What do we know about teaching and learning in primary schools in South Africa? A review of the classroom-based research literature

Ursula Hoadley

(University of Cape Town)

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1. Introduction

This document 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. The review forms the background to the WCED Grade 3 Improvement Project, which aims to identify the critical factors impacting on the performance of students on Grade 3 systemic tests. The research focuses on the Foundation Phase (Grade 1 to 3) level of primary school, and this review likewise attempts to gather all findings relevant to this level. However, the review's focus is broadened to the primary level more generally given that there is very little published research at the Foundation Phase level specifically. The review also locates the study of classrooms within the broader international context, discussing briefly international approaches and foci in classroom studies at the primary school level. This part of the review is not comprehensive but rather serves to locate the South African literature.

The review draws on both published and grey material in tabling existent findings on classrooms in South Africa. Many of these studies have significant methodological limitations, and are also limited by the small sample sizes of many of the research projects on which they are based. Nonetheless, cumulatively, they allow us to describe the nature of teaching and learning in classrooms, and also identify with relative confidence a number of classroom-level factors which impact on student achievement outcomes. School, and even more so classroom, effects have been difficult to discern in research, especially given the lack of longitudinal studies which are able to reflect the cumulative nature of learning that goes on in classrooms. We have yet to develop a stock of good studies in South Africa that focus on the factors that make a difference in classrooms, especially in studies which are generalisable to large populations. 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 large-scale studies.

The report begins with a brief international review, providing a broad summary of the methodological issues in classroom-based research world-wide. It also, largely through considering school effectiveness studies, considers some of the empirical findings that have emerged across different contexts. The review of the South African literature is more comprehensive, looking at a range of small and larger-scale studies, and drawing out the empirical findings of these studies. Studies which have looked at literacy and numeracy at the Foundation Phase specifically are also reviewed.

The report concludes with a summary of the findings, as well as some of the cautionary points around methodology and validity that emerge in the course of the discussion of the research literature.

2. International context

This first part of the review considers a number of central issues in classroom research generally. The first pertains to some of the debates around methodology and focus. Secondly some of the empirical findings around classroom factors impacting on student achievement outcomes in the school effectiveness tradition are drawn out.

Methodology and focus

The earliest work on classroom observation was that undertaken by Flanders in the US, who developed perhaps the first coding scheme for classroom interaction (Amidon and Hough, 1967). The work emerged from a socio-psychological tradition, and comprised pre-specified coding schemes based on verbal behaviour in the classroom. The focus was largely on the socio-emotional environment of the classroom. Progressively, as we see below, work in the US focused more on instructional issues, most notably the issue of time, especially 'academically engaged time'.

In relation to the research traditions in classroom research in the 1960s, Koehler (1978) distinguishes between those that described the process and those that linked processes to desired outcomes. Cazden (1986) summarizes these as positivist and interpretive in their approaches. The positivist approaches were based on the type of systematic classroom observation protocols of the Flanders type, linking classroom behaviours to student outcomes, which were later to become the school effectiveness type studies. The interpretive approach asked questions related to broader sociological, linguistic and cultural aspects of classrooms. Some of the most well-known included the question of the differential distribution of knowledge to students of different social groups (Keddie 1971; Walkerdine 1988), teacher labelling (Labov, 1972; Cicourel and Kitsuse 1963), tracking (Oakes 1985) and teachers and students of different social classes' access to different 'ways with words' and ways of interacting (Heath 1985).

The two approaches – broadly interpretivist and positivist - were associated with two differing methodological approaches to observing classrooms, broadly inductive and deductive. *Inductive approaches*, often described as classroom ethnography (Delamont & Hamilton, 1993; Galton & Delamont, 1985; Hammersley, 1993), and often but not always associated with grounded theory, call for the generation of the fullest possible records of classroom life from which theoretical frameworks could be inductively derived. Inductive approaches are usually but not always associated with exploratory, small-scale studies involved in theory construction. A notable exception is the TIMSS video study (Stigler, 1997; NCES, 1999) which adopted an inductive, theory building approach but which was relatively large in scale (and hence very costly).

Deductive approaches, in the past often referred to as systematic observation (Croll, 1986), operate deductively from theory to the development of categories and subcategories used to sample aspects of classroom life. Deductive approaches are more commonly used in large-scale studies and tend to be more concerned with theory testing than theory development.

Methodologically, one of the key issues grappled with in classroom observation research since the 1970s has been the pros and cons of these ethnographic (qualitative) and systematic (quantitative) approaches, and the relation between them (Wragg, 1975; Galton and Delamont, 1985), the former

entailing closed systems of pre-coded data collection, the second 'rich' and 'thick' descriptions of the everyday life of classrooms. Debates have also focused on how the two approaches may be reconciled.

One of the most well-known studies of the 1970s was the ORACLE study in Britain which drew on and developed the scheme offered by Flanders (Galton and Simon, 1980). ORACLE was the first large-scale, longitudinal classroom observation-based study in Britain. These represented initial attempts at getting at what was going on in classrooms and exemplified the limits of classroom-based research at the time. ORACLE set out to consider the "relative effectiveness of different teaching approaches across the main subject areas of primary school teaching" (164). Ultimately, as Alexander (2001) argues, these studies were able to do little more than give insight into the organisation of classroom interaction. The ORACLE study did contribute to our understandings of 'pedagogical asymmetry' – or the proportion of teacher talk to student talk, and also drew attention to the notion of teaching styles, based on the form of organisation (group or individual) and interaction between teacher and students. What all of this style of research missed was the issue of cognitive exchange in the classroom – in other words what did organisation and interaction mean in terms of student learning.

A third approach, also emerging strongly in the 70s was the socio-linguistic tradition, which 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 which began to move away from analyses of teaching styles to a consideration of knowledge exchange. Here evaluation of statements, which marks classroom speech productions off from that of everyday discourse, were privileged. Communication as identified here is specifically instructional or pedagogical.

These three major approaches in the 1970s – the ethnographic, the systematic and the socio-linguistic – 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. Empirically, there were three major issues which arose out of the body of classroom research by the 1990s. One was the focus on teaching styles, the other were interaction patterns described above and finally, there was an increasing interest and emphasis on the importance of time. There were also an increasing number of large-scale studies, including cross-cultural comparative studies which began to expand the understanding of classrooms and the relation of different dimensions of study. Finally, school effectiveness studies became increasingly prominent in the late 1980s and 1990s.

Cross cultural studies

Three of the most well-known cross-cultural studies are reviewed here, the IEA Classroom environment study (Anderson et al, 1989), the TIMMS video anlaysis study (Stigler & Hiebert, 1997; Schmidt et al, 1992); and Alexander's Five Cultures study.

One of the most well-known large-scale cross-cultural, comparative studies of classrooms which yielded important and interesting insights was the TIMSS video study of 231 classrooms in the US, Germany and Japan. This study focused in particular on Grade 8 mathematics classrooms, and was crucially concerned with the kinds of mathematics students in these classrooms encountered. An interesting conclusion drawn from the research in relation to considering reform and solutions to problems in teaching is that

> Teaching is not just a collection of individual features, it is a system of tightly connected elements. And the system is rooted in deep-seated beliefs about the nature of the subject, the way students learn, and the role of the teacher. Attempts to change individual features are likely to have little effect on the overall system (Stigler and Hiebert, 1997).

The authors of the study make strong arguments around the cultural embeddedness of classroom activity. "Besides the ineffectiveness of just disseminating prescriptions, systems of teaching are not easily transported from one culture into another. Teaching, as a cultural activity, fits within a variety of social, economic, and political forces in our society. The effects of teaching are determined, in part, by all of these forces". Thus the authors argue if one imports a system of teaching into a different culture, one cannot expect that system to produce the same results. The Japanese system of teaching is enmeshed within Japanese culture; the social and behavioural norms; the expectations and involvement of parents; the national curriculum; values of education held by students, parents, and the public; and so on.

Another large-scale comparative study was the IEA classroom environment study (Anderson et al. 2001) which considered 429 classrooms in 275 schools in eight countries – the Netherlands, Nigeria, Thailand, Canada (Ontario), Canada (Quebec), Australia, Hungary, Israel and Korea. The study produced both descriptive data and analysis of classroom factors related to greater student achievement. Classroom factors focused mainly on teacher behaviours and teaching styles. The study found little effects of teacher behaviours on student outcomes, and stronger effects of teacher expectations. The study itself identified as a key omission a satisfactory measure of opportunity-to-learn, and the consequent inability of the study to identify teacher or instructional variables associated with variable student achievement. The study confirmed many of the findings of earlier studies (especially ORACLE) and also confirmed the limitations of studying classrooms at scale in naturalised settings.

Alexander (2001), in a five-country comparative study, also conceptualised the study of pedagogy as both nested in systems and schools, and also as an inter-related system of organisation, discourse and values. Looking at France, England, Russia, India and the United States, the study examined the cultural patterning of schooling across different national contexts. Schooling processes are placed within their historical context, considering the socio-political development of educational systems and how these dynamics manifest in classroom organisation, values and discourse.

From the cross-country comparative studies a number of key issues arise. One is the inter-relatedness of the schooling system, where classrooms are conceived as nested within schools, systems and particular socio-political set-ups. Related to this is the cultural embeddedness of schooling and especially classroom processes. The issue of the inter-relatedness of classroom activity is an important issue in classroom-based research, especially that conducted at scale. The tendency in large-scale research has been to atomise practice in the identification of variables for measurement. Some of the more recent research has attempted at both a large-scale (Cohen et al, 2003) and small-scale (Morais, 2002) to theorise classroom practice as a structured process consisting of inter-related dimensions. Researchers working within the framework of the sociologist Basil Bernstein, have theorised pedagogy as a structuring of time, space and text, 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. In particular, the research draws specific attention to what it terms making the evaluative criteria explicit – which essentially entails making what students are required to do, what knowledge they are to acquire, very explicit. The Bernsteinian framework for the analysis of pedagogy is one which has been very

influential in classroom-based research in the South African context, and his categories for the analysis of pedagogy have been deployed in a number of projects. In this research the issues of cultural difference and cultural specificity have been downplayed and an emphasis on structure attended to. In addition, more recently there have been attempts to conceive of classrooms in the context of schools and systems, and to understand these as related. We return to these in a discussion of the South African research below. Two remaining issues arise out of the studies discussed thus far: that of measurement and that of time.

Measurement

The issue of measurement has also been an on-going source of debate and development since the 1960s, especially in relation to large-scale research. Often based on self-reporting, teacher accounts of their own practice have proven to be problematic not only because of memory, comprehension judgement and social desirability (Douglas, 2009), but also because of the enduring finding that teachers' reported practice is fundamentally different to what they do in practice in their classrooms (Argyris and Schön, 1974), this being found for South African teachers as well (Taylor and Vinjevold, 1999). More recently alternative methodologies (Pianta & Hamre, 2009), such as teacher logs (Rowan & Correnti, 2009) are being proposed and trialled. The question of sampling has also been of critical concern. How often to observe (a day, a week, a teaching unit, etcetera), what to focus on (teacher, student, productions, resources) and what technology to employ (video, audio recording, etc.) have all been aspects of concern. Finally methods of analysis, including mixed methods, are increasingly regarded as crucial in obtaining valid and reliable understandings of classroom processes. Moving beyond multiple regression and considering new analytic approaches such as latent class analysis and latent transition analysis (Douglas, 2009) has been highlighted. 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).

Time

In the 1970s, at the height of the progressivist expansion, time became an object of study, partly because within progressivism it became a crucial variable in considering forms of pedagogy. This was because the individual learning path of students, as well as developmental variability in students, became emphasised. Who should have control over classroom time (student or teacher) and how it should be matched to student development and different levels became an object of concern. Progressive pedagogy often found itself at odds with a curriculum set within finite time, to be completed at a particular stage. The Berlaks (Berlak and Berlak, 1981), Brown and McIntyre (1993) and Bennett (1995) all focused on time as a crucial variable or 'container' of what occurred in classrooms, making explicit the direct relationship between time and learning. By the mid 1990s the concern with time, and more crucially time-on-task which had been found to be compromised by the more flexible structuring of progressive classrooms, had become a serious concern in educational research. As we will see in specific studies below, time is an issue that has been extensively explored in studies in South Africa, with crucial implications for research findings related to teaching and learning.

At least three distinctions in the research on time can be discerned. One is focused on the allocation of time (in other words on time scheduling or timetabling); another considers academically engaged time (which looks at opportunities for learning and student engagement); and finally there is a strong research tradition focused on pacing (a specific concept employed to obtain a more fine-

grained analysis of academically engaged time by looking at the rate of transmission). A number of studies have sought to combine aspects of pacing with content coverage and with the conceptual level of instruction in a construct known as opportunity-to-learn. This construct, variously defined, also includes in some studies across-grade pacing and sequencing of topics. Opportunity to learn (OTL) is a variable that has become strongly represented in the school effectiveness research to which we turn in the next section.

School effectiveness research

Starting earlier, but becoming widespread in the 60s and 70s and continuing today, is the school effectiveness tradition of research. Essentially, this research took as its independent variable student achievement and attempted to identify those factors associated with better results, in other words the relative effectiveness of different variables in producing improvements in student test scores. This tradition as been less prevalent in South Africa, given the general lack of student achievement data until recently. We do report on some of the studies below, which have increased since the availability of student test data beyond that of the final school leaving exam. However, it has always been the US that has been pre-eminent in this type of research.

Beginning with Coleman in the 1960s, one of the most enduring findings from this research and in the sociology of education more generally, is that home background makes the biggest difference to students' learning outcomes, and that the impact of the school (and classroom) is relatively small. Coleman's findings showed that

> [T]he social and academic characteristics of the student environment experienced by the average Negro and the average white are very great – greater in fact than differences in any other characteristics of their respective schools (Coleman et al, 1966: 257).

The other major difference that Coleman and his colleagues found was in the characteristics of teachers (especially in terms of 'attitudes' and scores on a vocabulary test), and the fact that white and black teachers were matched to white and black student populations. Overall, the Report claimed that about 70% of the variation in student test scores across schools could be explained by home background; the next most significant factor being teacher quality; with actual physical resources accounting for very little of the variation.

One of the responses to the Coleman Report was a spate of research that attempted to show that schools did make a difference. However, despite all the research showing just what does make a difference, the Coleman findings have remained one of the most stable in school reform research (Muller, 1999:3). This finding was seen as claiming that schools don't and can't make a difference. What Coleman had meant was that poverty level and class predicted more reliably than any school factor the relative success of a student at school.

There have been a number of reviews of the many school effectiveness studies that have been published in recent years which summarise the classroom and teacher variables associated with higher achievement, the most well-known being those of Creemers (1996), Scheerens (2001), Scheerens (2004) and Reynolds and Teddlie (2001).

It is clear from the reviews that there is a vast array of factors impacting achievement. What emerges strongly is that teachers and teaching do make a significant different, but there has been a tendency in the production function models of the school effectiveness research to de-emphasize teachers and class size as important factors. The research has thus generally been unsuccessful in determining what it is precisely about successful teachers and teaching (such as classroom interaction patterns, teachers' professional expertise, etcetera) that increases student achievement (Kain, Hanushek & Rivkin, 1998; Bryk and Schneider, 2002; Kyriakides, 2002). Some inventories and lists have narrowed down which sets of factors make the most difference, and some progress has

been made particularly in *between-school* studies. However, the challenge of studying classroom level process factors remains, particularly in developing countries (Scheerens, 2001:357). Although it is unclear what precisely does make a difference to student achievement outcomes after taking background into account, Coleman *et al*'s (1966:316) finding, which highlights teacher characteristics, has endured.

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 (p. 1536). Further, as pointed out by Brophy and Good (1986), teacher effects persist in varying greatly across grade level, subject and types of pupils, and this variation is exacerbated by the fact that teacher effects are additive and cumulative, and generally not compensatory (Darling-Hammond, 2000).

Teachers' subject knowledge (Scriven, 1994), teachers' general knowledge of pedagogy (Fennema & Loef-Franke, 1992), and pedagogical content knowledge (Shulman, 1987) are all widely perceived as factors affecting teacher effectiveness. Borich (1992) points out, however, that teachers' prior achievement, regardless of how it is measured, has rarely correlated strongly with classroom practice and student achievement. Darling-Hammond (2000) also shows that the teachers' measured knowledge and the performance of their students have little or no relationship. In South Africa the importance of teacher knowledge has been stressed (Taylor & Vinjevold, 1999), given teachers' reportedly low levels of conceptual and content knowledge of their subjects. Although the importance of the issue may be commonsensical, there is as yet little conclusive research evidence as to what kind of measurable effect teachers' knowledge has on learning (if any) in this country.

The school effectiveness tradition generally remains committed to the social justice goal of providing 'equality of educational opportunity' and optimizing opportunities for learners within the 'circumscribed possibilities for improvement schools had to begin with' (Muller, 2000). Not all would agree with this interpretation. The school effectiveness tradition has been criticized for having anti-democratic tendencies in areas such as school leadership, teacher professionalism, curriculum and pedagogy, especially within the context of an accountability regime in Britain (Wrigley, 2003). It is also argued that, although it provided an antidote to the pessimism and fatalism of the 1970s, 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. See also, 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.

Summary

This section has provided a brief overview of classroom-based studies internationally. It has identified a number of central features of studies of classrooms, including some of the methodological issues and empirical findings. The latter emanate largely from the school effectiveness research, which identifies a number of factors associated with better student performance. Out of this literature there are four features that emerge in developed country contexts as significant: Time; textbooks; teacher training; and opportunity to learn. Time as a variable in the school effectiveness literature time is conceptualised in ways described earlier. Opportunity to learn is another variable which emerges as significant in the literature (Rowan et al, 2002; Schmidt et al, 2001). The school effectiveness literature, however, fails to satisfactorily understand what actually goes on in classrooms and what teaching and learning is all about. In the

next section of the review the South African literature is considered in more detaile, and an attempt is made to gain as comprehensive a picture as possible regarding the empirical findings relating to classrooms which have proved to be consistent over a number of different research studies.

3. South African studies

Introduction

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 (p. 158). 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 resistance on the part of 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) 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" (p. 21). 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), a 3-year project that followed a 1985 pilot study examining the nature of the language and learning difficulties that black Std 3 (Grade 5) children in South Africa experience when they change from their mother tongue of Sepedi to English as a medium of instruction and learning. Essentially this study focused on the problems experienced by learners when they were expected to cope with the demands of suddenly 'crossing the threshold' to learning all their subjects through the medium of English. The study was conducted in the then apartheid homeland of Bophuthatswana. The study showed how learners had about 700 words at most in English but that the curriculum required at least 7000. 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 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" (p. 143). The study made connections between this pedagogical experience of learners and the very high drop out rate of learners at the Grade 4 level at the time.

Another early socio-linguistic study was that of Chick (1996) who made the argument that the chorusing and rhythmic chanting in classroom, 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" (p. 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 set up under apartheid.

Walker (1989) conducted a significant amount of action research at the time, 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 base 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 use. 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 which assessed learner achievement.

These studies were problematic, conceptually and methodologically (Taylor *et al* 2003; Ensor & 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 there have been a number of small and large-scale projects focused on classrooms. What has predominated are small-scale qualitative studies; however, there have been a growing number of larger-scale studies, of which the current study is one of the largest in scale. 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 and availability of data from standardised systemic testing of student performance. 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). However, Van der Burg and Burger (2002) and van der Berg (2002) have been able to show the effect of school-level factors on student performance. Van der Burg and Burger (2002) show very similarly poor schools serving poor communities performing almost across the full range of variation in matriculation results. Although suggesting the importance of management factors, these studies have as yet not been able to distinguish between school and classroom level factors and their effects on student performance. Thus what it is precisely about schools and especially classrooms that makes the difference remains elusive in this form of multiple regression study.

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. Although there have been few of these studies which have looked at classroom level variables, those that exist offer some insights into the dominant factors. 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 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 and 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.

Though not a classroom variable but one related to the home, the PPP confirmed language as the most powerful influence on learning, after poverty: children are severely disadvantaged when the home language and the language of instruction do not coincide. This is a well established finding in South Africa (see below, and Taylor et al, 2003 for a summary). In the home, the PPP found that learning is enhanced when parents speak to their children in the language of instruction, and where children read and do homework frequently. In relation to classroom factors specifically, the PPP was unable to show any significance of any of these variables.

In a smaller study of 24 poor schools, also in the Western Cape, Reeves (2005) and Reeves and 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 these studies which have been shown to optimise student learning, which include pace, and its differentiation; curriculum coverage; and providing feedback to learners, i.e. on-going assessment for learning.

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. Although relatively few of these projects have been properly evaluated, Nick Taylor has done extensive work on identifying the elements of successful

programmes (Taylor, 2007; Taylor, 2008). Rather than looking for causal relations, the emphasis has been on establishing 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. Two of the largest projects evaluated at the primary level were the Imbewu project and the Learning for Living project. Imbewu encouraged a change in teacher practices consistent with those stipulated by Curriculum 2005 – learner-centred methods and progressivist tenets of outcomes-based education teaching. 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 Learning for Living project was a focused reading intervention, involving training in teaching reading as well as the provision of reading resources. This project did show gains in reading when project and control schools were compared (Schollar, 2005).

The Khanyisa Education Support programme (Taylor and Moyane, 2004) baseline study looked at 24 primary schools in Limpopo province, randomly selected from two rural districts, generating a number of interesting insights into classroom practices, and generally confirming findings elsewhere in the literature. Classroom observations were undertaken in all 24 schools of literacy and numeracy lessons at Grade 3 level. 39 teachers teaching three 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% 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 Bitou 10 project, a much smaller project working in seven primary schools in the Western Cape, has shown gains in reading at the Grade 3 level through an intensive emergent literacy approach involving explicitly tying reading and writing and providing students with extensive opportunity to practice both skills. Like the Learning for Living project, the focused nature of the intervention has shown significant gains in student reading scores, although the project is of too small a scale to make any broad claims regarding its representivity or replicability.

A number of the initial large-scale studies constituted base-line studies for various classroom interventions (for example, Khulisa, 2001). These studies, 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 existent classroom practices which 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 which describe the average classroom, and those factors associated with improved learning outcomes for students.

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

. A lack of print material in classrooms, especially textbooks
. A 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

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

. Teachers adjusting pace to pupil ability
. Greater curriculum coverage, including teacher knowledge and planning for and coverage of curriculum standards
. Greater opportunity to learn (content coverage by cognitive demand, content exposure as well as curriculum coherence and pacing)
. More appropriate assessment and providing feedback to learners
. A focus on reading and writing text.

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 and notwithstanding the problem of their generalizability, these studies provide useful and illuminating insights into classroom practices. Several of the studies and their findings are reviewed in Taylor *et al* (2003). Significant work in the interrogation of theories of pedagogy which guide the exploration of classrooms is also being undertaken in education departments in various institutions, notably the University of Cape Town, University of the Witwatersrand and University of KwaZulu-Natal. This concerted effort by a number of researchers asserts the importance of classroom-based research, while recognizing the complexities of conducting that research. In a sense, this effort expresses Ensor's (2002) concern that

> …irrespective of epistemological commitment, the challenges we face in making robust claims about pedagogy remain shared. At issue are the steps we take to produce and analyse classroom data in order to make trustworthy claims about pedagogy. Trustworthiness ultimately is a matter of rigour, and the establishment of clear criteria of worth (p. 10).

In other words, the need to theorise classroom practice more carefully persists. Similar to the international context there is a need to avoid atomisation and to consider the relatedness of classroom variables. 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 knowledge in the classroom. We report on these below, before considering the few Foundation Phase-specific studies which enhance our understanding of what is going on in classrooms at a descriptive level at this particular level.

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. Ensor et al (2002) conclude that classroom pacing is strongly affected by school management practices such as time management and macro curriculum pacing.

In considering the use of instructional time in a social class comparison of schools, Hoadley (2003) also 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) confirmed this finding in their study of the use of textbooks in classrooms. They were struck by the extremely slow pace of learning, which they hypothesis may be linked to the weak specialisation of time, by which they mean "the strict partitioning of the school day into units set aside for engagement with the formal curriculum, for play and for other activities". Ensor et al (2009) and Schollar (2008) find 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 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.

Large-scale studies of time use place these findings in context. Although many of these findings are derived from teacher and principal reports and consequently limited, they are consistent across studies and revealing. The Educator Workload Study conducted in 2005 and drawing on a nationally representative sample of teachers, showed that teachers by their own account spend only 41% of allocated time teaching. The PIRLS study shows very little time spent on reading in South African schools compared to other countries (Howie et al, 2007). Van der Berg and Louw (2008) in their analysis of the SACMEQ data revealed high levels of teacher absenteeism, especially in poorer schools.

The issue of time is especially pressing when one considers the implications for students coming from poor homes. 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

At the Foundation Phase level, school pupils are inducted into the language of teaching and learning, which is often different from their home language. In order to be successful in later years in the schooling system, pupils need to be taught the language of teaching and learning from the Foundation Phase, within a context of Home Language instruction. Thus Foundation Phase teachers, for the majority of schools, need to understand multiple languages. In the majority of cases, this would entail knowledge of English and an African language.

The importance of language to student performance has been raised consistently in the research literature (Taylor et al, 2003; Fleisch, 2008, for example). A number of studies have looked at the strong relationship between student performance on standardised tests and exposure to the test language at home (Howie et al, 2007; Reddy et al, 2005). The 'causal' nature of the relationship is, however, far from conclusive. The link between language proficiency and academic performance is not always well-understood, and is not straightforward. Although comparative studies such as TIMMS indicate that there are factors other than language which contribute to lower test scores, language is regarded as one of the key determinants of student success in schooling. Fleisch (2008) is concerned with identifying the 'generative mechanisms' or the actual causal links between school

language practices and academic performance. From the research literature he elicits five different 'generative mechanisms'. These are all derived from classroom-based studies.

The first generative mechanism relates to 'transfer theory' and the density of unfamiliar words: the argument made here is that students should first master the decontextualised discourse of schooling in their home language before transferring to a second language. Heugh (2005a and 2005b) suggests that teachers focus on low level cognitive tasks as a way of managing children's lack of mastery of language, an argument similar to the one made in the Threshold Project. The conclusions drawn from the Threshold project by MacDonald (1990) and Heugh are, however, markedly different as Fleisch (2008) points out. Whereas Heugh uses the findings to argue for protracted mother-tongue instruction, MacDonald's recommendations focus on improved teaching of English.

A second generative mechanism concerns the emotions of second language teaching: Probyn (2001) has identified stress and depression for second language learners as contributing to poorer performance. Thirdly, code-switching is a factor: Setati & Adler (2000) show how sophisticated the act of code-switching is, particularly in mathematics classrooms where teachers not only have to switch between language codes but between different discourses of mathematics as well (notably procedural and conceptual). Code switching and language translation also takes a long time, which the pacing of the official curriculum may not make allowance for. In short, when used for improved learning, code switching is a sophisticated and difficult strategy.

As part of the same classroom-based research study, English language infrastructure was also investigated (Setati et al, 2002). English language infrastructure relates to exposure to English in the school, community and home, and in particular the difference in amount of this exposure between urban and rural schools. The study found that urban learners have greater access to resources such as television, radio, newspapers than rural learners, which impacts on their academic achievement. A number of other studies have considered how print-rich the classroom environment at Foundation Phase level is, print-rich environments being a prerequisite for the language approach suggested in the National Curriculum Statement.. Finally, the relationship between language and power is identified as a fifth generative mechanism in the relationship between poor performance and language. Braam's (2007) research shows how home language can become stigmatized in a school and lead to less than optimal teaching practices. Home language as opposed to English instruction also has a class dimension to it. The research thus locates language of instruction within a social and political context and explores the implications.

This overview of the research on language is useful in that it alerts us to the explanations for the relationship between language and student performance that exist in the research literature. The overview also indicates that the understanding around language and student performance is far from empirically robust or conclusive. Fleisch (2007) alerts us to the questionable nature of some of the research, and the assertions about language that are based on questionable methodologies. The question of why, and by how much, language affects achievement remains open. Finally, he 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 in relation to social class and those in rural and urban areas. 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 evidenced by 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.

Knowledge and cognitive demand

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 work of Schollar (2008) and Taylor (2008) argues 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 under-achievement. 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. At a more general level, a number of research studies have addressed the issue (introduced earlier in the review) of the nature of the evaluative criteria (Bernstein, 1996) and making these explicit. Morais *et al*. (2004) usefully explain what is meant by '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' (p. 8). Essentially control over these by the teacher, and the explicitness of teaching is a significant factor in considering effective teaching practices. This was highlighted in relation to the international research literature earlier.

What is neglected in this research, however, including that which attempts to draw out the effectiveness of direct teaching approaches, is the question of knowledge. Increasingly researchers are beginning to look at the question, although thinking through how to conceive of knowledge for teaching and how to measure it is still in development. 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.

Hoadley (2007) considers the question in relation to the kind of knowledge made available, drawing attention to the distinction between school knowledge and everyday knowledge, and the equity implications for how these knowledges are differentially distributed. Her study shows how "students in different social-class contexts are given access to different forms of knowledge, that context-dependent meanings and everyday knowledge are privileged in working-class contexts, and context-independent meanings and school knowledge predominate in the middle-class schooling contexts" (p. 682). On this basis she makes arguments about students' differential access to school knowledge.

The low prevalence of reading and writing in classrooms and the low level of conceptual demand is a further knowledge-related factor identified in a number of studies (Schollar, 1999; Vinjevold and Roberts, 1999; Adler et al, 2002; Setati et al, 2002). The Khanyisa project, looking at Grade 3 mathematics and language teachers observed across three days in 24 schools, found that students engaged very little with books, and reading consisted predominantly of sentences being written on the board and chanted by the class as a whole.

Ensor (2009) in the context of the COCA study combines a consideration of time use, and pacing in particular, with cognitive demand in a concept she develops called '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 its 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 *related* system, rather than atomised dimensions such as pacing and cognitive demand. The COCA study found that the predominance of concrete apparatus (such as counting beads, blocks, etcetera) in teaching undermined both the specialisation oft text and time in classrooms. "In general the use of apparatus anchors experience in the local and particular and explicit specialising strategies are needed to facilitate the move to abstraction' (Ensor et al, 2009: 22). Students are engaged in very concrete methods for solving problems rather than being given access to more abstract algorithms and means

for solving problems.Thus, low specialisation of text coupled with very few computations over time (i.e. very slow pacing) led to the conclusion that classrooms exhibited very low semantic density – i.e. a low conceptual level and low rate of learning.

Reeves (2005) found that teaching style (i.e. child-centred versus teacher-centred) did not matter as much as certain features of pedagogical practices. Most important amongst these in her study included aspects related to knowledge and its explicit transmission. The pedagogical practices associated with better achievement gains over time were teachers making explicit the criteria by which any knowledge display is evaluated – and in particular correcting pupil errors; and engaging pupils at relatively high levels of cognitive demand with respect to both principled and procedural knowledge.

Schollar's (2008) work on the Primary Maths Research Project also deals with explication, arguing that clear criteria for assessing performance need to be made explicit. His work, like that of Hoadley's below, also problematises the dominance of certain understandings of constructivism in classrooms and of concrete methods for solving problems. Two figures from the work of Hoadley (2007) and Schollar (2008) respectively show how students at Grade 3 and Grade 6 solve problems.

Figure 1: From Schollar (2008) Grade 5 student's working out

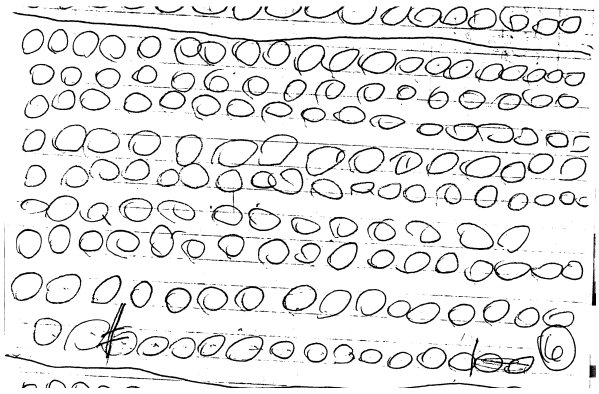

Figure 2: From Hoadley (2007) Grade 3 calculating 210+14

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 also in the work on mathematics knowledge in schooling by Davis (2010). Davis uses the notion of *ground* to describe the ontological decisions of teachers and learners as they make references to mathematical objects in order to regulate the production of mathematics. Ground in this work serves to expand the dichotomy which 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.

Finally a pilot study in forty schools in Gauteng province of the project 'Towards an understanding of student academic performance in South Africa' (Carnoy et al, 2008) has attempted to operationalise Shulman's notion of pedagogical content knowledge in their classroom research. Pedagogic practices

were analysed in relation to *mathematical proficiency* of the lesson, *level of cognitive demand*, the *mathematical content* of the lesson, and the teacher's *mathematical knowledge* observed in the lesson. Each of these dimensions had multiple levels which were measured. Given the exploratory nature of the research at this point, no claims could be made and it was clear that the operationalising of these concepts in empirical research was a challenge.

Teacher knowledge

Although beyond the classroom, teacher knowledge is regarded as a crucial variable and since the PEI studies has gained prominence in explaining poor classroom outcomes. Although understood as absolutely crucial to successful teaching and learning, there is very little research into teachers' subject knowledge. Where evidence does exist it is largely at an anecdotal level and it is believed to be very low. It is very difficult to administer tests to teachers in South Africa, there being strong union opposition to this. However, three projects have managed to construct tasks which resemble tests to assess what teachers know. The Khanyisa Baseline Project assessed a sample of Grade 3 teachers in their 24 schools, testing them on Grade 6 mathematics and literacy items. The results indicate the low levels of literacy and numeracy among this small sample of teachers: The average score on the maths test for 25 teachers was 10 correct responses out of 15 items (67%). Only one teacher scored 100% correct (15) while 3 scored below 50%. The average score on the Language test for 23 teachers was 13 correct responses out of 24 items (55%). The majority of teachers scored between 7 and 12 marks out of a possible 24 (29% - 50%); 12 of the 23 teachers scored less than 50%, with a lowest score of 21,7%. Only one teacher scored higher than 75% (Taylor and Moyana, 2005).

Another project which has measured teachers content knowledge is the Integrated Education Project running in four provinces.: KZN, Eastern Cape, Limpopo and Northern Cape. The analysis by Mabogoane and Pereira (2008) indicates the very low levels at which the tested teachers were performing, on items spanning grade levels up to Grade 7, especially in mathematics the mean achieved by 67 Grade 4 to 6 teachers on Grade 4 to 7 items was 32%.

Finally the Stanford comparative study measured both content knowledge and pedagogical content knowledge in a test administered to 49 teachers in Gauteng province, broadly representative of teachers in the province. The results showed that on average teachers scored about 60 percent on both parts of the test. This is not a high score for teachers testing on a Grade 5 test, and as the standard deviation is about 15 to 19 points, it suggests that only 15 percent of teachers in the sample score above 75-80 percent. The study argues that overall the score suggests that many South African teachers teaching sixth grade do not have high content and pedagogical content knowledge of mathematics.

Summary

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

. Low levels of teacher knowledge
. Low levels of cognitive demand
. Everyday, context-dependent knowledge
. Teaching practices which often undermine explicit, direct instruction
. Lack of opportunities for reading and writing (oral discourse dominates)
. Slow pacing
. Collectivised as opposed to individualised learning
. The erosion of instructional time
. Multiple issues related to language, especially second language teaching and learning

In the two sections that follow we consider a small number of studies that have focused on Foundation Phase specifically. As stated above, there are very few systematic studies of classrooms at this level, however, the studies largely confirm the findings above and allow us more confidence in making generalisations about South African primary school classrooms which will bear out testing in the current project.

Foundation Phase literacy

A study conducted by the HSRC in Limpopo province entailed observations in twenty schools in Grade 1 to 4 classrooms. A total of 77 classrooms were observed for the first two hours of the school day, 26 comprising Foundation Phase classrooms where the teaching of reading was specifically investigated. The study showed that very little reading took place, and that very few texts were in evidence in classrooms. In 12% of 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 approach to text.

Learners were mainly involved in reading isolated words rather than continuous text. Most of the Limpopo teachers (78%) never or hardly ever cued or drew learners' attention to main ideas in extended text when this was read during classroom observations. Rather than the practice of making sense of text (including stories), the most common approaches were to involve learners in discussing or responding to pictures and illustrations, or in using pictures/illustrations as clues for understanding. In 18 (69%) of 26 recorded cases teachers seldom or never unpacked or elaborated on learners' responses. This was a pervasive practice (cf. e.g. Macdonald, 1990) - when a child made a mistake, the teacher simply passed over it.

The authors conclude that not much direct or explicit literacy teaching is taking place in most of the Limpopo classes. They argue that the teachers did not know and follow appropriate steps to develop literacy. The data also indicates that 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 (2008) research into literacy practices at the Foundation Phase level confirms the lack of feedback on student response, and on making explicit to students what constitutes an appropriate performance, especially in reading. Reading aloud as a class, or chorusing text after a teacher were common strategies. In other words the pedagogy is strongly communalised. Hoadley (1999) in a small number of Grade 1 classrooms also shows how the reading and writing of single words in the Foundation Phase predominates.

From the descriptions of research into early literacy in classrooms, what teachers deploy approximates an audiolingual approach to literacy, a behaviourist approach focused on oral drill sequences. This appears 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 (i.e. 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 Vinjevold, 1999; MacDonald 2002). The formal and appropriate teaching of phonics, especially in poor schools, is an area of dire neglect.

Pretorius and Machet (2004) considered five disadvantaged schools in Kwa-Zulu Natal, looking at teaching of reading in Grade 1 classrooms. The authors found an emphasis on 'sound-centred readers', where the focus was on decoding rather than meaning. This decoding related largely to single words, so that performance by learners dropped radically from reproducing single words to reading a paragraph. Comprehension was found to be extremely poor. 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.

Another study which considered literacy in the early grades, also in a small sample, was that which aimed to investigate the reasons for underperformance in Literacy in Grades 3 and 6 in selected national quintiles 1, 2 & 3 schools in the Western Cape (Hill, 2009). This qualitative research project considered urban and rural sites, isiXhosa-medium and Afrikaans-medium schools. Some of the factors identified as potentially affecting learners' performance negatively were the high proportion of teaching and learning time that was wasted; the lack of homework; and a lack of appropriate reading resources. The research found that the 'literacy half-hour' promoted by the government campaign 'Foundations for Learning' (modelled on the British literacy strategy) tended to be interpreted as free time for learners and teachers. The researchers also found that levels of cognitive challenge were very low. Although based on a very small sample, the findings confirm those of other studies (such as Hoadley, 2008; Pretorius and Matchet, 2004 and Reeves et al, 2008).

Thus from the literacy studies we can further our characterisation of classrooms, by tentatively arguing that in the majority of language classrooms we will see the features listed in Table 4 below.

Table 4: Descriptive features of Foundation Phase literacy classrooms

- Students have limited opportunities to handle books and bound material;
- There is limited teaching of reading;
- Students mainly read isolated words rather than extended texts;
- There is little emphasis on the comprehension of text – the focus is on decoding not meaning;
- There is little or no elaboration on learner responses (IR with no E);
- Learning is largely communalised;
- There is virtually no vocabulary and spelling development, and very little formal teaching of phonics; and
- There is a lack of (good) print material in classrooms.

Foundation Phase numeracy

Only three small-scale studies focused specifically on numeracy at Foundation Phase level were found for this review. It is surprising how little research has been conducted at this level in

mathematics, especially when compared with other countries. Ensor et al (2009), as part of the Count One Count All (COCA) project, analysed classroom observation data collected in eighteen Foundation Phase classrooms in three different schools serving poor communities. What the study found was that classroom strategies for mathematics focused predominantly on concrete strategies for solving problems, thus inhibiting students' potential for grasping the symbolic system of mathematics and more abstract ways of working with number (2009:5). The focus on mathematical knowledge in this project is elaborated on above. The study also found that teachers provided students with minimal feedback on their responses, particularly on errors. There was extremely weak pacing and it was clear that teachers lacked the knowledge of how students learn numbers.

Hoadley (2007), looking at four working class classrooms compared to middle class ones, also found that in poorer schools there was an extremely slow pace, and that teachers provided little response to student error. In addition, everyday knowledge predominated in these classrooms such that the principles, concepts and procedures for mathematics were not systematically taught. Both this dominance of everyday knowledge, and the concrete methods referred to above result in a very low conceptual level in the classroom (confirmed in Schollar's 2008 study of Grade 6 classrooms, where concrete methods for solving problems persisted).

The third study is one of the few experimental studies in South Africa and considers the impact of two different interventions in numeracy in the Foundation Phase (du Toit and Rosenberg, 2009). In a sample of 12 schools, classes were randomly allocated the South African curriculum and textbooks while the other half of the sample was allocated the Singapore curriculum and Singaporean textbooks. The study showed improvement in all schools, but greater improvement in the schools allocated the Singaporean curriculum and materials. Most interestingly, the research showed how a programme could overcome some of the problems associated with poor teacher subject knowledge. Those teachers in the Singapore programme scored well below the South African programme teachers, and yet their learners showed much greater improvements. The precise nature of what in the programme could account for the difference had not yet been identified. The research has also to date not been subject to proper peer review. Nonetheless, at the very least it highlights the need for more experimental studies in classrooms to complement and strengthen the findings of the school effectives studies and the very small scale studies on offer.

Some of the general points related to mathematics that emerge from these studies include the findings listed in Table 5 below:

Table 5: Descriptive features of Foundation Phase mathematics classrooms

. Teachers do not demonstrate a clear theory of how children learn number;
. The use of apparatus and concrete methods for solving problems dominates classrooms;
. Everyday knowledge in many instances obscures the learning of mathematics;
. Learning occurs at an extremely slow pace;
. There is a very low conceptual level of instruction;
. There is a lack of feedback – very often Initiation and Response, with no Feedback.

4. Conclusion and summary

One of the problems in classroom-based research thus far 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. 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 trying to make an intervention there. Studies that have

attempted to look at various levels – such as the PPP – have failed to develop adequately robust constructs for measuring classroom factors that will show up in regressions. Thus, although we know that at the heart of education lies in instruction, we have yet to show the impact of different forms of teaching and learning on students' education livelihoods, however much we might believe or intuit these to be crucial.

Much of classroom research tends towards descriptions of teaching styles. These descriptions are often also polarised into more learner-centred approaches versus traditional ones (or in the terms of the US literature, reform versus direct instruction). 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.

Given the limitations of the research base, however, 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 the following factors are those which need to be most crucially 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 taking 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, time and values (broadly based on Alexander's (2001) and Bernstein's (1996) conceptualising of pedagogy) are used to summarise and organise the factors.

Table 6: Descriptive features of South African primary school classrooms

Discourse	. Oral discourse dominates – there is a lack of opportunities for reading and writing; . Classroom interaction patterns that privilege the collective (chorusing); . Weak forms of assessment and lack of feedback on students' responses - very often the pattern is Initiation and Response, with no Feedback or Evaluation; . Little explicit, direct instruction.
Knowledge	. Low levels of teacher knowledge; . Low levels of cognitive demand; . Little use of textbooks or strong texts; . Everyday, context-dependent knowledge predominates; The use of apparatus and concrete methods for solving problems dominates classrooms; . Lack of focus on written text, reading and writing.
Time	. Slow pacing; . The erosion of instructional time.
Values	. Learning is largely communalised; . Collectivised as opposed to individualised learning.

Table 7: South African primary school classroom factors associated with student learning gains

Discourse	. More appropriate assessment and providing feedback to learners.
Knowledge	. A focus on reading and writing text. . Teacher's proficiency in the language of instruction; . amount and type of reading and written work.
Time	. Teachers adjusting pace to pupil ability; . Greater curriculum coverage, including teacher knowledge and planning for and coverage of curriculum standards; . Greater opportunity to learn (content coverage by cognitive demand, content exposure as well as curriculum coherence and pacing).

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