2005a; 2005b; MacDonald, 1990; Setati & Adler, 2000; Probyn, 2001). Fleisch's overview indicates that the understanding around language and student performance is far from empirically robust or conclusive. The question of why, and by how much language, especially learning in an additional language, affects achievement remains open. Fleisch makes the important observation

that it is very likely that the use of English as the language of instruction is likely to have different effects across different groups of learners, especially with regard to social class and those in rural and urban areas. In other words, a consideration of the social context in which any language is being taught needs to be considered. A crucial argument in this debate is one taken up by Murray (2002), who argues that divided opinions over the language of instruction issue have masked the issue of poor literacy teaching per se, as is evident in the low home language literacy levels amongst learners. Of concern is the evidence that learners do not have competence in literacy in any language. To a certain extent, in other words, debates around language deflect attention from the quality of instruction, irrespective of the language of instruction.

What do the empirical studies around language and literacy instruction show?

A study conducted by the Human Sciences Research Council (Reeves et al 2008) in the Limpopo province entailed observations in 77 primary classrooms in twenty schools. The study showed that very little reading took place, and that very few texts were being used in classrooms. In 12% of the foundation phase classrooms no reading was taught. When it was, teachers' predominant reading activity was to read aloud to the whole class. Teachers did not model or demonstrate how learners should treat, handle and care for books, nor did they reference punctuation, page numbers, or even the left-to-right orientation to text. Learners were mainly involved in reading isolated words rather than continuous text, and deriving meaning from text was rare, as was elaboration on learners' responses by the teacher. The authors conclude that not much direct or explicit literacy teaching is taking place in most of these Limpopo classes. They argue that the teachers did not know and follow appropriate steps to develop literacy and the scale of exposure to vocabulary (even pedestrian vocabulary) and text falls way below what should be expected at each grade level observed.

Hoadley's research (2008) into literacy practices confirms the lack of feedback to student response in working class classrooms. Reading aloud as a class and chorusing text after a teacher were common strategies in what she describes as a 'strongly communalised pedagogy'. Pretorius & Machet (2004) studied five disadvantaged schools in KwaZulu-Natal, focusing on the teaching of reading in Grade 1 classrooms. The authors found an emphasis placed on 'sound-centred readers', where the focus was on decoding single words rather than extended reading for meaning. Interestingly, the authors relate practices to the teachers' own social context. Many of the teachers are located in communities with deep oral cultures and are not in the habit of reading themselves. The lack of reading resources, and libraries in particular, was identified as an additional barrier.

From the descriptions of research into early literacy in classrooms, what teachers deploy approximates an audio-lingual approach to literacy, a behaviourist approach focused on oral drill sequences. There are aspects to these practices that appear not to have changed from the findings of the early studies in classrooms. This early research into reading had reported a strong reliance on the more technical decoding skills. The little research that existed argued that learners in poor schools could often decode text (that is, pronounce sounds and words) but had little understanding of what they had read (MacDonald 1990; Flanagan 1995). This formed part of the aversion to the teaching of phonics in curriculum revisions post-apartheid. Research also indicates that the struggle with reading and literacy is not only in English but in African languages as well (Taylor and Vinjevoold 1999; MacDonald 2002). The formal and appropriate teaching of phonics, especially in poor schools, is now an area of dire neglect as is exposure to whole language.

A number of classroom based studies have considered the practices of code-switching, translation and 'translanguaging' in classrooms to help learners contend with the demands of learning in an additional language (Macdonald 1990; Probyn 2009; Setati et al 2002; Desai 2001; Brock-Unte and Holmarscottir

2004). These researchers focus on the complexities in the classroom where learners learn through the medium of English, which is not their home language, and teachers deploy strategies that attempt to bridge home language and the language of instruction for a range of cognitive and affective purposes (Probyn 2009). Although it is clear that the demands on both teachers and learners in these contexts are great, findings on the actual effect of code-switching and other bilingual practices on student learning is inconclusive.

From the literacy studies we can further our characterisation of classrooms, by suggesting the following descriptive features of language classrooms listed in Table 4 below.

Table 3: Descriptive features of primary literacy and language classrooms

FINDINGS	KEY STUDIES
<ul style="list-style-type: none"> • Lack of learner opportunity to handle books and bound text • Limited teaching of reading and writing • Students mainly read isolated words rather than extended texts • Focus is on decoding rather than comprehension of text • Little or no elaboration on learner responses • Learning is largely communalised rather than individualised • Little formal teaching of vocabulary, spelling and phonics • Lack of (good) print material in classrooms • Numerous complex language challenges where the majority of learners learn in an additional language which is not their home language 	<p>Reeves et al, 2008 Reeves et al, 2008 Pretorius & Machet, 2004 MacDonald, 1990; Reeves et al, 2008 MacDonald, 1990; Hoadley, 2008 Hoadley, 2008 Taylor & Vinjevald, 1999 Reeves et al, 2008 Probyn, 2009; Setati & Adler, 2000; Desai, 2001; Brock-Unte and Holmarscottir, 2004</p>

Teaching styles and Bernsteinian studies

A review of the research literature shows that in South Africa there have been a number of studies focused on classroom interaction and on teaching styles. Some of this research has importantly identified that these teaching styles are related to pupil performance. For example, the works of Schollar (2008) and Taylor (2008) argue persuasively that the loss of emphasis on memorisation, and the idea of discovery learning and that children cannot be wrong are at the root of much learner underachievement. Teaching styles in the context of shifts to constructivist theories of learner and the negative outcomes of more 'learner-centred' classroom practices are thus identified as important.

But other studies have shown that broad characterisations – teacher-centred and learner-centred – are not helpful (Reeves, 2005; Schollar, 2001), and there is a body of research that has refined these categories into dimensions of pedagogy. This has been done especially effectively in studies drawing on a Bernsteinian framework. Researchers working within this framework have theorised pedagogy as a structuring of time, space and text (Bernstein 1996), and have explored the relatedness of classroom features in a way which considers both the organisation of knowledge and its transmission. This work has drawn attention to a number of features crucial to successful teaching and learning experiences, especially for working class students. Countering the teaching styles research which advocates either teacher-centred or learner-centred approaches (or in the US terms, traditional and reform or progressive pedagogies), this research has shown, empirically, the effectiveness of a mixed model of pedagogy, containing features from both types (Hoadley and Muller 2009). In particular, the research draws specific attention to making the evaluative criteria explicit, which consists of 'clearly telling children what is expected of them, of identifying what is missing from their textual production, of clarifying the concepts, of leading them to make synthesis and broaden concepts and considering the importance attributed to language as a mediator of the development of higher mental processes' (Morais et al 2004:8). In other

words, a direct pedagogy. The Bernsteinian framework for the analysis of pedagogy is one that has been very influential in classroom-based research in the South African context, and the categories for the analysis of pedagogy have been deployed in a number of projects. In this tradition of research the issues of cultural difference and cultural specificity have been downplayed and an emphasis on structure has been attended to.

The importance of knowledge

What emerged from the review of the literature was a new direction in classroom-based research, focused more on the ‘what’ (knowledge) of teaching and learning, in addition to, the ‘how’ (pedagogic practice). The research raises questions around how subject-specific knowledge may be theoretically described and researched. What we do know from systemic tests is that there is a very low level of cognitive demand in classrooms. Some research has begun to explore what this means (Schollar 1999; Vinjevald and Roberts 1999; Adler et al 2002; Setati et al 2002), and to consider students’ differential access to school knowledge (Hoadley 2007).

Ensor (2009) in the context of the Count One Count All (COCA) study combines a consideration of time use, and pacing in particular, with cognitive demand in a concept she calls ‘semantic density’. ‘Semantic density’ refers to the specialisation of texts and time, or more specifically, the distribution of text across time. In other words, the more specialised the text (i.e. the more abstract it’s rendering) and the more concentrated the periods of time across which the text is distributed, the higher the semantic density. This is a novel contribution to thinking about pedagogy as a relational system, rather than as atomised dimensions, such as pacing and cognitive demand. The COCA study found students engaged in very concrete methods for solving problems rather than being given access to more abstract algorithms and means for solving problems. These concrete methods are highlighted by Hoadley (2007) and Schollar (2008), examples given below.

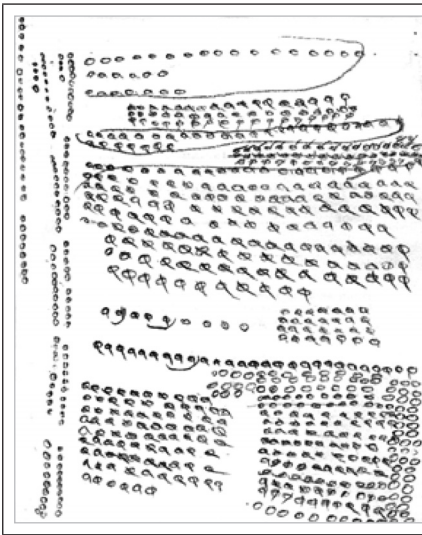


Figure 1: From Schollar (2008) Grade 5

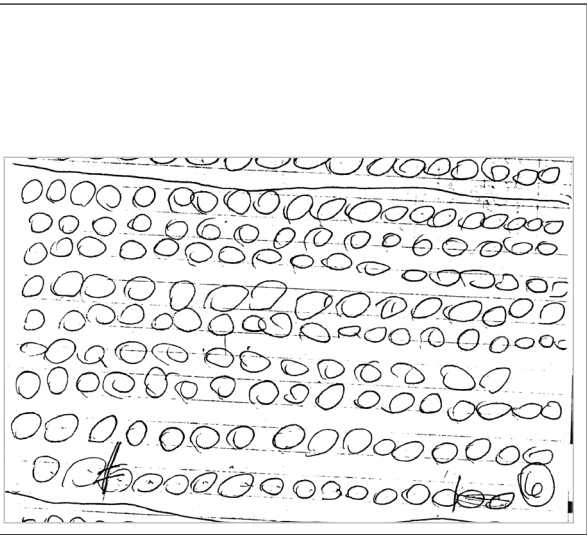


Figure 2: From Hoadley (2007) Grade 3 calculating student's working out $210+14$

The question of the movement from the concrete to the abstract (especially in mathematics) has been taken further by the work of the Count One Count All (COCA) project as described above, and in the work on mathematics knowledge in schooling by Davis (2010). Significant recent work by Venkat and colleagues also focuses on this issue of the concretising of mathematics in the classroom. Venkat & Askew (forthcoming) consider how teachers mediate number learning through the use of 'structured' artifacts in 'unstructured' ways. They point to the ways in which concrete counting allied with column algorithms in classrooms promotes a reduction of all number working to single digit number operation resulting in a bypassing of what literature would describe as good number sense, whilst allowing for the production of correct answers that allow the lesson to proceed. Further work by Venkat and Naidoo (2012) also focused on Foundation Phase classrooms, considers poor coherence in and across pedagogic communication and activities and the random selection and sequencing of exercises that inhibit meaning making. The random selection and sequencing of tasks and weak coherence give rise to what they term an 'extreme localization' and 'ahistoricity'. Davis (2010) uses the notion of ground to describe the ontological decisions of teachers and learners as they make references to mathematical objects precisely to regulate the production of mathematics. 'Ground' in this work serves to expand the dichotomy that exists between procedural and conceptual ways of coming to understand mathematics through the generation of four categories, taking iconic, propositional, procedural and empirical (trial and error) aspects into account. Although initial and undergoing development in relation to empirical data, the work signals a deeper focus on the specificities of subject-specific knowledge in the pedagogic context, beyond relatively simple distinctions between school knowledge and everyday knowledge and procedural and conceptual knowledge.

From the small scale studies we have a relatively clear picture of what is happening in classrooms in primary schools, and many of the factors resonate with those found in larger scale studies. The features are summarised in Table 3 below

Table 4: Descriptive features of primary school classrooms derived from small-scale studies

FINDINGS	KEY STUDIES
<ul style="list-style-type: none"> • Low levels of cognitive demand • Dominance of concrete over abstract meanings • Lack of opportunities for reading and writing (oral discourse dominates) • Slow pacing • Collectivised as opposed to individualised learning • The erosion of instructional time • Multiple complexities related to language, especially second language teaching and learning • Lack of explicit feedback to learners • Lack of coherence 	<p>Adler et al, 2002 Schollar, 2008; Ensor, 2009 Reeves et al, 2008; Pretorius & Machet, 2004 Hoadley, 2003; Ensor et al, 2002 Hoadley, 2008 Chisholm, 2005 Probyn, 2009; Setati & Adler, 2000; Desai, 2001; Brock-Unte and Holmarscottir, 2004 Reeves, 2005; Hoadley, 2008 Venkat and Naidoo, 2012</p>

Conclusion

One of the problems in classroom-based research has been the inability of research to show the impact of teaching and learning on learner achievement, relative to other factors, such as management and teacher professionalism. In fact, it is clear that the latter two factors have gained prominence in thinking about how we might improve schools (see for example the 2011 National Planning Commission's plan for education). The danger is that we may lose the key point of leverage for improving students' educational opportunity, in this way, by understanding what goes on in the classroom and making effective interventions there. Studies that have attempted to consider various levels – such as the PPP –

have failed to develop adequately robust constructs for measuring classroom factors that will show up in regressions. For this reason, although we know that instruction lies at the heart of education, we have yet to show the impact of different forms of teaching and learning on students' educational livelihoods, however important we might believe or intuit these to be. We need more large scale, longitudinal studies of classrooms. However, there is much to be learnt from small-scale studies and what we already know, in developing the appropriate constructs to measure in these large scale studies.

Much of classroom research tends towards descriptions of teaching styles. These descriptions are often also polarised into more learner-centred approaches versus traditional teacher-centred ones. These discussions only take us so far, because as Alexander reminds us 'it is now generally accepted that cognitively demanding interaction is a fundamental condition for all successful teaching of young children, however it is organised' (2001:394). The relative lack of importance of 'teaching styles' in the South African context has been clearly shown by the work of Reeves (2005), where curriculum coverage and opportunity to learn far outweigh the effects of a learner-centred or teacher-centred pedagogy. New avenues of research into pedagogy and its relation to subject-specific knowledge signal a deeper engagement in making sense of classrooms.

The limitations of the research base aside, we are able to derive from a range of studies a number of classroom variables at the primary level, which, on the one hand, describe what is going on in classrooms, and, on the other, relate these to differential student outcomes. It is the consistency of findings over a number of relatively small and medium scale studies that allows us to report with some confidence that these are factors that might fruitfully be explored in further research. Such research would usefully take heed of some of the methodological shortcomings of current studies identified in this review, as well as take seriously the interrelatedness of classrooms, schools, communities and systems and the deep historical embedding of classroom practices within particular socio-political contexts. These descriptive and achievement related factors are listed in the final tables below. The notions of discourse, knowledge and time (broadly based on Alexander's (2001) and Bernstein's (1996) conceptualising of pedagogy) are used to summarise and organise the factors.

Finally methods of analysis, including mixed methods, are increasingly regarded as crucial in obtaining valid and reliable understandings of classroom knowledge and processes of its transmission. There is potential to go beyond multiple regression and ethnographic description to consider new analytic approaches (such as latent class analysis and latent transition analysis (Douglas 2009)) in the examination of classrooms. Experimental designs have also been suggested as a significant means of moving classroom-based research forward, where best-bet instructional interventions (what Cohen Raudenbush, and Ball (2003) call 'instructional regimes') are designed and developed and tested in schools, especially those serving poor students. These instructional regimes can be derived from our existing knowledge base – combining hypotheses from large-scale correlational studies, new evidence stemming from basic research and well-supported theory, and the best wisdom of practice (Cohen et al 2007). Gaining deeper and more robust understandings of instructional practice is critical to understanding why and in what ways schooling in South African primary schools continues to fail the vast majority of learners. And we already have established a comprehensive knowledge base from which to develop this work.

Table 5: Descriptive features of South African primary school classrooms

Discourse	<ul style="list-style-type: none"> • Oral discourse dominates – limited opportunities to read and write • Classroom interaction patterns privilege the collective (chorusing) • Limited feedback or evaluation of student responses • Most learners learn in an additional language • Learning is communalised rather than individualised
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Knowledge	<ul style="list-style-type: none"> • Low levels of cognitive demand; • Little use of textbooks, books or strong texts • Concrete meanings operations dominate over abstract meanings • Lack of focus on written text, reading and writing • Focus on decoding text and neglect of reading extended text
Time	<ul style="list-style-type: none"> • Slow pacing • The erosion of instructional time

Table 6: South African primary school classroom factors associated with student learning gains

Discourse	<ul style="list-style-type: none"> • More appropriate assessment and providing feedback to learners.
Knowledge	<ul style="list-style-type: none"> • A focus on reading and writing text • Teacher's proficiency in the language of instruction
Time	<ul style="list-style-type: none"> • Teachers adjusting pace to pupil ability • Greater curriculum coverage • Greater content exposure by cognitive demand

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