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Effective Pre-School and Primary Education 3-11 Project (EPPE 3-11)

Variations in Teacher and Pupil Behaviours in Year 5 Classes

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The views expressed in this report are the authors' and do not necessarily reflect those of the Department for Education and Skills

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1. Introduction

The Effective Pre-school and Primary Education Project 3-11 (EPPE 3-11) involves a number of components or “Tiers” of research. Tier 1 involves the analysis of primary school effectiveness across all primary schools in England using value added approaches (Melhuish et al, 2006). Tier 2 focuses on following up the academic and social/behavioural progress of children in the original pre-school sample across Key Stage 2 of primary education (age 7 to 11 years). In the original EPPE research children were tracked from age 3 years to the end of Key Stage 1, at aged 7 years plus (see Appendix O for the full range of EPPE Technical Papers). Tier 3 focuses on variations in classroom practice during Key Stage 2 focusing on Year 5 classes. It involves a sample of 125 schools and classes from among the 850 plus schools in which the EPPE children were located.

This is the first paper in a series reporting on the classroom observations component of the study (Tier 3). It presents results of the analysis and comparison of classroom observations conducted in Year 5 classes in 125 primary schools during the spring and summer terms of 2004 and 2005. The paper provides a description of the sample of schools and details of the two observation instruments used. Interest centres on the extent to which the instruments identify variation between classes in different aspects of teachers’ practice and in children’s observed responses.

In addition, analyses are described that explore the associations between several Ofsted measures of overall school quality and effectiveness (‘improvement’, ‘teaching and learning’), and the observed measures of teachers’ behaviour and children’s responses. Further analyses also linking classrooms observations to value added indicators of school effectiveness derived from the Tier 1 component of the research using national assessment data are also described. Later reports will also examine patterns of association between:

- teacher characteristics and observed classroom practice;
- features of Year 5 Classroom Climate measured by pupil questionnaire and observed classroom behaviours; and
- children’s developmental progress and observed classroom behaviours.

1.1 The Sample

The project identified a purposive school sample of primary schools from amongst those attended by the EPPE 3-11 children to include in the observation component of the research. The criteria for sampling included indicators of schools’ effectiveness (across a range of ‘effectiveness’ measures) and the number of EPPE children enrolled.

We used the available school value added ‘effectiveness’ scores for every primary school in England for the 2001/2002 year obtained from the early stages of the analysis for Tier 1 of the EPPE 3-11 project (Melhuish 2006). These scores were produced from an analysis of pupil progress over four years from Key Stage 1 (age 7) to Key Stage 2 (age 11) having controlled for pupil, community and school intake characteristics available from the Pupil Level Annual School Census (PLASC). From an analysis of school value added residuals for English, Mathematics and Science and their associated confidence limits, schools were classified into different effectiveness categories for the three core subjects. Schools where pupils were making significantly more progress than might be expected given their pupil and school intake characteristics were categorised as relatively ‘more effective’ and those where pupil progress was significantly below expected as ‘less effective’ in each subject.

The EPPE 3-11 child sample spans 4 academic years and cohorts of children with Cohorts 2 and 3 being the largest. The purposive sample for this paper was selected from schools attended by children of these two larger cohorts. In 2004, Cohort 2 of EPPE 3-11 (1180) children was in Year 5 in 483 schools. In 2005 Cohort 3 (1,435) was in Year 5 in 616 schools. From the schools where 4 or more EPPE children attended, schools were selected so that there were approximately equal numbers of relatively ‘more effective’ and relatively ‘less effective’ schools in each region of the study.

In the first year (2004) 54 schools were selected for observation using the Classroom Observation System for Fifth Grade (COS-5, Pianta, NICHD, 2001) instrument, applying the above criteria. An additional sub-group of 25 of these 54 schools were observed using the Instructional Environment Observation Scale IEO (Stipek, 1999) instrument. Unfortunately, one of these schools was unable to accommodate the researcher to conduct the IEO (Stipek), therefore reducing this to 24 classrooms. These 24 schools were chosen to reflect an approximately equal number of relatively more 'effective' and less 'effective' schools. In the second year (2005), 71 schools were selected using the same criteria described above in which to apply both the COS-5 (Pianta) and IEO (Stipek) instruments. The COS-5 (Pianta) instrument was conducted in all 71 schools, making a total of 125 schools. However, due to imminent Ofsted inspections, two of the schools were unable to accommodate the additional IEO (Stipek) visits and therefore a total of 69 schools were observed using the IEO (Stipek) instrument in the second year, making an overall total of 93 schools for this instrument.

Table 1.1: The Sample of classrooms

Year	COS-5 (Pianta) observations	IEO (Stipek) observations
2004 (Spring/Summer)	54	24
2005 (Spring/Summer)	71	69
Total	125	93

2. The Classroom Observations

Two observation instruments were adapted and used in the EPPE 3-11 project to obtain information about variation in classroom processes, including teachers' and pupils' classroom behaviour and experiences. The employment of two instruments serves as a method of exploring validity and reliability, and offers the potential for comparison increasing the range of behaviour covered and enhancing validity. These instruments are the Classroom Observation System for Fifth Grade (COS-5, Pianta, NICHD, 2001) and the Instructional Environment Observation Scale (IEO, Stipek, 1999). The COS-5 (Pianta) Observations were completed in the Spring term (2003/4 and 2004/5) and the IEO (Stipek) was conducted in Summer (2003/4 and 2004/5). Visits were conducted on 'typical' days and over 1,000 children were observed in classrooms across 125 schools. The COS-5 (Pianta) observations were conducted across a range of academic subjects whereas the IEO (Stipek) focused on Literacy and Numeracy only. These instruments were selected because they were devised relatively recently, they are appropriate for the primary age group, they cover a wide range of pupil and teacher behaviours and they offered the opportunity to facilitate comparison with research in other contexts (e.g. Galton et al 1999, NICHD, 1998 and 2001). The following section provides a brief description of the two instruments.

2.1 Instructional Environment Observation Scale (IEO, Stipek)

The second instrument used in this part of the research was the Instructional Environment Observation Scale (IEO) designed by Professor Deborah Stipek, University of California, for the Centre on Organisation and Restructuring of Schools. It, like the COS-5 (Pianta, NICHD, 2001) was used to obtain information about variation in school processes, including teachers' and pupils' classroom behaviour and experiences. The purpose of the IEO (Stipek, 1999) is to gather high inference, numerical indicators of the instructional environments experienced by pupils by combining researcher judgements about the teacher's teaching and pupils' learning behaviours. In the EPPE 3-11 study, the IEO was used specifically to observe both Literacy and Numeracy in each of the Year 5 classrooms in 93 focal schools, given the importance of these aspects of the curriculum to later academic success and the development of the National Strategies.

There are 4 main areas under which information was gathered. These include: General Classroom Management and Climate, General Instruction Scales, Mathematical Instruction Scales, and Writing Instruction Scales. Within each of these areas there are a total of sixteen sub-scales (see also Appendix A).

General Classroom Management and Climate Scales

Classroom Climate
Classroom routines

General Instruction Scales

Cross-Disciplinary Connections
Linkage to life beyond the classroom
Social support for student learning
Student engagement

Mathematical Instruction Scales

Use of Maths analysis
Depth of knowledge and student understanding
Basic skill development in the context of problem solving
Maths discourse and communication
Locus of Maths authority

Writing Instruction Scales

Reading as meaning making
Basic skills development in the context of reading
Higher order thinking in writing
Purposeful development of writing skills
Instructional conversations.

Each of the scales is rated between 1 and 5, where 1 is low and 5 is high. The following is provided as a 'rule of thumb' for field researchers as they decided upon a rating;

- 1 = Stereotype of conventional (formal/didactic) and/or undesirable environment.
- 2 = Minimal intensity to mark a shift from the conventional environment could be limited to the teacher or to a few students.
- 3 = Greater and/or uneven intensity in shift from conventional includes some students.
- 4 = Substantial and intense shift from conventional, includes many to most students.
- 5 = Very intense, includes most, to almost all students.

Before the researcher decides upon the rating for each of these scales, s/he is required to take detailed observation notes (running record). These notes are used as the primary source of evidence upon which the ratings are derived. Researchers are required to review each of the relevant scales prior to beginning an observation in an effort to help them focus their note taking upon relevant evidence that will help to support their numerical rating. The type of information researchers are encouraged to collect includes teacher and child behaviour, levels of pupil engagement, evidence of how children interact with each other and with the adults in the classroom, the types of questions overheard and the like. One of the benefits of this instrument is that it provides both quantitative and qualitative data upon which analysis can draw.

2.2 The Classroom Observation System for Fifth Grade (COS-5, Pianta)

The Classroom Observation System (COS-5, Pianta, See Appendix B), developed by Professor Robert Pianta (NICHD, 2001), was initially used by the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development in the USA. The instrument is divided into two main parts that include The Behavioural Coding System, which we refer to as the Frequency of Behaviour Coding System, and the Qualitative Coding System, which we refer to as the Measures of Quality Coding System. These two parts, described in more detail below, make up what is referred to as an observation cycle, lasting 20 minutes in total.

Overall 1009 observations were conducted in the 125 schools using the COS-5 Pianta instrument. For each school, observers were required to complete a minimum of 8 twenty minute observation cycles. These observation cycles had to include¹:

¹ This has been adapted from the NICHD (2001).

- 1 Start of the day observation
- 1 Start of the afternoon observation
- 2 Literacy observations
- 2 Numeracy observations
- 1 Science or Social Science observation
- 1 additional academic subject (could be another Literacy, Numeracy, Science or Social Science).

Researchers were therefore asked to schedule all of their observations on days and times when the teacher reported that most instruction would be occurring, or what came to be known as 'typical days.'

Table 2.2a presents the number of children observed in each school and the number of cycles and Table 2.2b presents the total number of cycles broken down by lesson type.

Table 2.2a: Number of cycles as a function of number of schools

No of children observed (No of 10-min Cycles)	7	8	9	10	Total
Number of schools	2	113	9	1	125
Total	14	904	81	10	1009

Table 2.2b: Number of cycles broken down by type of lesson

Curricula subject	Number of cycles
Start of the day	72
Start of the afternoon	71
Literacy	153
Numeracy	149
Science	76
Social Science	44
Other	3
Total (observed in 2004)	568
Unclassified (observed in 2005)	441
Total	1009

Of the 1009 observations, 441 were not classified according to lesson type. However, the proportional representation of each lesson would have similar to that presented in Table 2 for the 568 observations conducted in 2004 (25% for Literacy, 25% for Numeracy and around 13% for science).

High priority was placed on core-academic subjects as these are the areas that the EPPE and EPPE 3-11 projects have most child outcome data for. It was found that the instrument was more difficult and less appropriate to use when applied to non-core subjects (e.g. ICT, music etc). At the start of each 20-minute observation cycle, observers were required to fill in a cover sheet with general information about the classroom observed. This includes information such as the gender of the target child, the lesson observed, the number of adults in the room and their designation (classroom teacher, learning support assistant etc.), the number of pupils in the class, the type of room (regular classroom, Library, ICT suite etc.) and the time the observation began. A similar page is filled in before the start of the second part of the cycle, The Measures of Quality Coding System.

a) The Frequency of Behaviour Coding System

Part one of this observation *cycle* is referred to as The Frequency of Behaviour Coding System and is used during the first of 2 ten-minute observation segments within the overall COS-5. It includes the coding of child and teacher behaviours across a range of classroom and curriculum settings. For the duration of this part of the observation, a target child (TC) is observed and recorded during a sequence of ten 60-second intervals (30-seconds observe, 30-seconds record) during which focus is placed upon capturing information in five general areas of the target child's classroom behaviour and experience. It is important to note that the behaviours included are not exhaustive of the types of behaviours or situations one might observe of a pupil or teacher in a Year 5 classroom.

The categories are:

Child Level Setting – This code is intended to describe the setting in which the target child is working, i.e. whole class, individual or large/small group. In order to identify this, the Research Assistant was asked to focus upon what setting the target child is working in rather than the setting intended by the teacher.

Content of Target Child's Activity – this code is intended to capture the nature of the activity in which the target child is engaged or supposed to be engaged. The codes include subject areas (e.g. Literacy, Numeracy, Science, Social Science etc) as well as non-curricular activities (e.g. Enrichment, Free Time)². The focus here is on the particular activity the teacher has set for the target child during each observation interval. Within the Literacy and Numeracy categories, there were sub-categories which further break down the activity of the target child. The sub-categories under Literacy included 'Word-Level' and 'Comprehension' and under Numeracy, 'Computation' and 'Concept Development/Problem Solving'. Where applicable, these sub-categories could be in conjunction with other subject areas (e.g. If observing a Science lesson where the children were measuring the change in the height of a plant, the Researcher would code Science and 'Computation').

Teacher³ behaviour – The codes that fall under the teacher behaviour category focus on a select group of teaching and supporting behaviours, which while comprehensive are not to be considered an exhaustive list. All the behaviours specify ways in which a teacher may interact with the target child or a group of students that includes the target child. The behaviours include 'Attending to target child' (directly), 'Teaching Basic Skills/Facts', 'Teaching Analysis/Inference', 'Managerial Instructions', 'Monitoring/Checking Work', 'Displaying positive or negative affect' and 'Disciplines'.

Child Academic behaviour – This category includes codes that focus on aspects of the target's academic behaviour in terms of the intensity and level of involvement demonstrated by the target child (i.e. 'Engaged', 'Highly engaged', 'Unproductive/Spaced Out/Disengaged' or 'Off-task – Alternative Academic Activity'), as well as the type of behaviour the child is engaged in ('Learning/Performing Basic Skills', 'Learning/Performing Analysis/Inference/Planning', 'Collaborative Work', 'Requesting Attention/Help/Information' and 'Volunteers'). While some of these codes correspond with codes found under the teacher behaviour category, the two were coded independently.

Child Social Behaviour - This category includes codes which capture the target child's social interactions with peers and adults in the classroom, as well as generally disruptive behaviour. These behaviours were coded whenever they were seen occurring and do not have to be characteristic of the full 30 second observation. The codes include 'Positive/Neutral Engagement

² All Research Assistants were advised to watch academic subject areas rather than 'other' activities. This was ensured by the pre-visit planning with teachers at focal schools to select two appropriate days where this would be possible.

³ The term 'teacher' here is generic and refers to any adult (e.g. learning support assistants, deputy head, parent volunteers) in the classroom whom the target child had direct contact with during the course of the observation.

with Peers', 'Negative/Aggressive Engagement with Peers', 'Positive or Negative Affect Towards Teacher' and 'General Disruptive Behaviour'.

Procedure

For each COS-5 observation cycle, the researcher focuses on a target child. For the duration of the first part of the observation cycle, the researcher watches and codes the target child's behaviour and experience in the classroom for a total of 10 sixty-second intervals (30 seconds observe, 30 seconds record) using a standard set of codes (see Appendix B). For the majority of the behavioural categories described above, the Research Assistant is required to choose the one descriptor that best characterises the interval concerned. However, with certain categories, such as 'Teacher Disciplines' or 'Target Child Volunteers', the behaviour would be coded whenever it was observed as occurring (e.g. the target child hits a peer would be coded as 'Negative/Aggressive Engagements with Peers'). These behaviours are called 'events.'

Once the 10 sixty-second intervals are coded, the Research Assistant completes three additional ratings (i.e. Teacher sanctioned classroom setting; Teacher sanctioned collaborative work and Teacher administered test) before continuing to Part two of the cycle, the Measures of Quality Coding System.

b) The Measures of Quality Coding System

Part two of the COS-5 observation cycle is The Measures of Quality Coding System. This is dedicated to ten minutes continuous observation of behaviours and characteristics of the target child, the teacher and any other adults in the room and the classroom environment at a more global level. During this portion of the observation the researcher focuses upon the 'who, what and how' of everything happening at the classroom level and with the target child's behaviour within that specific classroom environment. During these final ten minutes the Research Assistant scores each of the 16 constructs (see below) based upon the degree to which the behavioural, emotional and physical markers are present and indicative of different levels of each construct. The ratings were completed at the end of the ten-minute observation.

The Measures of Quality Coding System contains two broad categories: Child Codes and Classroom Codes. Under these main headings there are a number of sub-headings or constructs (behaviours, characteristics) that must be rated.

The seven child-level items for rating the **target child** in the classroom are:

1. Positive affect
2. Self-Reliance
3. Sociable/Co-operative with peers
4. Attention
5. Disruptive
6. Activity level
7. Child-Teacher Relationship (Main teacher only).

The eight classroom-level items for rating **aspects of the overall classroom** are:

1. Richness of Instructional Methods
2. Over-control
3. Chaos
4. Detachment/Teacher
5. Positive Classroom Climate
6. Negative Classroom Climate
7. Purposeful use of instructional time
8. Evaluative Feedback
9. Teacher Sensitivity (Main teacher only).

After training, the researcher makes judgements based upon the range of, frequency, intention, and emotional tone of the interpersonal and individual behaviors seen during the observation cycle. Individual items are then rated on a seven-point scale (1 = very uncharacteristic and 7 = very

characteristic). After assigning the sixteen qualitative ratings, the observer completes an additional set of codes that rate the teachers on pedagogical strategies (discussed further in section 4.2.3).

Training

In order to prepare researchers to use the COS-5 and IEO, intensive training was required. We are grateful to both Robert Pianta and Deborah Stipek who assisted us in informing our training. They provided guidance notes and video material. The training included 12 days of in-house (Institute of Education) training and additional days for researchers to review the materials and practice using the instruments both with videos and in real classroom settings. In addition researchers conducted 'paired' observations to improve reliability. For further information about training and reliability see Appendix C.

3. Results

3.1 IEO Scale (Stipek)

One of the instruments used in this phase of the research was the Instructional Environment Observation Scale (IEO) that was designed by Professor Deborah Stipek, University of California, for the Centre on Organisation and Restructuring of Schools. The purpose of the IEO (Stipek, 1999) is to gather high inference, numerical indicators of the instructional environments experienced by pupils by combining judgements about the teachers' teaching and pupils' learning behaviours. In the EPPE 3-11 study, the IEO was used specifically to observe both a Literacy and a Numeracy hour/lesson in Year 5 classrooms in focal schools. This instrument allowed the EPPE team to examine Literacy and Numeracy in more detail. These core subjects were of particular concern given the development of the National Literacy and Numeracy (later to be known as the Primary Strategies) Strategies. The IEO instrument was applied in 93 of the focal schools. Researchers observed one complete Literacy and one complete Numeracy lesson.

There are 4 main areas under which information is gathered from 16 sub-scales:

General Classroom Management and Climate Scales - Classroom Climate and Classroom routines.

General Instruction Scales - Cross-Disciplinary Connections, Linkage to life beyond the classroom, Social support for student learning and Student engagement.

Mathematical Instruction Scales - Use of Maths analysis, Depth of knowledge and student understanding, Basic skill development in the context of problem solving, Maths discourse and, communication and Locus of Maths authority.

Writing Instruction Scales - Reading as meaning making, Basic skills development in the context of reading, Higher order thinking in writing, Purposeful development of writing skills and Instructional conversations.

Each of the scales is rated between **1 (low) and 5 (high)**. For descriptions of what classroom settings looked like under this rating see Appendix F.

3.1.1 Literacy

During the Literacy observation researchers were asked to make judgements on the items above as well as 5 sub-scales as follows:

Definitions

Reading as meaning making - the extent to which students try to derive meaning from the texts they read.

Basic skills development in the context of reading - extent to which students learn basic reading skills within the context of reading.

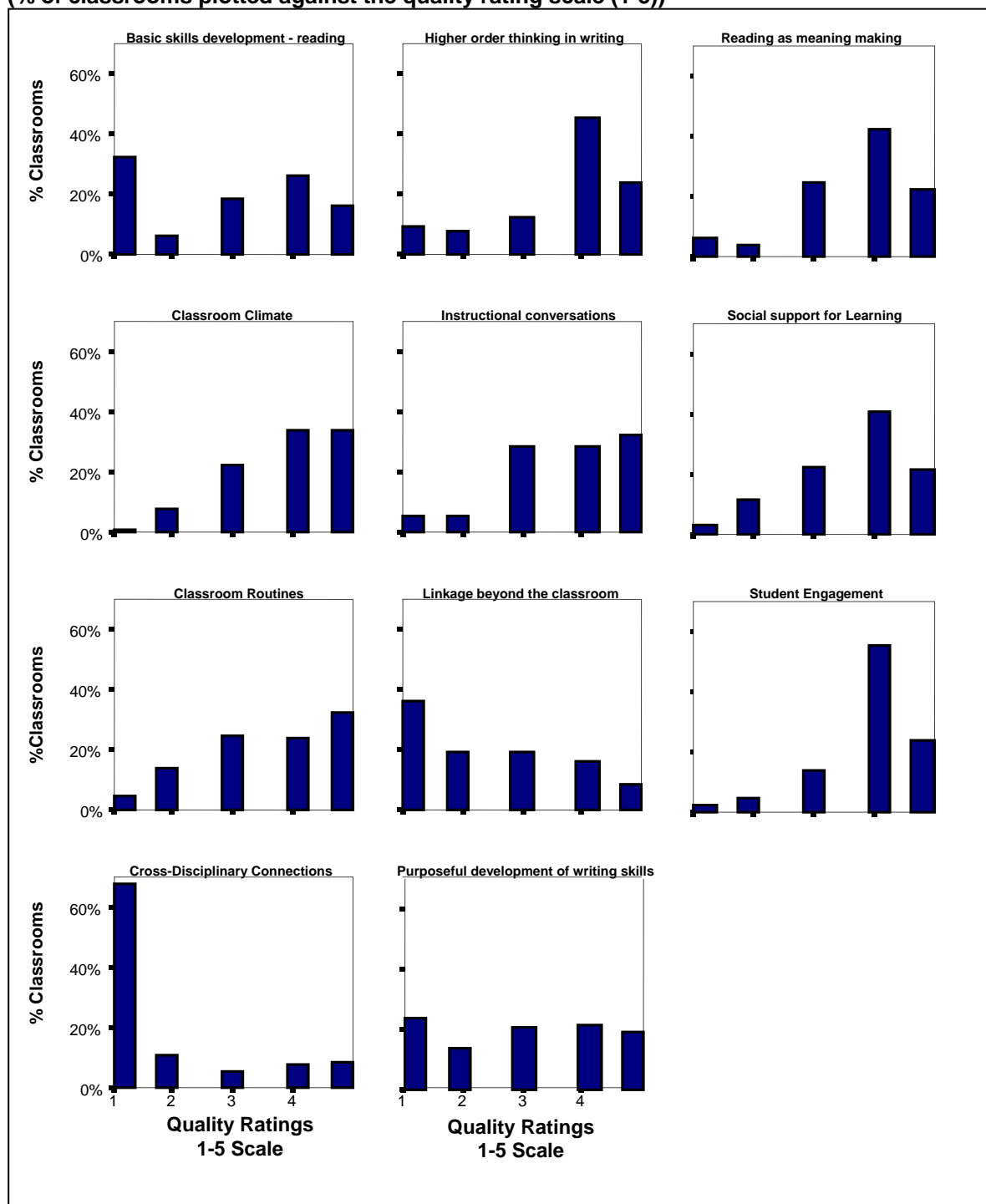
Higher order thinking in writing - extent to which students plan for, edit, revise and otherwise engage in higher order thinking in writing.

Purposeful development of writing skills - extent to which students learn basic writing skills as they write.

Instructional conversations - extent to which classroom conversations are devoted to creating or negotiating shared understandings of content.

The following codes for Literacy were found to vary most across classes: 'Cross-Disciplinary Connections', 'Linkage to life beyond the classroom', 'Reading as meaning making', 'Basic skill development in the context of reading', 'Higher order thinking (HOT) in writing', 'Purposeful development of writing skills', and 'Instructional conversation'. The distributions are shown in charts in Figure 3.1.1

**Figures 3.1.1: Distribution of the IEO (Stipek) Literacy codes
(% of classrooms plotted against the quality rating scale (1-5))**



The emphasis on ‘Basic skills in development in the context of reading’ showed a particularly wide spread with over a third of classes given the lowest rating. ‘Reading as meaning making’, by contrast showed few classes receiving a low score. Approximately 70 per cent of classes were rated favourably for ‘Classroom Climate’. In line with findings for the COS-5 instrument, the IEO suggests that pupil engagement levels are high in the majority of Literacy classes/lessons observed. ‘Cross-Disciplinary Connections’ were uncommon in most classes although ‘Social support for learning’ was, in general, fairly positively rated.

The extent to which teachers make ‘Cross-Disciplinary Connections’ and demonstrate ‘Linkage to life beyond the classroom’ may be important in demonstrating how teachers widen interest in Literacy beyond the confines of the subject and make it more relevant to their pupils. This has

implications for the impact of the Excellent and Enjoyment (DfES, 2003) agenda that seeks to widen the current focus of primary teaching on the core subjects.

Table 3.1.1: Central tendencies for the Literacy Codes

n=93	Mean	SD
Classroom Climate	3.94	.99
Classroom Routines	3.66	1.20
Cross-Disciplinary Connections	1.78	1.33
Linkage to life beyond the classroom	2.41	1.35
Social support for student learning	3.66	1.04
Student engagement	3.95	0.86
Reading as meaning making	3.71	1.06
Basic skills development in the context of reading	2.88	1.52
Higher order thinking (HOT) in writing	3.68	1.20
Purposeful development of writing skills	2.99	1.46
Instructional conversations	3.77	1.13

Table 3.1.1 provides measures of the mean and standard deviation for the Literacy observations on 11 scales. These indicate that the highest variations across schools were linked to 'Basic skills development in the context of reading and writing'. The lowest average scores on scale were observed with the 'Cross-Disciplinary Connections' scale.

Most of the IEO Literacy codes were significantly correlated (Appendix I). The strongest associations were between 'Classroom Climate' and 'Classroom routines' (0.77), 'Social support for student learning' (0.73), 'Student engagement' (0.66) and 'Instructional conversation' (0.62). In classrooms that scored high on these scales teachers and pupils were respectful of each other. The discipline is sensitive and disagreements are academic and not personal. There is a good pace to lessons which run like 'well oiled machines'. Pupils are supported in taking risks and learn from their errors. There are high levels of 'on task' behaviour with pupils taking the initiative in activities and discussions.

'Classroom routine' was also strongly correlated with 'Student engagement' (0.70) and 'Social support for student learning' (0.62), suggesting that in classrooms where a teacher's expectations are clear and transitions are managed smoothly, pupils shower higher levels of 'on task' behaviour.

'Student engagement' was also highly correlated with 'Reading as meaning making' (0.64). In classrooms scoring high in these domains pupils were more likely to complete tasks and have their initiatives extended by the teacher. During Literacy lessons pupils were more likely to be engaged in discussions that emerge from issues encountered in a text, such as the nuances of a new word. 'Social support for student learning' was also highly correlated with 'Student engagement' (0.62) and 'Instructional conversation' (0.65). Classrooms scoring highly in these areas would be places where there would be high levels of teacher-pupil and pupil-pupil interaction that was reciprocal, promoting coherent shared understandings. The discourse would be topic focused in an environment in which everyone's contribution was valued. Interestingly, 'Basic skill development in the context of reading' showed no significant associations with most other areas except 'Classroom routines' and 'Reading as meaning making'.

3.1.2 Numeracy

The lowest mean scores on the IEO Numeracy scales are associated with the extent to which teachers provide a wider context for material learned in class. 'Cross-Disciplinary Connections' and 'Linkage to life beyond the classroom' had the lowest mean scores (1.15 and 1.66 respectively – see Table 3.1.2) of all variables. The low standard deviations, especially for 'Cross-Disciplinary Connections' (0.59), also suggest that many teachers across all observed schools paid little

attention to drawing wider connections with other subjects or activities outside of the subject during Numeracy lessons. Mathematics is a subject that can provide many opportunities for making 'Cross-Disciplinary Connections' and 'Linkage to life beyond the classroom', for instance measurement activities could be related to shopping and there are very obvious links between Mathematics and Science (linking plant units to Maths bar charts). In not making these links teachers may be missing opportunities to make Mathematics more relevant to the lives of children they are teaching and underplay the importance of Mathematics in everyday lives.

As well as the general codes referred to above, researchers had to make judgements on 5 specific areas:

Definitions

Use of Maths analysis - extent to which children use higher order thinking in Mathematics such as inventing original procedures to solving a problem, using manipulation in unique Mathematical ways, searching for Maths' patterns etc.

Depth of knowledge and student understanding

Basic skill development in the context of problem solving - extent to which students learn basic skills in the context of problem solving.

Maths discourse and communication

Locus of Maths authority - the extent to which Mathematics lessons support a shared sense of authority and responsibility for validating students' Mathematical reasoning e.g. text validation? Student explanation? Teacher as expert?

The item 'Basic skill development in the context of problem solving' showed wide variations in ratings across classes with a minority (a little over a fifth) rated very low on this aspect and a smaller proportion (10%) rated very highly (see Figure 3.1.2). Teachers rated highly on this item show evidence of in-depth attempts to link basic skills teaching to problem solving. They make the links explicit and children are able to explore their solutions. By contrast those scoring 'low' on this item would be characterised by a focus on memorisation or recitation rather than linking computation skills to actual 'real' situations. The pattern for 'Use of Maths analysis' was very similar. In this context 'high' scoring teachers would be encouraging pupils to justify and evaluate their computational methods rather than just mechanically reporting routine procedures. As in the Literacy lessons, 'Student engagement', 'Classroom Climate' and 'Support for learning' were generally favourably rated in most cases.

**Figures 3.1.2: Distribution of the Numeracy codes
(% of classrooms plotted against the quality rating scale [1-5])**

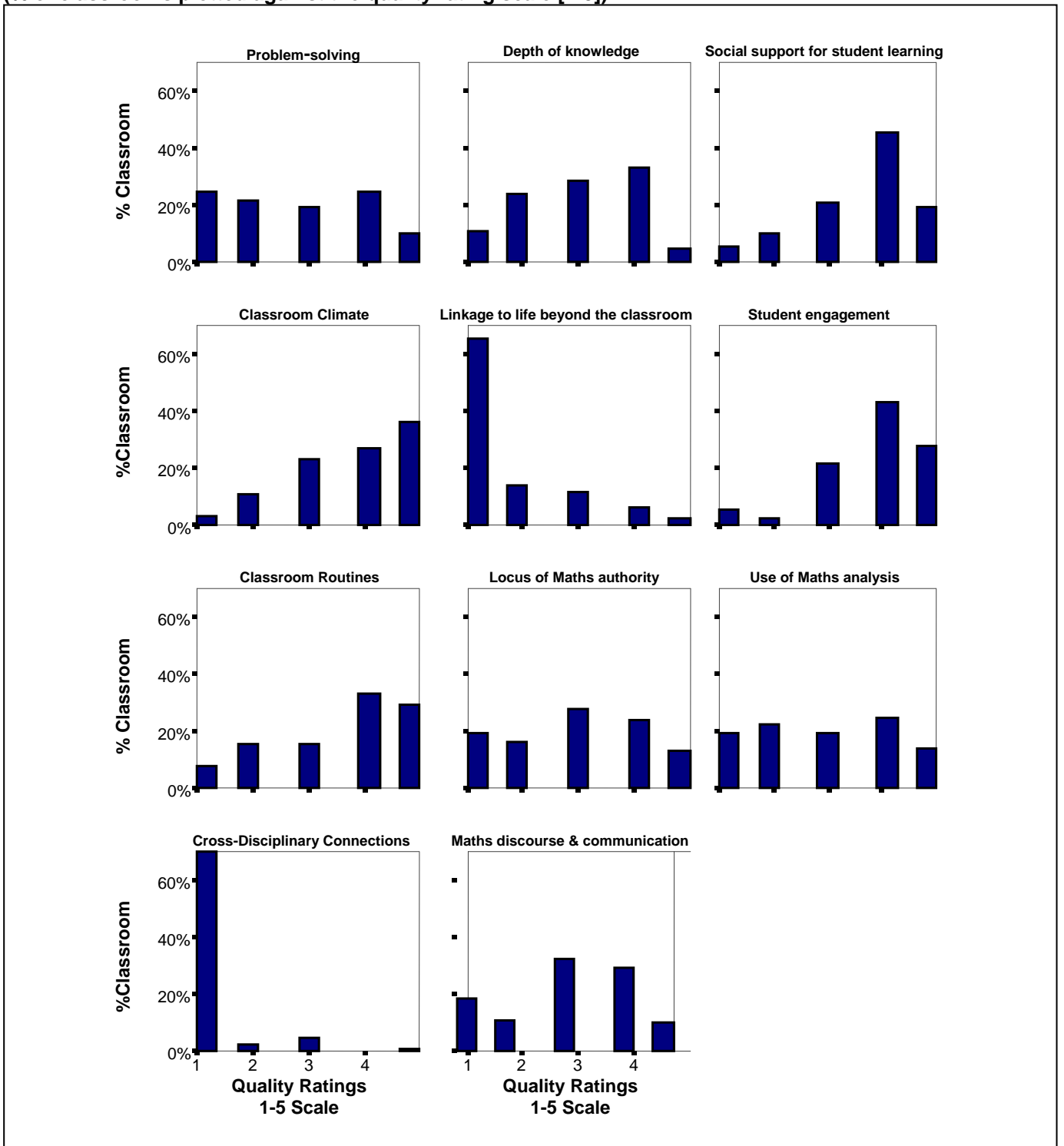


Table 3.1.2: Central tendencies for the Numeracy Codes

n=93	Mean	SD
Classroom Climate	3.82	1.13
Classroom Routines	3.61	1.27
Cross-Disciplinary Connections	1.15	.59
Linkage to life beyond the classroom	1.66	1.06
Social support for student learning	3.63	1.07
Student engagement	3.86	1.03
Use of Maths analysis	2.91	1.35
Depth of knowledge and student understanding	2.96	1.09
Basic skill development in the context of problem solving	2.73	1.34
Maths discourse and communication	3.01	1.24
Locus of Maths authority	2.95	1.30

The greatest variations across teachers were associated with teaching/pedagogy rather than class processes and were: 'Use of Maths analysis', 'Basic skill development in the context of problem solving' and 'Locus of Maths authority'.

All of the Numeracy codes were significantly correlated with each other, with the exception of 'Cross-Disciplinary Connections', which was correlated only with 'Linkage to life beyond the classroom'. 'Linkage to life beyond the classroom' was not significantly associated with 'Social support for student learning' (see Appendix J).

The strongest associations were between 'Classroom Climate' and three areas: 'Classroom routines' (0.81), 'Social support for student learning' (0.75) and 'Student engagement' (0.74) suggesting, as with the Literacy scales that classrooms that run smoothly provide better opportunities for pupils to maintain a focus on learning in a supportive atmosphere. It may be that teachers pay less attention to pupil autonomy in their focus on achieving clear routines. Similarly, 'Classroom routines' was strongly correlated with both 'Social support for student learning' (0.70), 'Student engagement' (0.77) and 'Locus of Maths authority' (0.62). 'Social support for student learning' was also strongly correlated with 'Student engagement' (0.76).

Strong correlations were also found between 'Use of Maths analysis' and 'Depth of knowledge and student understanding' (0.75), 'Basic skill development in the context of problem solving' (0.67), 'Maths discourse and communication' (0.68) and 'Locus of Maths authority' (0.66). 'Depth of knowledge and student understanding' was strongly correlated with 'Basic skill development in the context of problem solving' (0.69), 'Maths discourse and communication' (0.80), and 'Locus of Maths authority' (0.68). 'Maths discourse and communication' showed strong correlations with 'Basic skill development in the context of problem solving' (0.65) and 'Locus of Maths authority' (0.68). The item 'Depth of knowledge and student understanding' refers to environments where there is evidence of the development of relatively systematic, integrated or holistic understandings of Mathematical concepts. It could be argued that this can flourish only if the teachers themselves have confidence in teaching Mathematics. One of the purposes of the National Numeracy strategy was to provide a framework to give teachers more confidence in providing enriching mathematical experience for pupils, particularly those at the top end of Key Stage Two.

As noted earlier, the low ratings for relating skills to 'Linkage to life beyond the classroom' (lowest rating in 60% of classes) suggests that many teachers may make little reference to real life contexts and may be missing opportunities to enhance pupil awareness of wider applicability of mathematical concepts and approaches.

3.2 COS-5 (Pianta)

3.2.1 Frequency of Behaviour: Timed interval observations of individual children

The Frequency of Behaviour coding system is part one of the twenty-minute COS-5 observation cycle and aims to record the frequency of behaviours in five general areas of classroom behaviour and experience (i.e. Child Level Setting, Content of Target Child's Activities, Teacher Behaviour, Child Academic Behaviour and Child Social Behaviour). The focus is upon collecting information on the target child and teacher behaviours across this range of classroom and curriculum settings.

3.2.1a Classroom Organisation

Definitions

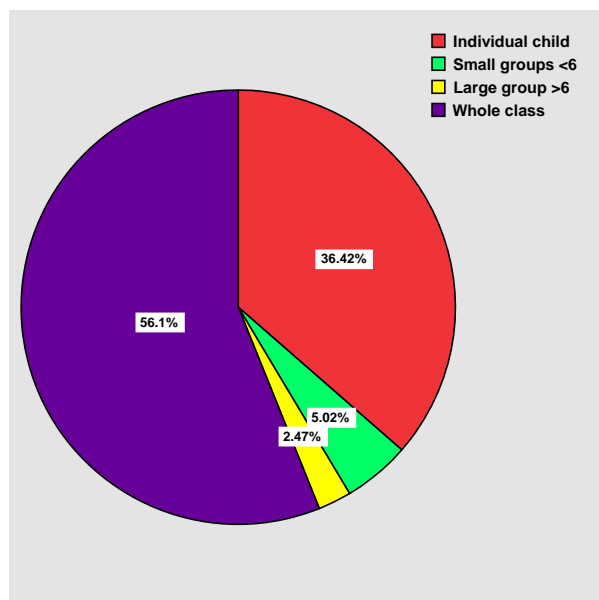
The COS-5 has four possible Child-Level Settings:

Whole class - when all the children in the room at a given time are receiving instruction (e.g. lectures, watching a video, listening to someone read).

Large group (more than 6) and Small group (6 or fewer). When the target child is part of a structural group (e.g. placed in a group which has no academic function) this was not coded as large or small group. For example, the target child sat around a table working independently on an assigned task would be coded as 'individual', despite the fact that the child is in close proximity to a group of children. It should be noted that this is the most common form of seating pattern observed in primary classrooms.

Individual - When the child is working by him/herself or is working one on one with a teacher or another adult in the classroom

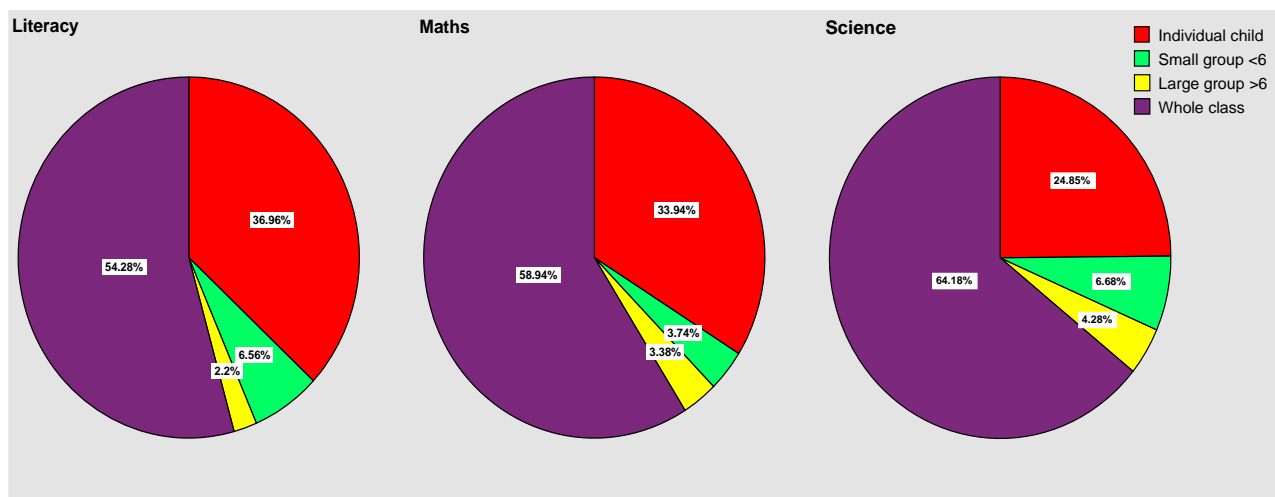
Figure 3.2.1a1: Proportion of time spent by children in specific classroom organisation categories



The most dominant type of setting observed was Whole class (over half of all lessons observed) with Individual setting accounting for just over 36 per cent of the time. Observations of large and small group settings were generally limited across all schools. It is important to note that some of these percentages may be inflated or deflated due to the timing of the observations of Literacy and Numeracy lessons. As the COS-5 observations were 20 minutes in total, the tendency for some researchers to begin observations at the start of Literacy or Numeracy lessons would mean they were more likely to observe children working in a whole class setting, as the start of the lesson is typically when whole class instruction occurs.

Within each of the three core subjects (Literacy, Numeracy and Science) (Figure 3.2.1a2), children were observed working in individual child settings most predominately during Literacy (37%) followed by Numeracy (35%) and least often in Science (25%). These differences were statistically significant ($F=5.7$; $df=3$; $p<0.01$). Whole class setting was most common during Science (64.18%); small and large group activities too were most likely to occur during Science (11%). Differences between the core subjects on these level settings, however, were not significant.

Figure 3.2.1a2: Classroom Organisation Trends across Literacy, Numeracy and Science



The proportion of whole class settings identified in the EPPE 3-11 Year 5 observation is higher than that reported by Galton et al. (1999), who found that children were engaged in whole class during Science only a third of the time. There are a number of potential reasons for this apparent difference. One main difference is likely to relate to definitions of 'whole class' activity. In Galton et al.'s research the definition was based on observations of **teachers' communication patterns** (whether an interaction was made with the whole class, an individual child or a group). In the two instruments used here, the interaction is seen **through the eyes of the target child**. In our observations whole class refers to those instances where the whole group of children are receiving the same instruction, at the same time from the teacher or another adult. In Galton et al.'s research a teacher answering a child's individual question during a whole class lesson would be coded as 'individual'. In the COS-5 observations an incident of a teacher answering a child's individual question during a whole class lesson would still be coded as whole class, as through the eyes of the target child they are still experiencing a whole class setting.

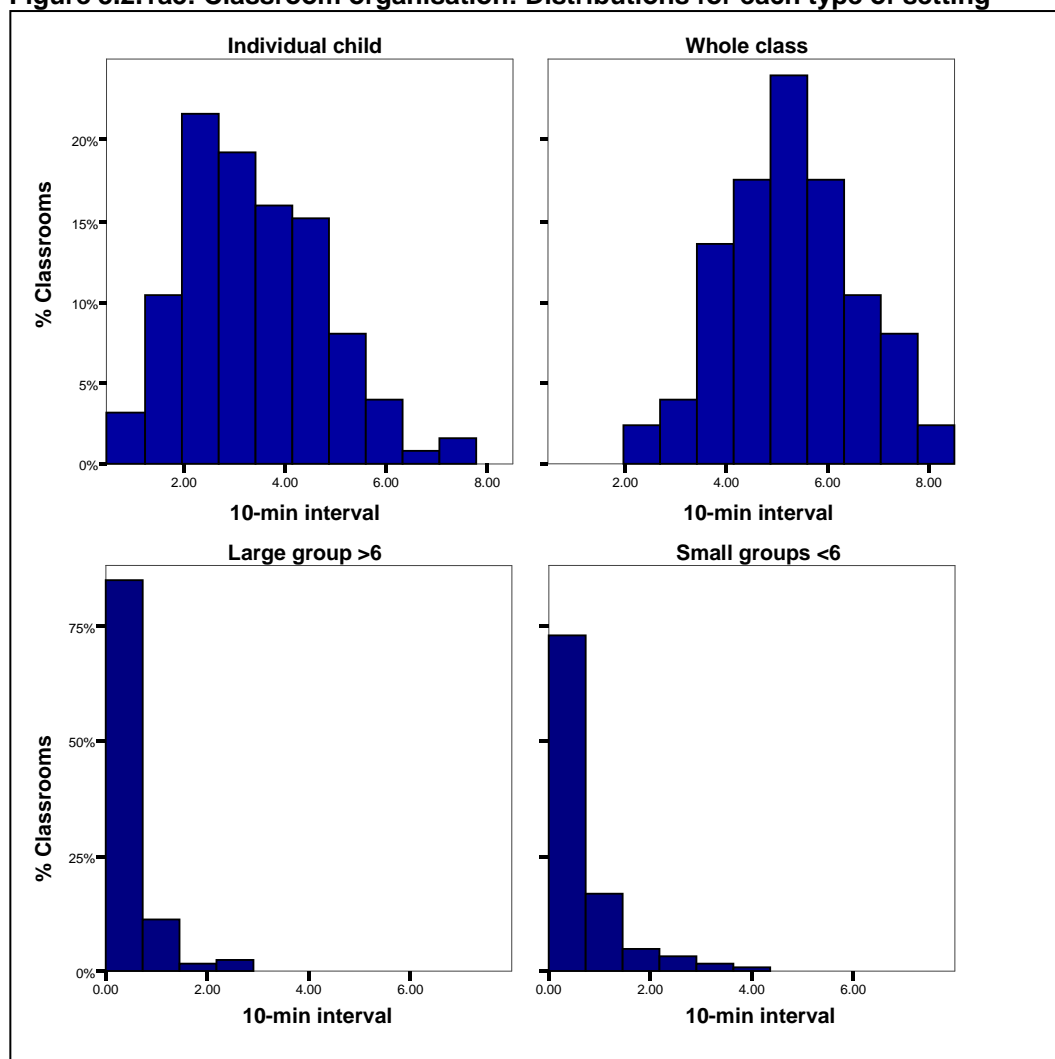
It is possible that the structured format of the Literacy and Numeracy strategies has influenced the way teachers approach Science teaching (and perhaps other subjects). Interactive whole class teaching is defined as an 'active teaching' model, which promotes high quality dialogue and facilitates discussion between teachers and pupils. The pupils are expected to participate actively in classroom discussions by posing questions, contributing ideas and explaining and demonstrating their thinking to the class. Teachers may make use of 'interactive whole class teaching' (Smith et al., 2004) during whole class sessions as encouraged in the National Strategies. Smith et al. (2004) found that the 'interactive whole class' teaching strategies have not dramatically transformed traditional patterns of whole class interaction.

Individual and Whole class settings generally dominated classroom organisation. However, variations between classes were apparent (Table 3.2.1 and figure 3.2.1a3). In both types of setting (Individual and Whole class) the distributions were fairly normal, indicating that only a minority of classes have very high or very low levels of particular groupings.

Table 3.2.1: Central tendencies for each type of setting in 10 minute observation

N=125	Mean	Sd
Individual	3.40	1.41
Small groups <6	.47	.82
Large groups >6	.23	.52
Whole class	5.25	1.31

Figure 3.2.1a3: Classroom organisation: Distributions for each type of setting

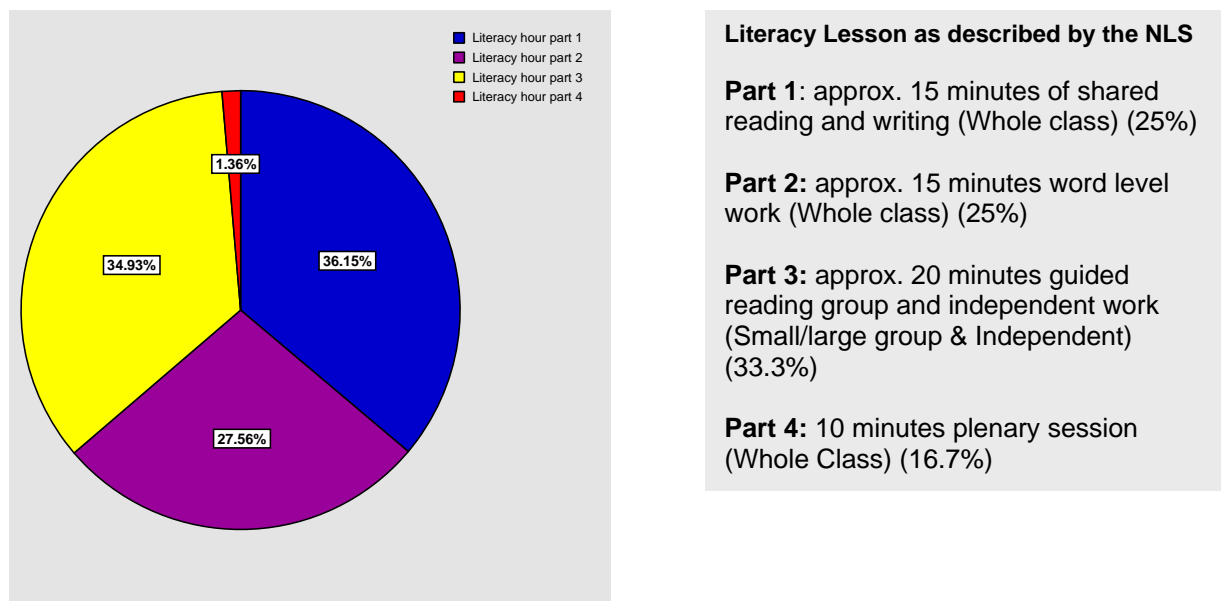


3.2.1b Contents of Curricula activity

Collecting information during the Literacy hour was one of the modifications made to the COS-5 instrument to make it more sensitive to the English school context. Researchers were asked to identify the part of the Literacy hour they were observing according to the description provided by the NLS guidelines:

- Whole class (15 minutes): Shared text work (balance of reading and writing).
- Whole class (15 minutes): Focused word work (balance over term of focused word or sentence work).
- Group and Independent work (20 minutes): independent reading, writing or word work, while teacher works with at least two ability groups each day on guided reading.
- Whole class (10 minutes): Plenary – review, reflect, consolidate teaching points and presenting work covered in the lessons (DfES, 2001a).

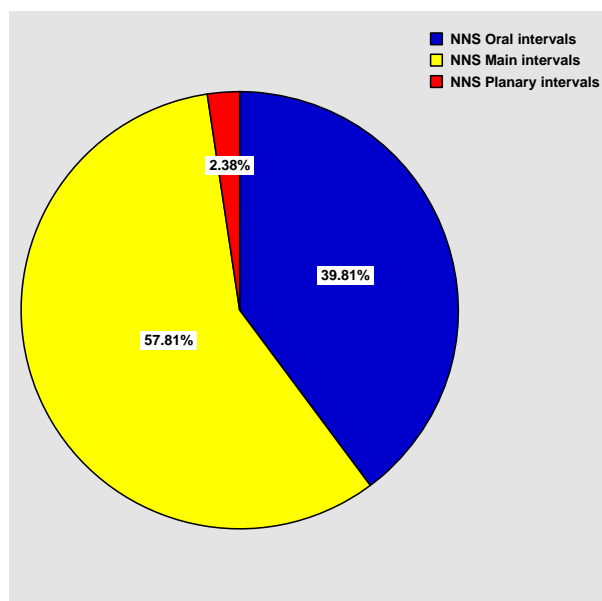
Figure 3.2.1b1: Time spent during Literacy lesson as observed using COS-5 (Pianta)



If we consider the parts of the Literacy strategy in relation to the child/class setting, (i.e. Part 1 = whole class, Part 2 = whole class, Part 3 = individual/group and Part 4 = whole class), according to the data presented in the pie chart above, on average, nearly 65 per cent of the total time children were observed during Literacy was spent in a 'Whole class' context. Individual setting dominated within the third part of the Literacy Hour (along with group work) and this was found to be occurring on average for 35 per cent of observations. Results generally indicated that times in different parts of the lesson are broadly in line with that described as a typical pattern by NLS.

The percentage of plenary sessions observed during Numeracy was slightly greater than that observed during the Literacy hour, 2.38 per cent in Mathematics (Figure 3.2.1b2) versus 1.36 per cent in Literacy (Figure 3.2.1b1) (though a direct comparison is not possible since the Literacy lesson is divided into four parts and the Numeracy into only three) (see Figure 3.2.1b2 below).

Figure 3.2.1b2: Parts of Numeracy hour



According to the information gathered with the IEO instrument, plenary sessions appear to be occurring in about half of the full lessons observed (50.7 % in Literacy and 47.8 % in Numeracy).

The apparent lack of a plenary in so many classrooms observed is an area of concern, given that the plenary session is the time when children are meant to get an opportunity to review, reflect and consolidate their learning. Black and Wiliam (1998) consider this to be the 'informative' feedback that is 'an essential component of classroom work' (1998, p9) that can lead to raised standards of achievement. Some schools in the sample were not following the suggested format of the Literacy or Numeracy lessons and also the issue of the timing of observations, as noted above, may have led to a trend to miss plenary sessions in some instances on the COS-5 observations (though not on the IEO). Further analyses will explore whether observed communication by the teacher and children differs during the plenary session. Note that Mortimore's et al. (1988) research, in line with the earlier work by Galton, Simon and Crowe (1980) and the subsequent 20 year on follow up by Galton et al. (1999), reported that higher order communication was relatively infrequent but associated with better child progress and that this form of communication was found to be more common in whole class interaction.

3.2.1c Teacher's Pedagogical Behaviour

Definitions

The COS-5 records four aspects of teacher's pedagogical behaviour:

Managerial instructions - the instructions serve to direct the children to learning materials or to explain how to begin, continue or complete the process of an activity. The purpose of the managerial instructions is to manage the process of the task, not for teaching. For example, teacher instructions that request children to gather or put away materials, expectations for how to begin, continue or complete an activity are considered managerial tasks. On the other hand teacher requests that give children the opportunity to demonstrate their understanding of what has been learned or teacher directions that serve to orient or focus the children to the materials being use, are NOT managerial instructions (e.g. 'What is the capital of England?' or 'Look at the picture at the bottom of the page.').

Monitoring - refers to the teacher's active attention to the child's performance in the classroom. It may include cuing the child, watching a child work or keeping him/her on task. Checking work refers to those instances when the teacher checks the child's work for correctness or completeness.

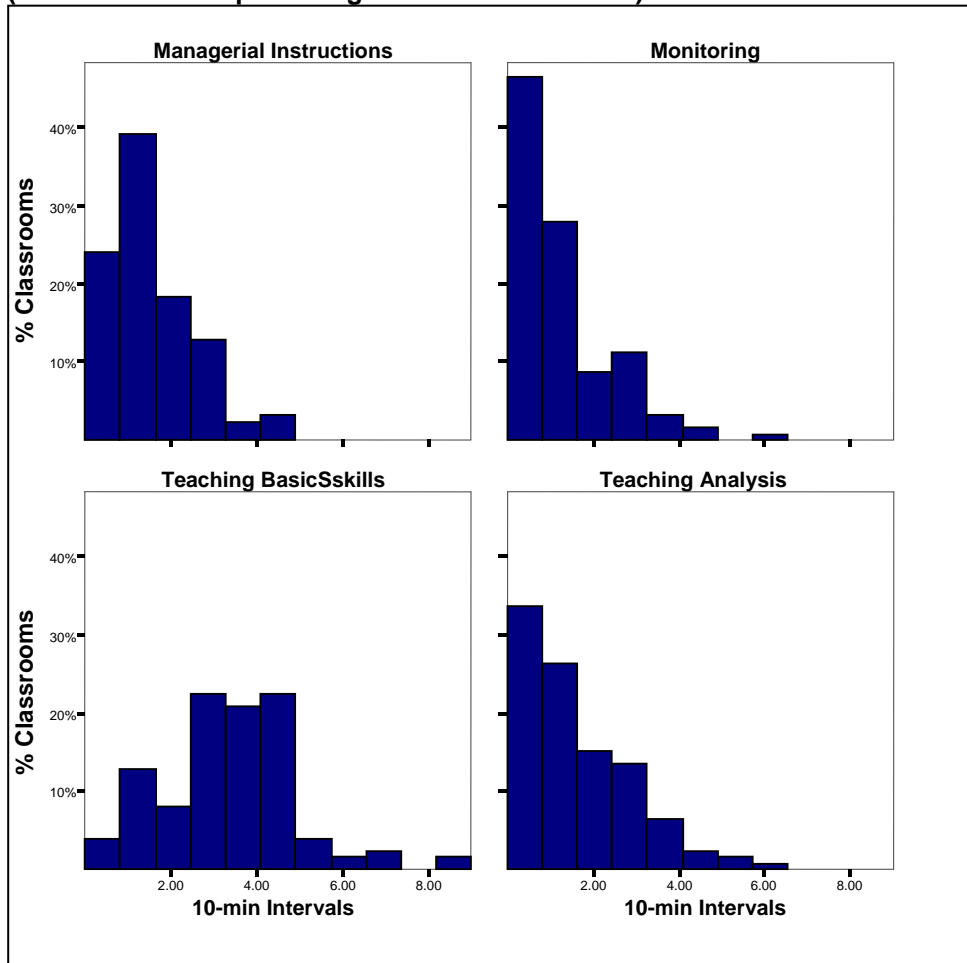
Teaching basic skills – this was coded when the teacher's focus with the target child (TC) or TC's group is on an isolated skill, the learning or reciting/remembering of factual material, or when the goal is performance towards the correct answer. It also includes step-by-step instruction on how to solve a problem.

Teaching analysis – this also includes analyses, inference, application, interpretation, problem solving, planning and times where the teaching involves students in critical thinking or asking them to demonstrate an understanding beyond memorising facts, rules or procedures. This can be thought of as 'higher order' skills.

Considerable variations were observed between the classes in teachers' pedagogical behaviours (Figure 3.2.6). There were large variations in the time spent teaching basic skills; in contrast the time teaching analysis and higher order thinking skills was less varied; the majority of teachers were observed to be teaching analysis for only a small proportion of the time (33%). Teachers spent 67 per cent of classroom time teaching basic skills.

The lack of teaching of higher order thinking skills is an area of concern given that the purpose of the National Strategies was not only to encourage and consolidate basic skills but to ensure that activities encouraged higher order thinking. Underpinning the introduction of the National Numeracy Strategy was the need for children to be 'confident and competent enough to tackle problems without going immediately to teachers' (DfEE, 1998, p.11) and to be able to draw on 'a range of calculation strategies' (p.11) and 'explain and make predictions' (p.12). Similarly, the National Literacy Strategy suggests that literate pupils should 'develop their powers of imagination, inventiveness and critical awareness' (DfES, 2001a, p.3). Once children have 'basic mastery' these attributes are best developed through opportunities for analyses, inference, application and problem solving.

Figure 3.2.1c: Teacher's Pedagogical Behaviour
 (% of classrooms plotted against 10-min intervals)



3.2.1d Child Academic Behaviour

Definitions

The COS-5 has four types of Child Academic Behaviours. They are:

Highly Engaged - an 'extraordinary degree of engagement and enthusiasm'. Indicators of high levels of engagement include verbal characteristics, such as detailed, enthusiastic responses or supportive cheering during games, physical behaviours, such as raising hand often and vigorously, and other body language (i.e. leaning into the action).

Engaged - being on task and productive, either actively or passively. That is, even if the child looked bored, as long as s/he was doing as expected, s/he should be coded as engaged. It is important to note that if there was no evidence to suggest the target child was not engaged, (e.g. he/she is looking in the direction of the teacher and not doing anything to suggest s/he was not engaged), then s/he was coded as engaged.

Unproductive - the amount of time lost to instruction for the child. The indicators of unproductivity include, non-involvement (staring out window/daydreaming), aimless, non-sustained activity (wandering around classroom, playing with pencil case) or irrelevant discussion (social chat with peers). Ultimately, in these instances, the child has a task set and s/he is choosing not to do it. However, in some cases unproductive behaviour may be involuntary because the child has been given no task or activity.

Off-task - when a child is involved in an academic activity other than the academic activity they are supposed to be engaged in. For example, the child is supposed to be working on a Mathematics worksheet, but is actually reading her reading book.

Figure 3.2.1d1: Child Academic Behaviour

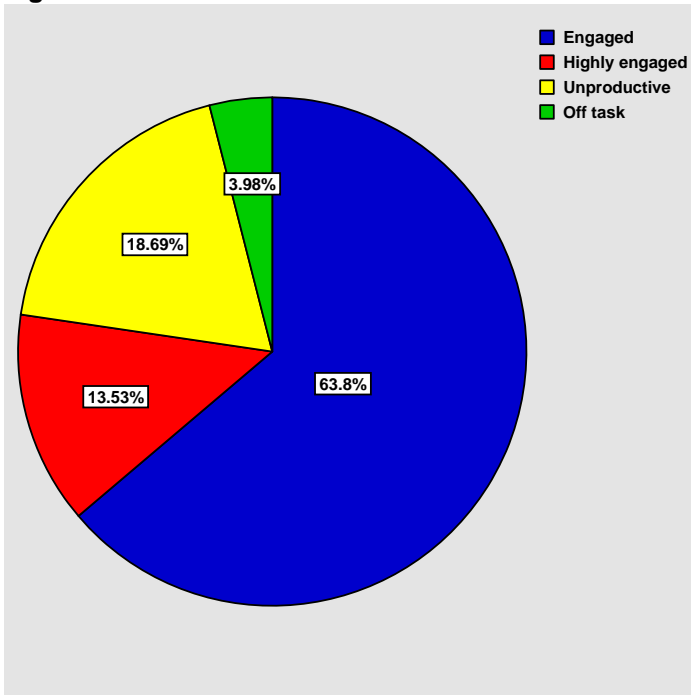
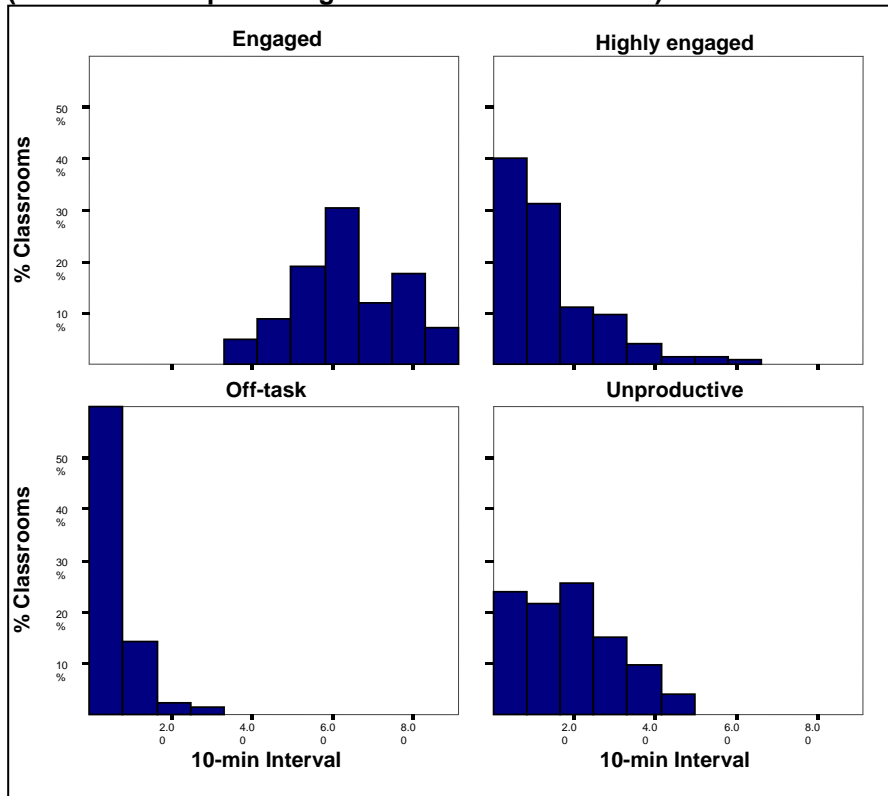


Figure 3.2.1d1 illustrates that for three quarters, nearing 80 per cent, of the time observed, the target children were productive (63.8% engaged or 13.5% highly engaged). Only a small proportion of time observed was classified as pupils 'off-task' (around 4%). Further detail of the variation between classes is shown in Figure 4.1.10. In over half of classes no 'off-task' behaviour was observed. This incidence of 'off-task' behaviour is less than that reported in Galton et al.'s, (1980/1997) original study of junior age pupils or in the study by Mortimore et al (1988). It should be noted that these two studies used a different observational instrument (ORACLE - Galton, Simon and Croll, 1980) in different contexts. When Galton et al. (1999) followed up their school sample 20 years on (in 1997) they found an increase in the proportion of time children were observed 'on task' suggesting that pupil engagement had increased over the period 1977 to 1997. The present data likewise indicates that 'off-task' behaviour is at a lower level than that found in studies in the 1970s or 1980s. Nonetheless, in a small number of classes (3%) the level was two or more minutes out of the total 10 minutes observed.

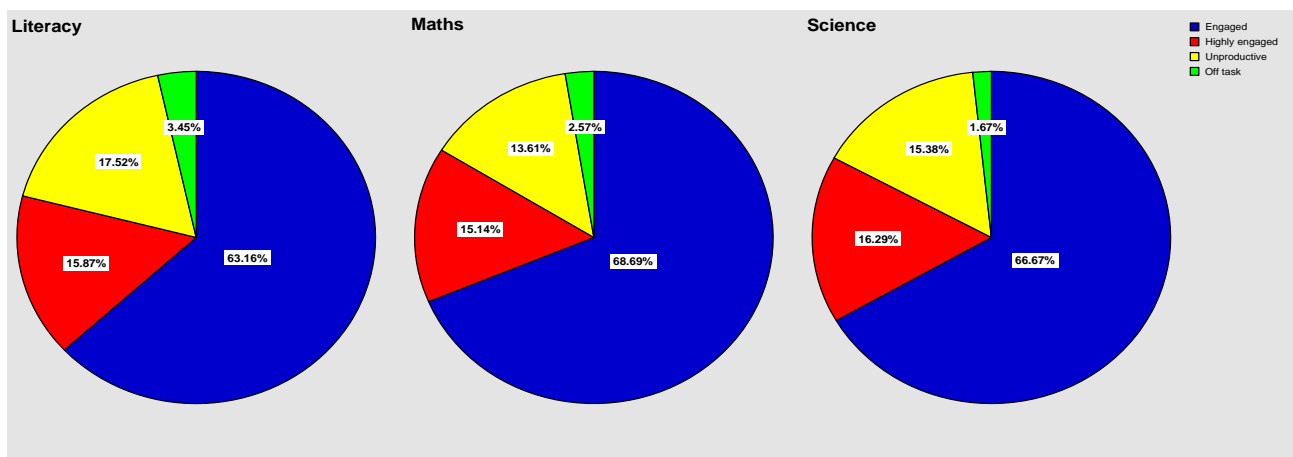
Figure 3.2.1d2: Distributions of 'Child Academic Behaviour' codes (% Classrooms plotted against 10-min time interval)



Overall, 'Unproductive behaviour' accounted for 19 per cent of the time observed (Figure 3.2.1d1 and 3.2.1d2). Whether the 'unproductiveness' is self-induced (e.g. talking to a peer about a social topic) or the result of the absence of an academic activity (during transitions, after completion of a task, lack of activity assigned) the Child Academic Behaviour is coded as 'Unproductive'. A high proportion of 'unproductive' time may be an indicator of poor organisation by the teacher. 'Unproductive behaviour' was relatively more common than 'off-task' behaviour, being a significant feature of observations of child behaviour in some classes (representing 3 or more out of 10 minutes in 20% of classes).

When broken down into subject areas, episodes of 'unproductive' and 'off-task' behaviours were slightly more common in Literacy lessons (21%), when compared with Mathematics (16%) and Science (17%) (Figure 3.2.9) but these differences were not statistically significant.

Figure 3.2.1d3: Child Academic Behaviour within each of the core-curricula subjects



3.2.1e Child-Teacher Interaction

A number of items in the COS-5 are devoted to the measurement of the nature of interaction between teacher and target child. Observations are made from both the perspective of the child and the teacher. Four behavioural measures are recorded (see below).

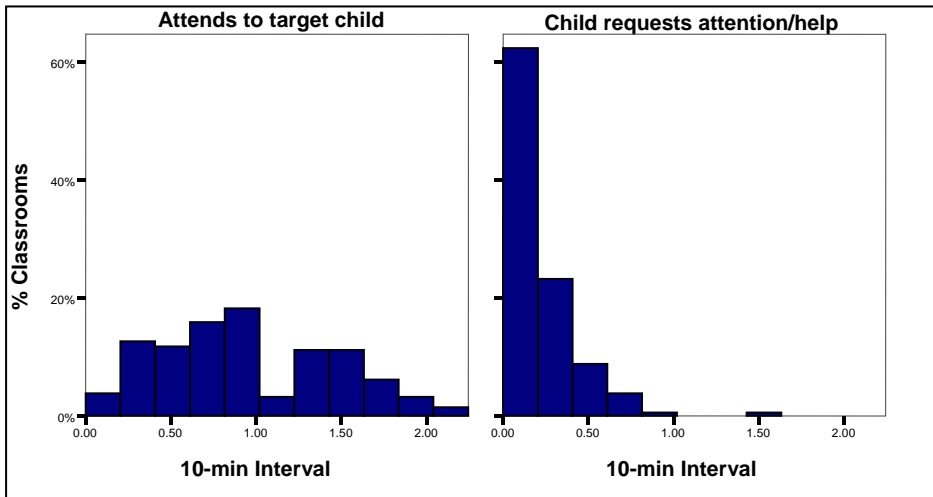
Definitions

The COS-5 has 8 behaviour codes that are paired to link the observations to be the child and the teacher.

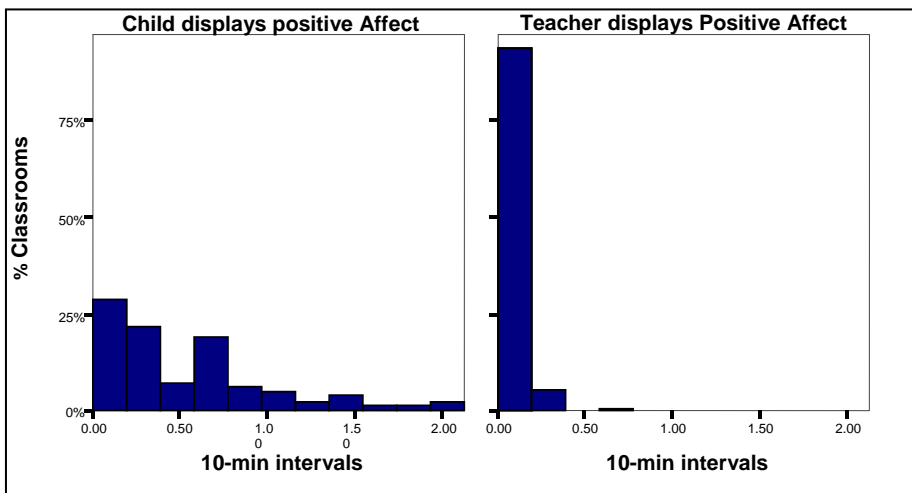
Teacher attend to target child	/	Child requests attention
Teacher displays negative affect	/	Child displays negative affect
Teacher displays positive affect	/	Child displays positive affect
Teacher disciplines	/	Child displays disruptive behaviour

Overall, teachers appear to be attending to children more frequently than children are requesting attention or help (see Figure 3.2.10). This may reflect teachers' skills in identifying potential need and may help to account for the low proportion of time 'off-task' (see Figures 3.2.7, 3.2.8 and 3.2.9).

Figure 3.2.1e: Child-Teacher Interaction across the classrooms
Attention



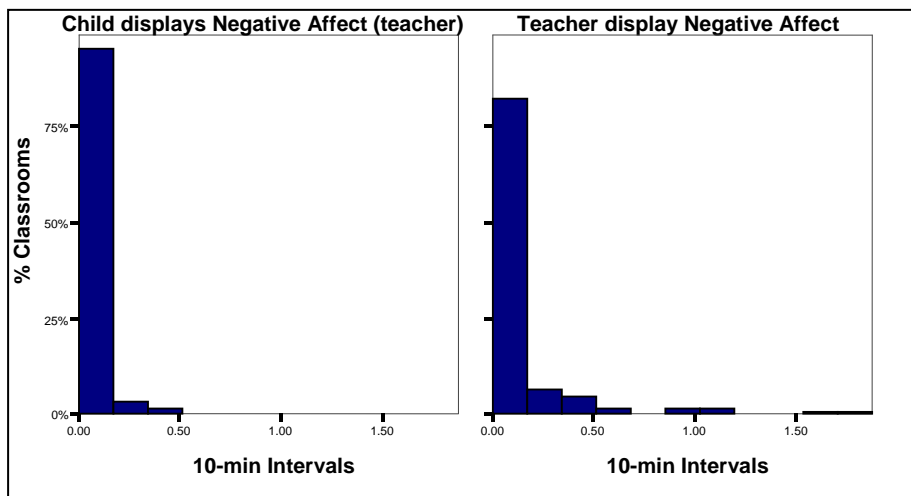
Positive Affect



Similarly, there is less of an association between child and teacher for 'Positive affect', with children expressing 'Positive affect' more often than teachers (see Figure 3.2.10). In contrast, the expression of negative affect appears more interdependent (see Figure 3.2.10). A class where

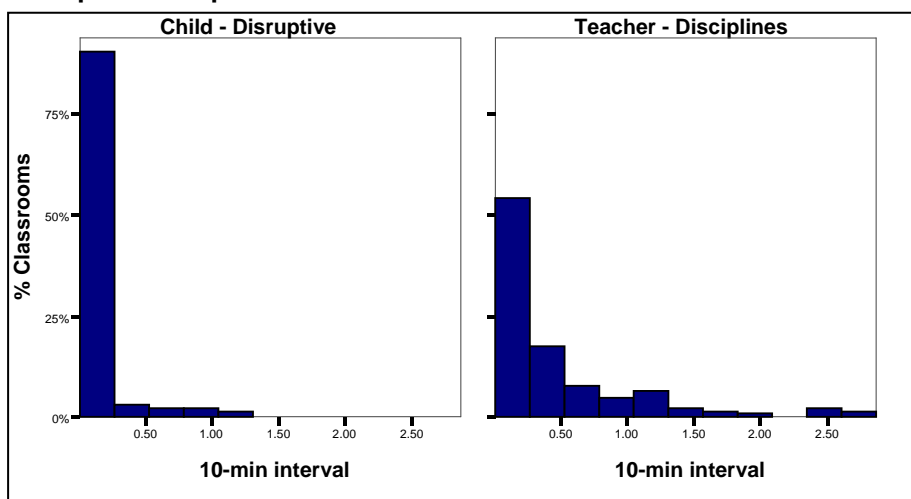
there was no incidence of 'Positive affect' (over 75%) by the teacher suggests that the target child received very little direct 'Positive affect'. Further analyses will explore whether children are more engaged in classes where 'Positive affect' is more frequent.

Negative Affect



Overall teachers tend to discipline children more frequently than children display disruptive behaviour (see Figure 3.2.10). This could occur for one of two reasons. First, the researcher coded teacher's disciplining behaviour even when it did not pertain directly to the target child but if there was observable evidence to suggest that the target child was affected by the teacher's disciplinary behaviour (e.g. target child raises head to look at teacher). Second, if the child was working in a whole class setting and the teacher was disciplining the whole class (e.g. for noise level) then although the target child would not be coded as 'Disruptive' s/he would still be a recipient of the teacher's disciplinary action. This suggests that there could be less disruption to children's concentration levels if teachers adopted discipline practices more specifically targeted to the disruptive children rather than a 'blanket' or general approach distracting a whole class or group of children.

Disruptive/Disciplines



3.2.2 Measures of Quality: Child and Classroom observation over a sustained period of time

The second part of the COS-5 observation cycle is dedicated to ten minutes continuous observation of behaviours and characteristics of the target child and the teacher/adult in the room at a more global level. The researchers focus is on the 'who, what and how' of everything happening, making judgements on the range of, frequency, intention, and emotional tone of the interpersonal and individual behaviors seen during the observation cycle. In these final ten minutes the researcher scores each of the constructs (see below) based upon the degree to which

the behavioural, emotional and physical markers are present and indicative of different levels of each construct. The ratings are based upon the behaviours and characteristics observed during the entire twenty-minutes observed. The Quality Coding System contains two broad categories: Child Codes and Classroom Codes.

The seven **Child classroom behaviours** are: 1) Positive affect, 2) Self-Reliance, 3) Sociable/Co-operative with peers, 4) Attention, 5) Disruptive, 6) Activity level and 7) Child-Teacher Relationship (Main teacher only).

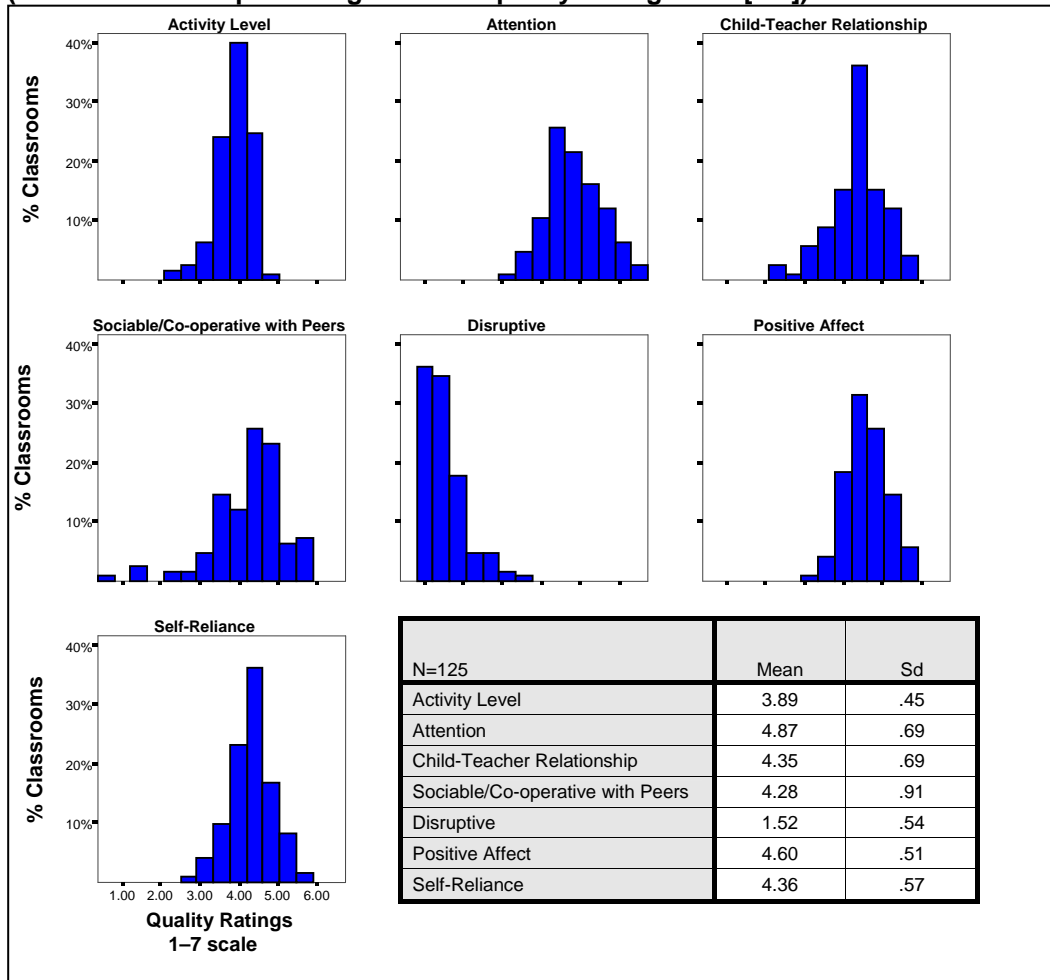
The nine **Teacher classroom practices and processes** are: 1) Richness of Instructional Methods, 2) Over-Control, 3) Chaos, 4) Detachment/Teacher, 5) Positive Classroom Climate, 6) Negative Classroom Climate, 7) Productive use of Instructional time, 8) Evaluative Feedback and 9) Teacher Sensitivity (Main teacher only).

Each code is rated on a seven-point scale (1 = very **un**characteristic and 7 = very characteristic). For descriptions of what classroom settings looked like under this rating see Appendix E. In addition to the items above the researchers were asked to rate several 'Other Pedagogical strategies' which school effectiveness research suggests is important in quality classroom interactions e.g. clear learning intentions etc.

3.2.2a Child's classroom behaviour

Classrooms varied across the following codes: 'Attention', 'Child-Teacher Relationship', 'Sociable/Co-operative with Peers' and 'Self-Reliance' (Figure 3.2.2a1). 'Co-operative with peers' had the highest standard deviation, which suggests that teachers vary in encouraging co-operation in Year 5 classes (the type of tasks assigned and the level of co-operation they encourage). In contrast 'Activity level', (activity, restlessness and fidgeting) had the lowest standard deviation of all child codes.

**Figure 3.2.2a1: Child's observed Behaviour: Variation across classrooms
(% of classrooms plotted against the 'quality' rating scale [1-7])**



An analysis of the inter-relationship within the child codes (see Table 3.2.2a below) revealed significant correlations between most codes on this scale with the exception of child's 'Disruptive' behaviour and 'Child-Teacher Relationship'. 'Disruptive' behaviour was significantly and negatively correlated with 'Attention' and 'Positive affect.' This indicates that children who were disruptive are also easily distracted and unfocused and likely to create diversions (attention) and also showed signs of being disengaged, glum and bored (opposite of 'Positive affect'). From these correlation data it is not possible to conclude whether a more positive emotional climate (influenced by 'Positive affect' and 'Attention' to individuals) helps to reduce the potential for behaviour problems or vice versa.

It is interesting to note that 'Child-Teacher Relationship' was significantly correlated only with 'Self-Reliance' and 'Sociable/Co-operative with Peers' but not as might be expected with 'Positive affect' or 'Attention'. It should be noted that the child's 'Positive affect' is not necessarily related to his or her momentary interaction with the teacher but is a measure of the general happy state of the child and how content they are with the situation they are in. Indeed the teacher's pre-occupation with another child might lead to low scores for 'Child-Teacher Relationship' when there was no actual negative affect exchanged between the two. 'Positive affect' is significantly correlated with all the child codes (apart from Child-Teacher Relationship). 'Positive affect' is a measure of the quality of emotional expression and reflects the overall happy mood and pleasant state of the child. Children who score high on 'Positive affect' seem to 'sparkle' or 'radiate', characterised by smiles and enthusiasm.

'Activity level' is significantly associated with 'Positive affect', 'Sociable/Co-operative with Peers' and 'Self-Reliance', while the 'Child-Teacher Relationship' is associated with 'Self-Reliance'. 'Attention' is related to 'Positive affect' and 'Self-Reliance'. Nonetheless, the score for 'Positive

affect' would be reduced by a lack of, or reduced level of, engagement, which is part of the child's 'Positive affect' (shows some engagement or interest in an activity). The highest correlations were between 'Positive affect' and 'Attention' (.48) and 'Positive affect' and 'Activity level' (.44). These figures suggest that children who are show enthusiasm and 'sparkle' in class have higher levels of 'tuned-in' or 'on task' behaviour and also show movement around class appropriate to the situation of the activity.

The charts in Figure 3.2.2a1 indicate a fairly wide spread in the frequency of different types of child behaviour across different classes. It is clear that 'Disruptive' behaviour is very uncommon in most of the Year 5 primary classes and shows a different distribution to other behaviours. This, taken with the findings in section 3.2.1d (Galton's increase of 'on task' behaviour) suggests that the current 'layman's' perception of increases in disruptive behaviour in schools (deteriorating over time) is not supported by our observations for this sample.

Table 3.2.2a: Inter correlations within child's classroom behaviour (only significant correlations shown)

n=125	Positive Affect	Self-Reliance	Sociable/Co-operative with Peers	Attention	Disruptive	Activity Level	Child-Teacher
Positive Affect	1						
Self-Reliance	.27**	1					
Sociable/Co-operative with Peers	.27**	.33**	1				
Attention	.48**	.43**		1			
Disruptive	-.21*			-.40**	1		
Activity Level	.44**	.21*	.22*			1	
Child-Teacher		.42**	.24**				1

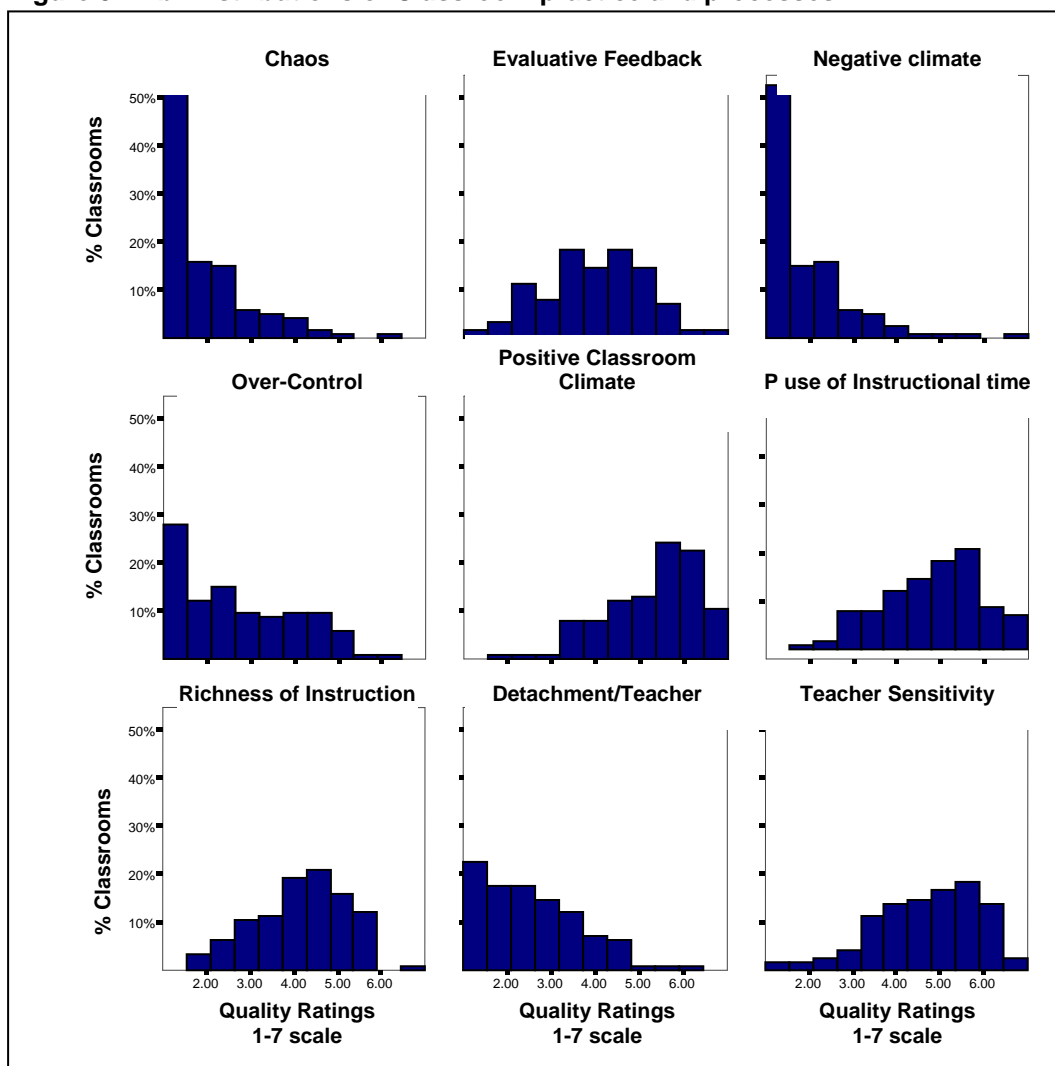
The associations described above may help to indicate important features of Classroom Climate. Further factor analysis (in Section 4) examines the underlying structure in these data more clearly.

3.2.2b Teacher classroom practice and processes

In the second part of the 'Measures of Quality' researchers focused on more global measures of the classroom environment. Classroom practices varied across schools on the nine classroom codes (see Appendix E for more detailed descriptions). The largest variation across schools was on 'Over-Control.' This was a relatively uncommon feature (40% of classes were rated low on this scale) of most classes but in a very small minority (4%) observations suggested 'Over-Control' was a strong feature. Classrooms high in 'Over-Control' were characterised by rigid structures, driven by the teacher's agenda rather than the needs or interests of the children. In these situations the talk is teacher dominated.

'Chaos' and 'Negative Classroom Climate' both showed highly skewed distributions indicating that in most classes these aspects were rare (see Figure 3.2.2b). Classrooms scoring high on these two scales were characterised by lots of noise and unruly behaviour both during activities and transitions. The teachers in these classrooms were irritable and used mechanisms such as sarcasm and humiliation as disciplining strategies. In all, over 50 per cent of classrooms received the most favourable rating on these scales. By contrast the ratings for 'Evaluative Feedback', 'Teacher Sensitivity', 'Richness of Instructional Methods' and 'Productive use of Instructional time' showed a wider spread across classes.

Figure 3.2.2b: Distributions of Classroom practice and processes



The extent of variation between classes is an important feature of the observation data; if there was little difference (variation) in observed teachers and pupil behaviour and responses between classes there would be little possibility that such features account for differences in measures of effectiveness or improvement. It is thus evident that children in Year 5 classes may experience a range in teaching approaches and strategies and in some classes the experiences may not be positive.

Table 3.2.2b: Central tendencies for Classroom practice and processes

n=125	Mean	SD
Chaos	1.90	1.02
Evaluative Feedback	3.95	1.15
Negative Classroom Climate	1.86	1.02
Over-Control	2.67	1.34
Positive Classroom Climate	5.28	1.06
Productive Use of Instructional Time	4.84	1.11
Richness of Instructional Methods	4.16	1.04
Detachment/Teacher	2.52	1.15
Teacher Sensitivity	4.71	1.21

All classroom codes were significantly correlated with each other (see Appendix G). Most correlations were statistically ($p < 0.001$) significant. The strongest associations were between

'Richness of Instructional Methods' and three other measures: 'Productive use of Instructional time' (0.75), 'Evaluative Feedback' (0.75) and 'Teacher Sensitivity' (0.85). 'Teacher Sensitivity' also showed strong associations with 'Positive Classroom Climate' (0.79), 'Productive use of Instructional time' (0.71) and 'Evaluative Feedback' (0.77). Classrooms which scored highly on these scales were strongly 'work focused' and teachers exposed children to a wider range of 'higher order' thinking skills such as hypothesizing, developing intellectually engaging reciprocal discussion and 'modelling' examples. They had efficient routines with smooth transitions. Teachers were sensitive to children's mood and interests and used sensitive discipline. They were also able to provide feedback that demonstrated an awareness of a child's particular talents or skills. These are similar findings to the pedagogies associated with more effective early learning in the earlier EPPE case studies research (Siraj-Blatchford, Sylva, Taggart, Sammons, Melhuish and Elliott, 2003).

As might be expected the item 'Negative Classroom Climate' showed strong associations with 'Chaos' (0.72).

Further factor analysis was conducted on the COS-5 Quality measures to reveal underlying structures in these data. The results of this analysis are presented in Section 5.

3.2.3 Other Pedagogical Strategies

The COS-5 was designed for American classrooms. When adapting it to an English context the EPPE 3-11 team added items in the Frequency of Behaviour section to provide information significantly relevant to the teaching of Literacy and Numeracy lessons as outlined by the National Strategies. Similarly at the end of the observation period the team supplemented the instrument with some additional areas to rate. These were items likely to be important aspects of teachers' pedagogical strategies and one on climate. These measured:

- 1) children are responsible for time and materials;
- 2) the learning intentions of the lesson/activity are clear to the children;
- 3) children could reflect on their learning through review;
- 4) the teacher's materials/resources were well organised/managed/'fit for purpose';
- 5) the teacher is clear about what s/he expects the children to do in their activities;
- 6) the teacher ensures that concepts/ideas are clear to the children and
- 7) the children are liked and respected by peers.⁴

All items were measured on a 5 point scale 1 = not clear, 5 = extremely. Researchers were required to consider the whole of the observation in order to code these items.

'Children are responsible for time and materials' and 'Children could reflect on their own learning', had the lowest mean scores (1.87 and 1.93 respectively – Table 3.2.4) of all items on this scale. This suggests that most teachers give little autonomy to Year 5 pupils. Scores on these items differed, but the distributions are fairly wide indicating considerable variation to teacher approaches to these areas (see Figure 3.1.13). In contrast, two teacher behaviours: 'The teacher is clear about what she expects the children to do in their activities' and 'The teacher ensures concepts/idea are clear to the children', were skewed towards the higher end of the scale with relatively higher means than the rest (4.51 and 4.30 respectively). Clarity of instruction is very important in maintaining order and work focus and to help children access the curriculum. These items measure the extent to which the teacher is clear and makes things clear to the children, and does not necessarily relate to the richness of instruction or the actual (higher order) expectations of the lesson or activity. As can be seen in the graphs in Figure 3.2.13, these distributions were skewed towards the positive end of the scale, but this is partly a reflection of the use of a 5 point scale for these two items.

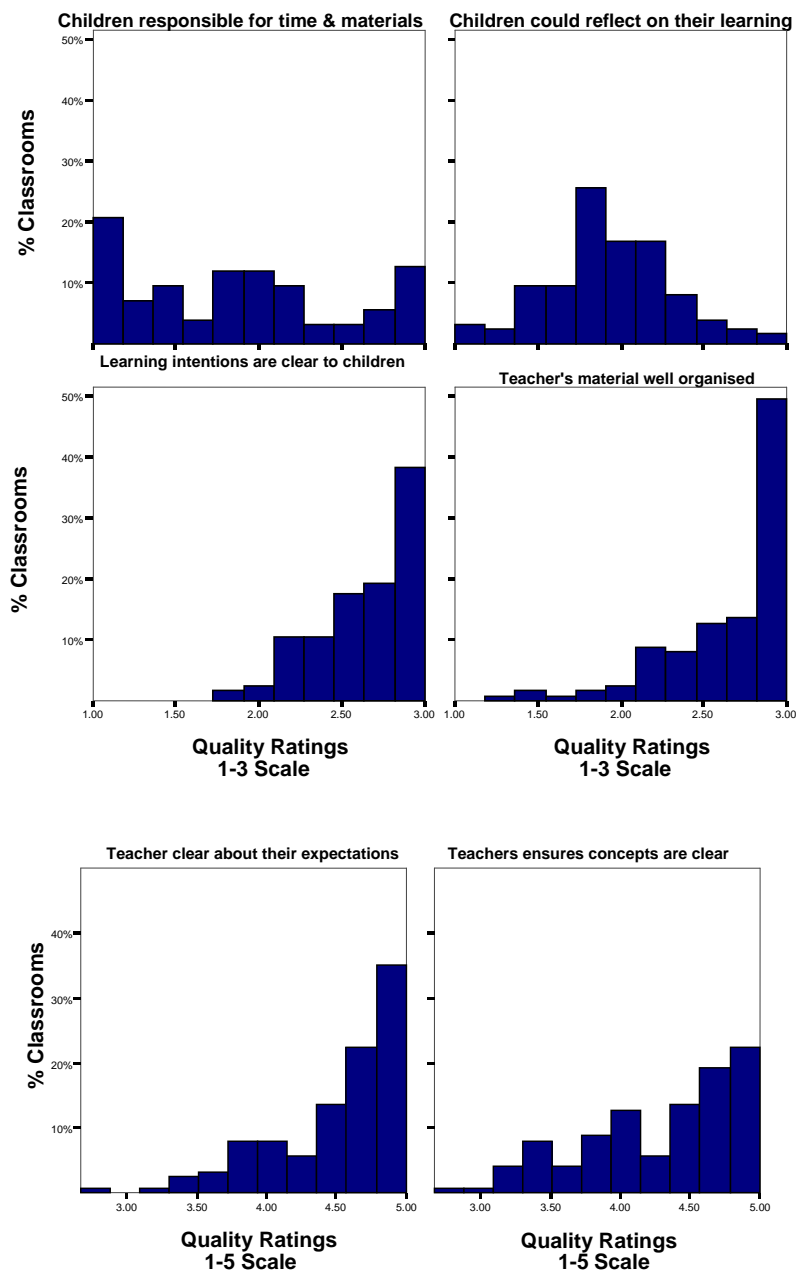
⁴ This item did not come under the strict definition of teacher pedagogical strategies as it related more to Classroom Climate (although certain pedagogical strategies can promote a more positive or negative relationship between pupils).

Table 3.2.3: Central tendencies for Other Pedagogical Strategies

N=125	Mean	Sd
Children responsible for time and materials	1.87	.65
Learning intentions are clear to children	2.66	.30
Children could reflect on their learning	1.93	.38
Teacher's material well organised	2.67	.38
Teacher clear about their expectations	4.51	.48
teachers ensures concepts are clear	4.30	.55

NB: The first four items are rated on a scale of 1 to 3, and the final two items on a scale of 1 to 5.

Figure 3.2.3: Other Pedagogical Strategies



All 'Other Pedagogical Strategy' items were significantly correlated with each other apart from 'Children responsible for time and materials' and 'Learning intentions of the lesson are clear to the children'. Most correlations were statistically significant ($p < 0.001$). The strongest associations were between 'Teacher clear about their expectations' and 'Teachers ensures concepts are clear' (0.89). Strong associations were also found between 'Learning intentions are clear to children' and 'Teacher clear about their expectations' (0.76) and 'Teachers ensures concepts are clear' (0.75). Full details are shown in Appendix H. This evidence suggests that most teachers give high priority to ensuring clarity in communication with children in Year 5.

The item 'Children are responsible for time and material' was quite clearly defined as the degree to which the children were independent in these areas. It appears that many teachers feel it necessary to distribute all equipment, control the dialogue (little evidence of pupil voice), and be prescriptive about how things should be done. Figure 3.2.13 indicates that only a minority of classes were rated as giving pupils much responsibility for managing their time and materials.

3.3 How the COS-5 (Pianta) and the IEO (Stipek) compare

3.3.1 COS-5 Child's Behaviour in the Classroom codes and IEO

This section explores the relationship between the two observation instruments used in the EPPE 3-11 classroom research.

For the 93 out of 125 schools (nearly three quarters or 74.4% of the sample) in which both observation instruments were conducted it was possible to make comparisons between observed codes in the same Year 5 classes, although at slightly different time points (Spring term, COS-5, and Summer term, IEO).

Table 3.3.1a shows the pattern of statistically significant correlations between the various scales related to child behaviour in the classroom as measured by the COS-5 and the IEO Literacy scales.

While there are many significant associations, most correlations are fairly modest in size. The strongest positive associations are between 'Student engagement' and 'Attention', (both measures of 'tuned in' or 'on task' behaviour) and 'Reading as meaning making' and 'Attention' (suggesting that pupils in classrooms where pupils are making meaning that goes beyond decoding words were also classrooms where higher levels of concentration and 'on task' behaviour were seen). The strongest negative correlations are between 'Student engagement' and 'Disruptive' behaviour (both being measures of pupils behaviour along a continuum from daydreaming and slight disruption to seriously disturbing the learning of a wide number of children), and between 'Support for student learning' and 'Disruptive' behaviour (indicating high 'Disruptive' behaviour is associated with situations where there is little mutual respect between pupils and pupils, and teacher and pupil).

Table 3.3.1a: The COS-5 (Pianta) 'Child's behaviour in the classroom' codes and IEO (Stipek) Literacy (only significant correlations are shown)

n=93	COS-5 – Child classroom behaviour codes					
IEO Literacy Classroom Codes	Positive Affect	Self-Reliance	Sociable/Co-operative with Peers	Attention	Disruptive	Child-Teacher
Classroom Climate				0.25*	-0.36**	0.33**
Classroom Routine				0.23*	-0.31**	0.29**
Cross Disciplinary Connections		0.32**	0.27**			0.31**
Linkage to life beyond the classroom		0.25*		0.23*		0.21*
Support for student learning	0.27**			0.31**	-0.38**	

Student engagement				0.38**	-0.46**	0.32**
Reading as meaning making		0.29*		0.38**		
Higher order thinking		0.32**				
Purposeful development of writing skills		0.33**		0.24*		
Instruction conversation						0.22*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

There were no significant correlations between:

- IEO 'Basic skill development in the context of reading' and any of the COS-5 child codes;
- COS-5 'Activity level' and any of the IEO Literacy codes.

Comparing the COS-5 with the IEO Numeracy scales, no statistically significant correlations were found between the COS-5 child behaviour codes and the IEO Numeracy code 'Cross-Disciplinary Connections'; and there were no significant correlations between the COS-5 'Positive affect', 'Sociable/Co-operative with Peers' and 'Activity level' codes with any of the IEO Numeracy codes.

Table 3.3.1a: The COS-5 (Pianta) Child codes and IEO (Stipek) Numeracy (only significant correlations are shown)

n=93	COS-5 – Child classroom behaviour codes			
IEO Numeracy Classroom Codes	Self-Reliance	Attention	Disruptive	Child-Teacher
Classroom Climate	0.28**	0.31**	-0.29**	0.42**
Classroom Routine		0.25*	-0.29**	0.34**
Linkage to life beyond the classroom				0.29**
Support for student learning		0.27**		0.21*
Student engagement	0.23*	0.42**	-0.30**	0.24*
Use of Maths analysis		0.22*		0.31**
Depth of knowledge and student understanding		0.25*		
Basic skill development in the context of problem solving				0.24*
Maths discourse and communication		0.24*		0.23*
Locus of Maths authority		0.21*		

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

These results indicate that the two instruments may provide different kinds of information about some aspects of classroom practices although the differences in the time the two observations were conducted (Spring and Summer term) may well have led to lower associations too.

3.3.2 The COS-5 (Pianta) Classroom practices and processes codes and IEO (Stipek)

Five of the IEO Literacy codes were correlated with all of the COS-5 classroom codes these included: 'Classroom Climate', 'Classroom routine', 'Support for student Learning', 'Student engagement' and 'Instructional conversation'. Some of the IEO Literacy codes correlated with some of the COS-5 classroom codes but not others; these correlations are presented in Table 3.3.2a (below). The association between these domains is the likely importance of 'Classroom Climate' in shaping other learning practices and processes.

Overall, 'Detachment/Teacher' is negatively correlated with better scores on 'Basic skills

development in the context of reading'. 'Chaos', 'Over-Control', and 'Negative Classroom Climate' are similarly negatively associated with 'Reading as meaning making'. 'Purposeful development of writing skills' was positively correlated with 'Richness of Instructional Methods'. This points to the role of establishing a 'Classroom Climate', through routines and sensitive management strategies, which enable learning to flourish. These correlations underline the relationship between classroom management and learning, and the way poor behaviour management and badly managed routines may affect the successful delivery of the curriculum and pupil learning.

Table 3.3.2a: The COS-5 (Pianta) Classroom codes and IEO (Stipek) Literacy (only significant correlations are shown)

n=93	IEO – Literacy					
COS-5 Classroom codes	Cross Disciplinary Connections	Linkage to life beyond the classroom	Reading as meaning making	Basic skill development in reading	Higher order thinking	Purposeful development of writing skills
Richness of Instruction	0.37**	0.25*				0.41**
Over-Control			-0.36*			
Chaos			-0.39**			
Detachment/Teacher	-0.30**			-0.39**		
Positive Classroom Climate			0.34*			
Negative Classroom Climate			-0.35*			
Productive Use of Instructional Time	0.27**	0.23*	0.39**		0.22*	0.24*
Evaluative Feedback	0.35**	0.24*		0.39**		
Teacher Sensitivity	0.29**					

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The 'Cross Disciplinary Connections' code during Numeracy observations did not correlate with any of the COS-5 classroom variables. Seven of the remaining IEO codes, including 'Classroom Climate', 'Classroom routine', 'Social support for student learning', 'Student engagement' and 'Depth of knowledge and student understanding', however, were significantly correlated with all of the COS-5 classroom codes.

'Use of Maths analysis' and 'Basic skills development in the context of problem solving' similarly, were significantly correlated with all the classroom codes, apart from 'Over-Control'. 'Linkage to life beyond the classroom' was correlated with some of the classroom codes but not others, the relationship between this code and the COS-5 classroom codes are presented in Table 3.3.2b.

Table 3.3.2b – The COS-5 (Pianta) Classroom codes and IEO (Stipek) Numeracy Codes

n=93	IEO – Numeracy Codes
COS-5 Classroom Codes	Linkage to life beyond the classroom
Richness of Instructional Methods	
Over-Control	
Chaos	-0.21*
Detachment/Teacher	-0.20*
Positive Classroom Climate	0.24*
Negative Classroom Climate	-0.26*
Productive Use of Instructional Time	0.21*
Evaluative Feedback	
Teacher Sensitivity	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

These analyses suggest that there are significant but relatively weak to modest associations between the two observation instruments. It appears that the two measure somewhat different aspects and the two instruments seem to tap into somewhat different underlying dimensions of teacher and pupil behaviour and pupil responses. Taking the correlations overall they underlie the important relationships between Classroom Climate/teacher practices and the development and delivery of the curriculum. Where the climate is more positive and it is likely that children feel valued and secure, the curriculum is more embracing and the learning more challenging.

3.4 Key Dimensions in Classroom Processes

Principal components analysis is a form of data reduction used to uncover underlying dimensions in the observational data. This examines the extent to which certain items cluster together (were more closely correlated), indicating these clusters contain conceptually similar items. The factors are the dimensions identified from the clusters of variables in the data set, and they provide a summary that helps in interpreting the results of the observations.

3.4.1 The IEO Factors

Data from the Literacy and Numeracy scales of the IEO instrument were analysed separately. Analysis of both Literacy⁵ and Numeracy yielded similar factors – ‘**Pedagogy**’, ‘**Subject development**’ and ‘**Learning linkages**’ - explaining 73 per cent of the variance in the individual Literacy items, and 76 per cent of the variance in the Numeracy items. The loading of each Literacy and Numeracy item and the corresponding factor can be found in the tables below.

⁵ The analysis of the Literacy scale included only nine of the 11 items. The two remaining items - ‘Reading as meaning making’ and ‘Basic skills development in the context of Reading’ - were not included as these two activities were mutually exclusive and would rarely co-occur within the same observation cycle, consequently the number of observations for these items were too small to include.

Table 3.4.1: Factors identified in the IEO (Stipek) – Literacy

1. Pedagogy	Component		
	1	2	3
Classroom Climate	.882		
Classroom Routines	.863		
Social support for student learning	.806		
Student engagement	.806		
Instructional conversations	.562	.460	
2. Subject development			
Higher order thinking (HOT) in writing		.767	
Purposeful development of writing skills		.853	
3. Learning linkages			
Cross-Disciplinary Connections			.805
Linkage to life beyond the classroom			.816

Table 3.4.1: Factors identified in the IEO (Stipek) - Numeracy

1. Subject development	Component		
	1	2	3
Use of Maths analysis	.849		
Depth of knowledge and student understanding	.848		
Basic skill development in the context of problem-solving	.822		
Maths discourse and communication	.817		
Locus of Maths authority	.693	.447	
2. Pedagogy			
Classroom Climate		.853	
Classroom Routines		.833	
Social support for student learning		.846	
Student engagement		.886	
3. Learning linkages			
Cross-Disciplinary Connections			.880
Linkage to life beyond the classroom			.684

The latent structures underlying the Literacy and Numeracy data were found to be conceptually similar. Three factors were extracted for each set of data each consisting of 'Subject development', 'Pedagogy' and 'Learning linkages' dimensions. The items loading on the 'Learning linkages' were the same for both Literacy and Numeracy; the items loading on 'Pedagogy' were again the same with the exception of 'Instructional conversation' which was an additional item to load on Literacy; the 'Subject Development' factors were subject specific.

3.4.2 The COS-5 Factors

Data from the COS-5 child and classroom codes were entered into a principal components analysis with Varimax rotation to identify factors of empirically linked items. Five factors were extracted accounting for 76 per cent of the variance in the 16 individual item scores.

Table 3.4.2a - Latent variables for the Quality measures

1. Quality of pedagogy	Component				
	1	2	3	4	5
Classroom codes - Richness of Instructional Methods	.882				
Classroom codes - Detachment/Teacher	-.661				
Classroom codes - Positive Classroom Climate	.664	-.459			
Classroom codes - Productive Use of Instructional Time	.759				
Classroom codes - Evaluative Feedback	.853				
Classroom codes - Teacher Sensitivity	.900				

2. Disorganisation					
Child code - Disruptive		.875			
Classroom codes - Chaos	-.416	.749			
Classroom codes - Negative Classroom Climate	-.516	.684			
3. Child positivity					
Child code - Self-Reliance			.752		
Child code – Sociable / Co-operative with Peers			.551		-.499
Child code - Child-Teacher Relationship	.443		.732		
4. Positive engagement					
Child code - Positive Affect				.840	
Child code - Activity Level				.729	
5. Attention and control					
Child code - Attention		-.488			.627
Classroom codes – Over-Control					.589

The first factor is interpreted as representing general classroom processes and pedagogy and was termed **Quality of pedagogy**. This factor is associated with six of the classroom quality measures including, 'Teacher's sensitivity' and 'Detachment/Teacher', 'Richness of Instructional Methods', 'Evaluative Feedback' and 'Positive Classroom Climate'. Scoring high on these dimensions indicates a classroom where the teacher provides pupils with a rich learning environment. The focus is on learning and a 'can do' culture. Pupils are supported in their learning with 'feedback' from the teacher that challenges them.

Child's 'Disruptive' behaviour, 'Chaos' and 'Negative Classroom Climate' formed the second factor. This dimension may be conceptualised as measuring the extent of classroom '**Disorganisation**' (or its obverse) characterised by higher scores on general chaotic and negative Classroom Climate and pupils' disruptive behaviour or its absence. This clustering shows that disruptive behaviour and negative or chaotic classroom atmosphere are likely to coincide. Whether a chaotic atmosphere in the classroom encourages disruptive behaviour or whether it is a reflection of it, is not possible to determine, but it seems probable that the two would tend to reinforce each other. Scoring high on all elements in this factor was rare; nevertheless there were a small proportion of atypical classrooms where the level of chaotic and disruptive behaviour observed was relatively high.

Note that two of the three items loading on the 'Disorganisation' factor ('Chaos' and 'Negative Classroom Climate') also load (negatively) on the 'Pedagogy' factor. This suggests that while 'Pedagogy' and 'Disorganisation' may represent different underlying dimensions, the two constructs are not entirely independent of each other. Disruptive behaviour may undermine good teaching practices while poor teaching practices may promote disruptive behaviour.

'Self-Reliance', 'Sociable/Co-operative with Peers' and 'Child-Teacher Relationship' converged into the third dimension, suggesting classrooms where children are more self-reliant also score more highly on social skills to co-operate with others. This dimension is referred to as '**Child positivity**'.

'Activity level' and child 'Positive affect' formed the fourth factor. We refer to this dimension as '**Positive engagement**' as this clustering seems to suggest that in classes where children are observed to be occupied children also appear to be happy.

Finally, the fifth factor to be extracted brought together 'Attention' and 'Over-Control' into a single dimension termed '**Attention and control**'. This is in many respects the inverse of the 'Disorganisation' dimension where 'Chaos' and 'Disruptive' behaviour are replaced by control and attentive behaviour. However it should be noted that high levels of 'Over-Control' may be associated with more regimentation and lack of individualization (though such high levels are rarely observed).

The associations between the two instruments were explored using correlation analysis for the 93 classes where both sets of observations were conducted. The results show moderate associations.

In terms of underlying structure the two instruments (COS-5 and IEO) seem to be measuring some common aspects of classroom processes (see Table 3.4.2b). It should be noted that the observations were conducted in the same classes but at different time points (Spring and Summer term) and this would be expected to reduce the associations. The strongest correlation is between Pedagogy (IEO Literacy) and Quality of pedagogy (COS-5) at $r=0.52$ (Table 3.4.2b).

Table 3.4.2b: Association between the COS-5 (Pianta) and the IEO (Stipek) Factors (only significant correlations are shown)

IEO Factors	COS-5 - Child and Classroom factors				
	Quality of Pedagogy	Disorganization	Child positivity	Positive engagement	Attention and Control
Pedagogy in Literacy	0.52**	-0.50**			
Pedagogy in Maths	0.41**	-0.33**			
Subject Development in Maths	0.37**				

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Further principal components analysis was conducted on the data for the 93 classes but this did not produce a common set of interpretable underlying factors. It appears that the instruments are not significantly associated in several areas that reflect children’s behaviour and that measure features of ‘Classroom Climate’. This may reflect their different theoretical underpinnings and their emphasis on different aspects of good practice.

4. Associations between Classroom Processes and School Characteristics and Quality

4.1 Disadvantage and School Effectiveness and Quality Indicators

The following analyses investigate the important question of whether variations in teacher behaviour or children's responses are associated with the school context (as measured by level of social disadvantage, using the percentage of pupils eligible for FSM as an indicator). Disadvantage may act as a moderating influence on school and classroom processes (organisation and behaviour). In addition, teachers in schools in different contexts may have different expectations of pupils (lower expectations for example of disadvantaged groups). School effectiveness research, for example, has consistently found that pupil composition (in terms of level of disadvantage measured by the FSM indicator) is associated with poorer progress (value added) for all pupil groups in school with high concentrations of disadvantaged pupils (Sammons et al. 1997; Teddlie and Reynolds, 2000).

In addition to level of disadvantage it is hypothesised that more 'effective' schools and those judged to have higher quality might be expected to show more positive classroom practices. Two independent sets of *school effectiveness* indicators were used to explore this association: (a) *Ofsted Judgements* of effectiveness and quality and (b) *value added indicators* of effectiveness derived from statistical analyses of the variation between schools in pupil progress across KS1 to KS2 measured using national assessment data (see Melhuish et al., 2006).

4.1.1 Ofsted Observations

Classroom observation data for Year 5 classes were matched to a number of measures taken from the most recent Ofsted inspection report. Inspectors' global ratings of school effectiveness, the extent of improvement since the previous inspection, the effectiveness of leadership within schools, quality of teaching and learning in KS1 and KS2, and judgements about a number of pupil level measures such as exclusion, attitudes and attendance were analysed. Ofsted ratings are made on a 7-point scale where 1 is the most positive score and 7 the least positive. Inspectors are trained to use a common framework and are regularly appraised and quality assured (see Matthews and Sammons, 2004 for an evaluation of Ofsted's impact).

Schools, that were judged to be more effective or which were rated as showing more improvement across the last inspection cycle, might be expected to show more positive classroom practice. In exploring the associations between the classroom observation measures and inspection judgements, however, it must be remembered that inspection data were collected at different time points reflecting the national inspection cycle and apply to the whole school whereas the EPPE 3-11 classroom observations were conducted in 2004-2005 and are based on days of observation in one Year 5 class only. Appendix K shows the pattern of correlations between the various Ofsted indicators used in this study.

As might be expected inspection judgements of some aspects of school performance and quality tend to be closely associated in many areas. For example, the judgement on effectiveness is very strongly correlated with that of the extent of improvement since the last inspection ($r=0.85$); with the quality of teaching and learning during KS2 ($r=0.80$ on both) and with school leadership ($r=0.70$).

Weaker associations are found between these areas and the rating of pupil attendance. Interestingly, the level of disadvantage of the school (% FSM) shows very little association with Ofsted inspection judgements and correlations are not statistically significant for this sample ($r=0.12$). This finding provides little evidence to support the view that inspection judgements are biased against schools in more challenging (disadvantaged) contexts. Attendance was the only Ofsted rating that was significantly correlated with the FSM indicator ($r=0.51$), this correlation with FSM was also the highest in magnitude when compared with the associations between attendance and the other Ofsted measures. Many studies have found attendance rates of schools to be lower for pupils of low SES and thus the Ofsted ratings are likely to reflect this pattern (inspectors refer to schools' attendance data and examine registers in making their assessment of attendance).

4.1.2 Value added measures

Value added measures of overall school academic effectiveness were derived from analyses of pupil progress, measured using matched national assessment data across KS1 to KS2 test results, conducted for Tier 1 of the EPPE 3-11 study (Melhuish et al, 2006). Multilevel models controlling for individual pupils' prior attainment (KS1 results) and a variety of pupil background characteristics (such as gender, FSM eligibility, ethnicity, etc.) were used to calculate differences between expected and observed attainments at the end of KS2 for each school. These differences between expected and observed attainment (also referred to as 'residuals') provide a value added indicator of each school's effectiveness in promoting progress in a given outcome. Using four Key Stage 2 test results (English, Mathematics, Science and average score), value added measures of school effectiveness were calculated for each of the years 2002, 2003, 2004. (See Melhuish et al, 2006 for detailed discussion).

School value added indicators, based on the analyses of 2003 and 2004 national assessment results were matched to the classroom observation data of 123 of the 125 focal schools in the sample (no test results were available for two of the schools; consequently no value added measures were calculated for these schools due to the missing data). Only residuals based on the analyses of 2003 and 2004 examination results were used in the current analysis as children in the focal schools observed were in KS2 during this period. Table 4.1.2 presents the relationships between school residuals across 2003 and 2004 and between curricula subjects.

Table 4.1.2: Comparisons of school effectiveness across subjects and years

n=123	English 2003	Maths 2003	Science 2003	Average 2003	English 2004	Maths 2004	Science 2004	Average 2004
English 2003	1	.522**	.482**	.776**	.350**	.379**	.336**	.417**
Maths 2003		1	.625**	.870**	.302**	.559**	.400**	.492**
Science 2003			1	.847**	.224*	.450**	.564**	.485**
Average 2003				1	.351**	.566**	.527**	.566**
English 2004					1	.555**	.490**	.794**
Maths 2004						1	.712**	.889**
Science 2004							1	.862**
Average 2004								1

The moderately strong between-subject correlations within each year indicate that, in general, schools tend to show similarities in their effectiveness across different core subjects. Schools that are more effective in one subject tend to be more effective also in others; those that are less effective in one area also tend to be less effective in others. The correlations between Mathematics and Science tend to be higher (0.63; 0.71) than the correlations between English and either Mathematics (0.52; 0.56) or Science (0.48; 0.49). Correlations are highest between all individual subjects and the average scores ranging from 0.78 to 0.89, with Mathematics showing the strongest relationship (0.87; 0.89).

The correlations within subjects across years of the value added indicators suggest that the stability of school effectiveness over time is stronger for Mathematics (0.56) and Science (0.56) than it is for English (0.35). Evidence from the survey of classroom teachers conducted for Tier 3 indicates that teachers are more likely to report that they adhere to the National Numeracy strategy guidelines and this may lead to greater consistency in teaching approaches across years. In addition school differences in effectiveness in Science and Mathematics tend to be larger because these subjects are mainly learnt at school, whereas reading is generally found to be more susceptible to parental influences and so school differences tend to be smaller.

Mean value added scores of school effectiveness across the years 2003 and 2004 were calculated for each focal school in the sample. A mean value added score provides a more stable estimate of

effectiveness as it helps to smooth fluctuations in effectiveness over time. The mean value added scores obtained were used in all subsequent analyses.

4.1.3 Comparisons between Ofsted Grades⁶ and School Residuals (mean scores)

All inspection judgements apart from pupil attendance are significantly, though only weakly to moderately, correlated with the school value added indicators for all subjects (see Table 4.1.2). Interestingly, the correlations between inspection grades and value added indicators are stronger for Mathematics and Science than they are for English, with the exception of the rating for 'ongoing assessment' which is more closely correlated for English than it is for the other two subjects.

Table 4.1.3: Comparisons between mean effectiveness measures and Ofsted judgements

	English Mean 2003 and 2004	Mathematics Mean 2003 and 2004	Science Mean 2003 and 2004
School effectiveness (n=106)	.29**	.37**	.37**
Improvement since last inspection (n=101)	.29**	.34**	.39**
Teaching KS1 (n= 79)	.20	.29*	.28*
Teaching KS2 (n=101)	.32**	.39**	.34**
Learning KS1 (n= 79)	.23*	.31**	.31**
Learning KS2 (n=101)	.27**	.39**	.39**
Ongoing assessment (n=104)	.34**	.30**	.26*
Leadership (n=104)	.26**	.34**	.36**
Behaviour including exclusions (n=104)	.28**	.33**	.28**
Attitudes to school (n=104)	.20*	.29**	.25*

** Correlation is significant at the 0.01 level (2-tailed);

* Correlation is significant at the 0.05 level (2-tailed).

These associations indicate that schools rated more favourably by inspectors also tend to show better pupil progress over Key Stage 2. However, inspection ratings should not be seen as a substitute for effectiveness indicators based on pupil attainment data, since the inspection focuses on a range of other evidence of quality including observation of different classes and teachers, pupil response and behaviour in class and around the school, samples of work, documentation and parents' views. Inspection results apply to a particular time point while value added indicators are based on progress over four years (Key Stage 2). Also, poor inspection ratings will have acted as a stimulus for improvement especially if schools were placed in special measures or serious weaknesses (Matthews & Sammons, 2004).

Eligibility for free school meals (FSM) was not found to be correlated with the value added indicators. This is as expected since variations associated with this factor had already been accounted for in the multilevel models from which the value added indicators were derived.

The next two sub-sections explore the possible relationships between disadvantage, school effectiveness (measured by inspection judgements and the value added indicators) and the underlying factors (dimensions) of teacher and pupils' Year 5 classroom behaviours measured by the COS-5 and IEO instruments. Only statistically significant correlations are reported.

⁶ Each of the Ofsted judgement scales is rated between 1 and 7, where 1 is *high* and 7 is *low*. Since school residuals and ratings on the classroom observation scales were low for poor performance and high for good performance, the original correlations between these scales and the Ofsted judgements were negative for positive associations (e.g. more effective schools and better pedagogy) and positive for negative association (e.g. low effectiveness better pedagogy). For ease of interpretation we reversed the signs on all correlations with Ofsted data.

4.2 The IEO (Stipek)

Table 4.2 presents the correlations between the Ofsted school measures and the IEO Literacy and Numeracy factors. In line with findings for the COS-5 instrument the analyses of the IEO factors and items also indicated a number of statistically significant though modest associations between different school characteristics and Year 5 teachers' classroom practice.

Table 4.2: Associations between the Stipek factors and school characteristics

School level characteristics	IEO (Stipek) - Literacy factors			IEO (Stipek) - Numeracy factors		
	Pedagogy	Subject Development	Learning linkages	Pedagogy	Subject Development	Learning linkages
%FSM (n= 91)	-0.36**				-0.23*	
Ofsted School effectiveness (n=80)	0.24*	0.25*		0.25*	0.22*	
Ofsted Improvement (n=76)		0.27*				
Ofsted Leadership (n=81)		0.28*		0.23*		
Ofsted Teaching KS1 (n=61)		0.27*			0.27*	
Ofsted Learning KS1 (n=79)		0.29*			0.29*	
Ofsted Teaching KS2 (n=61)		0.24*				
Ofsted Learning KS2 (n=79)		0.23*				
Attitude (n=81)	0.24*					
Attendance (n=81)	0.23*				0.30**	
Maths value added Residuals (n=83)	0.20 (p=0.075)				0.26*	
English value added Residuals (n=83)	0.24*			0.18 (p=0.096)		

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.2.1 School Effectiveness

School value added residuals for English were significantly and positively correlated with the Literacy 'Pedagogy' factor ($r=0.24$), and the value added residuals for Mathematics were significantly and positively correlated with 'Subject development' in Numeracy ($r=0.26$). English residuals were also positively but weakly correlated with 'Pedagogy' in Numeracy ($r=0.18$) and Mathematics residuals were positively but weakly associated with 'Pedagogy' in Literacy ($r=0.20$).

Ofsted judgements of school 'effectiveness' were moderately but significantly and positively correlated with both the 'Pedagogy' and 'Subject development' factors in Literacy ($r=0.24$ and $r=0.25$) and Numeracy ($r=0.25$ and $r=0.22$). These relatively weak but consistently positive patterns of association indicate that observed practice in year 5 tended to be rated more positively in schools that were more effective in promoting pupils' academic progress across Key Stage 2 and in those rated more favourably by inspectors.

Ofsted judgements of 'improvement since last inspection' were significantly and positively correlated with the 'Subject development' factor in Literacy. Of the two items associated with this factor only the 'Purposeful development of writing skills' item of the Literacy scale was correlated with 'Improvement' ($r=0.38$). During the last four years the implementation of the National Literacy strategy has been 'bedding down'. During this period there has been an increasing focus on writing, especially for boys in the upper years of KS2 (DfEE 2000, DfES 2001b). The correlation between the extent of school improvement identified by inspectors and this aspect of Literacy suggests that the most improved schools may have laid more emphasis on writing development.

Given the evidence (reported in earlier sections) that around half of classes observed using the IEO instrument did not use a plenary session for Literacy or Numeracy lessons, further analyses

were conducted to see whether schools in which the plenary was observed differed in terms of our extra measures of school characteristics.

There were no significant differences according to level of social disadvantage. However, there was evidence that schools in which the Literacy plenary was observed were rated more favourably by inspectors on a number of aspects. Independent sample t-tests comparing mean scores indicated that Ofsted judgements on 'Effectiveness', 'Improvement' and 'On-going assessment' were more positive in schools where the Literacy plenary session was observed ($t=2.4$ $df=57$; $t=2.34$ $df=54$; $t=2.1$ $df=50$ respectively)⁷.

Similarly, classes in which the plenary session was observed tended to receive higher scores on the IEO 'Pedagogy' factors of both Literacy and Numeracy ($t=2.27$ $df=65$; $t=2.34$ $df=61$ respectively). Differences between groups were also found for a number of the individual items loading on this factor (see Table 4.2.1a below), thus indicating a more positive climate in classes where children get the opportunity to review, reflect and consolidate their learning. Absence of a plenary may indicate poorer planning or classroom organisation, and less attention to the use of interactive whole class teaching, consolidation and review.

Table 4.2.1a: Differences between classrooms where plenary sessions were observed and classrooms where no plenary sessions were observed on individual IEO (Stipek) items

	t	Df	Sig (2-tailed)	Mean Difference	Sd	95% Confidence Interval	
Literacy Classroom Climate	-3.434	67	.001	-.755	.220	-1.195	-.316
Literacy Classroom Routines	-2.223	66	.030	-.640	.288	-1.214	-.065
Literacy Social support for student learning	-3.506	67	.001	-.821	.234	-1.288	-.354
Literacy Student engagement	-1.922	67	.059	-.381	.198	-.776	.015
Literacy Reading as meaning making	-2.677	35	.011	-.924	.345	-1.624	-.223
Literacy Purposeful development of writing skills	-2.427	63	.018	-.889	.366	-1.621	-.157
Literacy Instructional conversations	-2.731	66	.008	-.722	.264	-1.250	-.194
Numeracy Classroom Climate	-2.218	66	.030	-.599	.270	-1.138	-.060
Numeracy Classroom Routines	-1.791	66	.078	-.554	.309	-1.172	.063
Numeracy Social support for student learning	-2.360	67	.021	-.592	.251	-1.092	-.091

Further comparisons were made of classrooms where both Literacy and Numeracy plenaries were observed compared with those where no plenaries were observed. In all just over a quarter of teachers used both Literacy and Numeracy plenaries while a similar proportion used neither (see Table 4.2.1b).

Table 4.2.1b: Literacy plenary sessions by Numeracy plenary sessions

		Numeracy Plenary		Total
		No	Yes	
Literacy Plenary	No	19 27.5%	15 21.7%	34
	Yes	17 24.6%	18 26.1%	35
Total		36	33	69

Comparisons across all groups reveal a clear pattern of higher scores for those using both plenaries. The results indicate that there were significant differences in the 'Classroom Climate' in

⁷Additional information about the occurrence of plenary sessions was gathered only with the IEO Stipek instrument for 69 classes in total.

Literacy ($F=3.9$, $p=0.012$), 'Social support for student learning' in Literacy ($F=4.1$, $p=0.01$) and 'Instructional conversations' ($F=2.7$, $p=0.051$) items. Differences on a number of additional items approached significance; these included: 'Purposeful development of writing skills' ($F=2.5$, $p=0.068$), 'Classroom Climate' in Numeracy ($F=2.5$, $p=0.071$), 'Social support for student learning' in Numeracy ($F=2.6$, $p=0.057$) as well as on the Ofsted judgement of 'Improvement since last inspection' ($F=2.4$, $p=0.079$). In all cases more positive scores were found in classes where both Literacy and Numeracy plenary were observed and lower scores for classes where neither were observed.

4.2.2 Leadership and On-going assessment

Ofsted judgement on school 'Leadership' was positively correlated to several aspects of classroom practice including the 'Subject development' factor in Literacy ($r=0.28$) and the 'Pedagogy' factor in Numeracy ($r=0.23$). These findings again support the conclusion that school influences can have an indirect impact on teachers' classroom practice providing evidence that schools with more effective leaders tend to have better observed classroom practice in year 5 in several areas.

4.2.3 Teaching and Learning

The Ofsted judgement of the quality of 'Teaching and learning' during KS1 was significantly and positively correlated with 'Subject development' in both curriculum areas. The 'quality of teaching and learning' during KS2 was significantly correlated with 'Subject development' in Literacy but not Numeracy. Again these results suggest that despite the different time-scales and frames of reference, there is evidence of better observed classroom practice in specific aspects of teaching in Year 5 classes in schools judged more favourably in Ofsted inspections. Thus research and inspection perspectives support the view that better school leadership and quality provides a supportive environment for the practice of individual class teachers.

4.2.4 Ofsted measures of pupil outcomes

There were significant positive associations between the 'pedagogy' in Literacy factor and Ofsted judgements of pupils' 'Attitudes to school' ($r=0.24$) and 'Attendance' ($r=0.23$). The Literacy factor 'Classroom routine' was correlated with all three Ofsted measures of pupil outcomes namely 'Exclusion' ($r=-0.30$), 'Attitudes to school' ($r=0.38$) and 'Attendance' ($r=0.22$). 'Classroom Climate' was also positively correlated with the inspection rating of pupils' 'Attitudes to school' ($r=0.29$).

There was also a significant positive association between 'Subject development' in Numeracy and 'Attendance'. All five items loading on this factor ('Use of Maths analysis', 'Depth of knowledge and student understanding', 'Basic skill development in the context of problem solving', 'Maths discourse and communication' and 'Locus of Maths authority') were correlated with this Ofsted measure (Table 4.2.4). 'Social support for student learning' was similarly correlated with 'Attendance'. In addition, 'Classroom Climate', 'Classroom routine' and 'Use of Maths analysis' were positively correlated with both pupils' 'Behaviour' and 'Attitudes' to school.

Table 4.2.4: Association between IEO (Stipek) Numeracy codes and Ofsted pupil outcome measures

Subject level judgements on pupil outcomes	IEO – Numeracy							
	Classroom Climate	Classroom Routine	Social support for student learning	Use of Maths Analysis	Depth of knowledge and student understanding	Basic skill development in the context of problem solving	Maths discourse and communication	Locus of Maths authority
Behaviour including exclusion (n=82)	0.22*	0.27*		0.24*				
Attitudes to school (n=82)	0.25*	0.28*		0.24*				0.24*
Attendance (n=82)			0.27*	0.31**	0.24*	0.29**	0.25*	0.27**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

The findings concerning patterns of association between inspection judgements of quality and observed classroom practice, in Year 5 classes in 102 of the 125 schools for which recent inspection data was available, indicate that features of 'School Effectiveness', 'Leadership' and other areas are significantly, if moderately, associated with better observed practice. This suggests that school and teacher effectiveness are not independent, but teachers' classroom practice appears to be better if they teach in a school found to be of higher quality in terms of inspection evidence. In addition, separate value added indicators of the school's academic effectiveness in promoting pupils' progress across Key Stage 2 are also associated with aspects of teachers' practice and pupil behaviour in observed Year 5 classes. This may reflect the influence of better leadership, higher expectations, greater collaboration between teachers and consistency in approaches in more effective schools. These are aspects that school effectiveness research and inspection evidence have consistently identified as important in promoting better pupil outcomes (Sammons, 1999; Teddlie and Reynolds, 2000; Ofsted, 2000, Siraj-Blatchford and Manni, 2006).

4.2.5 Disadvantage (% pupils FSM eligibility)

'Pedagogy' in Literacy and 'Subject development' in Numeracy were significantly negatively correlated with FSM eligibility ($r=-0.36$ and $r=-0.23$ respectively). In Literacy, all four individual items loading on the 'Pedagogy' factor ('Classroom Climate', 'Classroom routine', 'Social support for student learning' and 'Student engagement') were significantly and negatively correlated with FSM. For Literacy these aspects of 'Pedagogy' seem to be sensitive to pupil context and may reflect the influence of teacher expectations and or pupil behaviour. In contrast, for Numeracy it was the more specific aspects of Mathematics teaching, such as 'Depth of knowledge and student understanding', 'Basic skills development in the context of problem solving', 'Maths discourse and communication' and 'Locus of Maths authority' that were more related to level of social disadvantage than the more general aspects of classroom 'Pedagogy' such as climate and routine.

Taken together with the evidence already reported on the COS-5 observations, the findings indicate that teachers' classroom practice is associated with the level of social disadvantage in a school. Modest associations tend to be negative in relation to features of 'Pedagogy' indicating a tendency for poorer quality practice in schools where levels of disadvantage are higher. This may be related to lower teacher expectations, less experienced or poorer teachers or to difficulties relating to pupil 'Behaviour', 'Attitudes' and 'Attendance'. The findings warrant further investigation, given concerns about the widening gap in attainment related to pupil background that has been shown to increase as children progress through school. One explanation may be that disadvantaged children, for a range of reasons, are likely to experience poorer teaching in Key Stage 2.

4.3 The COS-5 (Pianta)

A few statistically significant associations were found between the COS-5 factors and individual items and the school value added indicator for Mathematics. In addition level of social disadvantage of school context (FSM eligibility based on % pupils), school effectiveness, and improvement since last inspection, also showed significant correlations with the COS-5 factors and items. Table 4.3 presents the correlations between these measures and the COS-5 factors.

Table 4.3: Association between the COS-5 (Pianta) child and classroom factors and school characteristics

School level characteristics	COS-5 - Child and Classroom factors				
	Quality of Pedagogy	Disorganization	Child positivity	Positive engagement	Attention and Control
% FSM (n=125)		0.36**			
Ofsted School effectiveness (n=107)	0.18 P<0.06				0.20*
Ofsted Improvement since last inspection (n=107)			0.21*		
Mathematics value added residual (n=123)	0.20*				
Attendance (n=105)		-0.22*			

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.3.1 School Effectiveness

Overall, the school value added indicator for English was not correlated with any of the COS-5 factors or individual items on the instrument. The value added indicator for Science was correlated only with the 'Self-Reliance' item of the COS-5 child codes. Of the Ofsted judgements, the 'Ongoing assessment' judgement was not correlated with the COS-5 factors or individual items and 'Leadership' and 'Teaching' judgements were correlated with only two of the child codes items.

School value added residuals for Mathematics were significantly and positively correlated with the factor 'Quality of pedagogy'. The Ofsted judgement of overall school 'effectiveness' was also positively correlated with this factor but the correlation was weaker and just missed statistical significance ($p < 0.06$). These results suggest that there are links between the more global construct of school effectiveness as identified by inspectors, and specific aspects relating to the quality of teaching. The classroom practice of teachers in a more effective school may be influenced by the school (indirectly or directly). In a more effective school, an individual teacher may receive more support, professional development or guidance that supports their teaching. The school culture and leadership may also affect teacher expectation and behaviour.

The factor 'Attention and Control' was significantly correlated with better scores in terms of professional judgement of effectiveness of the school by inspectors. The correlation analysis of the individual items revealed that while 'Attention' was significantly correlated with the 'Effectiveness' ($r = 0.26$) judgement by inspectors, the item 'Over-Control' was not. 'Attention' was also significantly correlated with other inspection ratings of 'Improvement' ($r = 0.24$) and 'School Leadership' ($r = 0.22$) judgements. This suggests that in schools judged to have made more improvement and to have better leadership, pupils are more likely to be observed to be engaged with their work. Conversely, in schools where there has been less improvement pupils show lower levels of engagement in class.

The 'Child positivity' factor (based on the items 'Self-Reliance', 'Sociable/Co-operative with Peers' and 'Child-Teacher Relationships') was significantly correlated with the Ofsted judgement of 'Improvement' but not with 'Effectiveness'. However, the 'Self-Reliance' item in this cluster was significantly correlated with both the 'School Effectiveness' judgement ($r = 0.36$) and with the inspection grade for 'Overall improvement' of the school ($r = 0.39$) in the analysis of the individual items, as well as with the quality of 'Teaching' and 'Learning' during Key Stage 2. The observation

item of 'Self reliance' was also weakly correlated with the school value added residuals for Mathematics ($r=0.18$ just failed to reach significance) and Science ($r=0.18$).

The item 'Self-Reliance' is an observational measure of the extent to which pupils display autonomy, take responsibility and show initiative and leadership in class. It could be argued that this is more likely to be observed in classrooms where teachers create a climate which encourages pupils to demonstrate and develop these traits. This dimension appears to be more evident in classes in schools identified by inspectors as more effective and having shown greater improvement.

4.3.2 Disadvantage (% pupils FSM eligibility)

The factor measuring classroom 'Disorganisation' was significantly and positively correlated with the percentage of pupils eligible for FSM. All three individual items loading on this factor ('Chaos', 'Disruptive' behaviour and 'Negative Classroom Climate') were also significantly correlated with this measure. This supports the view that teaching in high disadvantage schools is likely to be more challenging due to poorer pupil behaviour, although further analyses are needed to see if 'Disorganisation' is also higher where teachers are less experienced; since high disadvantage schools may find teacher recruitment and retention more problematic than low disadvantage schools (the teacher questionnaire provides evidence to explore this aspect further).

'Disorganisation' (as well as the associated items) was also negatively correlated with the Ofsted judgement on pupil 'Attendance', this indicating poorer attendance in schools where 'Classroom Climate' is judged more negatively. 'Chaos' (one of the items associated with this factor) was negatively correlated with both 'Attendance' ($r=-0.30$) and children's 'Attitude to school' ($r=-0.20$). 'Productive use of Instructional time' (an item loading on the 'Pedagogy' factor) was similarly correlated with children's 'Attitudes to school' ($r=0.24$) and 'Attendance' ($r=0.20$). This suggests that pupils' attitudes to school are less positive where classroom organisation is poor and potential learning time is lost. Attendance was judged more favourably in schools where teachers made productive use of learning time ($r=0.24$) and where the Classroom Climate was positive ($r=0.22$), but less favourably ($r=-0.30$) in schools where classes were less well organised (where time was wasted repeating instructions and the establishment of smooth routines and transitions between activities was problematic). It may be that poorer 'Attitudes' and 'Attendance' are a reflection or symptom of less effective teaching practices, but equally it may be that in schools with poorer pupil attitudes and attendance it may be harder for teachers to create productive classroom routines and climate.

The item 'Over-Control' showed no significant associations with school value added indicators or any of the Ofsted judgements but it was weakly positively correlated with FSM ($r=0.19$); the factor 'Attention and Control', however, was not associated with FSM. This suggests that in schools with higher levels of FSM pupils there may be more emphasis on maintaining teacher controlled routines. This finding may reflect the higher incidence of 'Disruptive' behaviour in disadvantaged contexts. It may be that teachers adopt more rigid routines in an effort to maintain classroom control.

These findings indicate that social disadvantage, school effectiveness and teaching quality are inter-linked and additional analyses will be conducted using multilevel models for the EPPE 3-11 sample to investigate these relationships further.

5. Summary

As part of the wider EPPE 3-11 research study, detailed classroom observations were conducted in 125 Year 5 classes in 2004 and 2005 using one or two (in a sub set of 93 classes) different research instruments developed in the US; but with additions to reflect features of the English education system. This paper provides an initial descriptive analysis of the results for each instrument and comparisons between the two instruments in 93 of these classes. It also investigates relationships with measures of school effectiveness and quality. The results reveal the existence of significant variation in observed patterns of child and teacher behaviour between different classes and schools in the sample and in pupils' responses. Children do not receive a common experience in Year 5 across these classes.

Overall, levels of student engagement are relatively high, and classroom climates positive. Teacher detachment is generally fairly low, but in a small number of classes this general pattern is not observed.

In terms of organisation the findings suggest that in a substantial proportion (around half) of Year 5 classes little use of the plenary session occurs in Literacy and Numeracy lessons. This is of some concern as this part of the lesson is intended to give opportunities for feedback and consolidate learning by the class. By missing this part of the lesson some teachers may be reducing the opportunity to provide such consolidation. In particular the use of more demanding higher order communication is typically more common in plenary sessions. The comparisons of observed practice in Literacy and Numeracy consistently indicated that better practice was more likely to be seen in lessons where teachers adopt a plenary in both Literacy and Numeracy; the lowest ratings were found for classes that did not use a plenary session in either subject.

There are indications that some aspects of teacher and pupil behaviour are associated with and appear to be influenced by the external context of the school; as defined by the level of social disadvantage of the intake. Pupil behaviour tends to be worse in schools where there are higher proportions of children eligible for free school meals. In addition, it appears that teaching quality is poorer in a number of aspects observed in classes where the school context is more disadvantaged. This may reflect the impact of more challenging pupil behaviour, lower teacher expectations and/or less experienced or capable teachers in such schools (since teacher recruitment and retention tends to be more problematic in such contexts). Further research to investigate the reasons for these associations and guidance on the improvement of practice in these contexts would be desirable.

The availability of recent inspection evidence for 102 of the 125 schools enabled an analysis of links between Ofsted inspectors' judgements of school quality in terms of effectiveness, improvement, leadership and overall teaching quality, and observed practice in Year 5 classes to be conducted.

The findings concerning patterns of positive associations between inspection judgements of quality and aspects of observed classroom practice, in Year 5 classes in 102 of the 125 schools for which recent inspection data was available, indicate that features such as 'School effectiveness', 'Leadership' and other areas are significantly if moderately associated with better observed practice. This suggests that school and teacher effectiveness are not independent, but teachers' classroom practice appears to be better if they teach in a school previously found to be of higher quality in terms of inspection evidence. This may reflect the influence of better leadership, higher expectations, greater collaboration between teachers and consistency in approaches in more effective schools. These are key aspects that school effectiveness research and inspection evidence have identified as important in promoting better pupil outcomes (Sammons, 1999; Teddlie and Rynolds, 2000; Ofsted, 2000). The results support the view that the influence of the school on classroom practice needs to be studied further.

Additional analyses explored the relationships between measures of teacher and pupil behaviour in Year 5 classes and value added measures of overall school effectiveness (based on pupil progress

measured using matched national assessment data from KS1 and KS2). A number of aspects of observed classroom practice in Year 5 classes were found to be significantly positively associated with the value added indicators of progress in Mathematics and English in Key Stage 2. Although only weak to moderate, such associations again point to links between overall school effectiveness and classroom practices. The correspondence between Ofsted ratings of quality and value added indicators with the classroom level observations gives confidence in the extent to which the different classroom observation instruments can identify important features of classroom practice in primary schools. These analyses help improve understanding of the variation in school and classroom processes and provide insights into more effective practice and pedagogical approaches.

Further analyses are being conducted to explore pupils' views and experiences measured by a questionnaire survey of children in the 125 Year 5 classes, including features of school and classroom climate. In addition, potential associations will be investigated between classroom climate and pupil progress for a sample of children in the 125 focal schools.

Key findings

Pedagogy

- The observational research identified significant variation in both teachers' classroom practice and pupils' behaviour in class and distinguished between better and poorer quality in the educational experiences for Year 5 pupils.
- Levels of student engagement were found to be relatively high and classroom climates were generally positive. Teacher detachment was generally low and there was less pupil 'off task' behaviour observed than in previous classroom studies conducted in the 1980s.
- There was, however, considerable variation in the quality of the classroom experiences of children in different Year 5 classes, indicating that some children attend poorer quality settings, which has implications for the promotion of greater equality of educational opportunities.
- Teachers varied in many aspects of their pedagogical practice and classroom organisation (for example the teaching of analysis skills and the extent of emphasis on basic skills) and several important features of observed practices (e.g. related to classroom climate, smooth organisational routines etc).
- Most teachers broadly followed the format of the National Strategies (Literacy and Maths) except for the use of the plenary which was not observed in nearly 50% of classes.
- The quality of teaching and pupil response was found to be consistently higher in classes where a plenary was used in both literacy and numeracy lessons and lowest in classes where no plenary was used in either subject.

The impact of School Context

- Incidence of poor pupil behaviour and classroom disorganisation was observed to be greater in schools with higher levels of social disadvantage, measured by the % of pupils eligible for free school meals (FSM).
- The quality of pedagogy was also found to be poorer in schools with higher levels of social disadvantage.

Associations between classroom practice and measures of 'effectiveness'

- Observed practice was found to be better in schools that had been rated more positively by Inspectors in earlier inspections (particularly in those schools rated more highly on overall leadership and school effectiveness). This suggests that the practice of Year 5 teachers in more effective schools is related to the overall quality of the school and its leadership.
- Significant positive associations were also found between Ofsted judgements of school effectiveness and improvement since the last inspection and teachers' use of a plenary in literacy and numeracy lessons.
- Several aspects of observed practice were also found to be weakly related to better value added outcomes in English and Maths.

Conclusions

This Report highlights new findings on the quality of teaching and learning in Year 5 English primary classes. The results are relevant to policy makers and practitioners concerned with improving practice and promoting greater equity by closing the attainment gap associated with social disadvantage. There are implications for the further development of the National Strategies and the results highlight areas of possible weakness in the teaching in some classes that could benefit from further guidance and professional development. The findings are of relevance to the Excellence and Enjoyment (DfES, 2003) agenda and the promotion of personalised learning. They are likely to be of interest to Ofsted inspectors and to schools' approaches to the improvement of classroom practice through self evaluation and review.

Key messages

There is wide variation in teachers' practice and children's responses in Year 5 classes and this is likely to affect pupils' educational outcomes.

- The quality of classroom practice is associated with the use of plenary sessions in literacy and numeracy lessons. Practice was found to be better in classes that used plenaries in both these subjects and poorer in classes where no plenary was observed in either but plenaries were present in only approximately half the Literacy or Numeracy lessons observed.
- The quality of Year 5 pedagogy and organisation and pupil behaviour is poorer in schools with higher levels of social disadvantage in their pupil intakes. This may reflect lower expectations, difficulties in recruiting/retaining good/experienced teacher and the greater behavioural difficulties associated with teaching in more challenging contexts. The quality of Year 5 practice observed was better in schools that had been rated more highly in terms of overall school leadership, effectiveness and improvement on the previous inspection. Such schools appear to provide a more positive context for teaching and learning.
- The use of well researched classroom observation instruments may provide valuable evidence for teachers' professional development and support a school's self evaluation and review process. This is particularly relevant where they identify quality across a range of features of teaching and learning that are linked with better outcomes for children.

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**Appendix A: IEO (Stipek)
Literacy Scoring Sheet**

LITERACY SCORING SHEETS		Score
General Classroom Management and Climate Scales One for each of the lessons observed		
A	Classroom Climate	
B	Classroom Routines	
General Instruction Scales One for each of the lessons observed		
C	Cross-Disciplinary Connections	
D	Linkage to life beyond the classroom	
E	Social support for student learning	
F	Student engagement	
Reading Instructional Scales		
L	Reading as meaning making	
M	Basic skills development in the context of reading	
Writing Instructional Scales		
N	Higher order thinking in writing	
O	Purposeful development of writing skills	
Instructional Conversations		
P	Instructional conversations	

(Adapted from IEO, Stipek, 1999)

Numeracy Scoring Sheet

NUMERACY SCORING SHEETS		Score
General Classroom Management and Climate Scales One for each of the lessons observed		
A	Classroom Climate	
B	Classroom Routines	
General Instruction Scales One for each of the lessons observed		
C	Cross-Disciplinary Connections	
D	Linkage to life beyond the classroom	
E	Social support for student learning	
F	Student engagement	
Mathematical Instructional Scales		
G	Use of Maths analysis	
H	Depth of knowledge and student understanding	
I	Basic skill development in the context of problem solving	
J	Maths discourse and communication	
K	Locus of Maths authority	

(Adapted from IEO, Stipek, 1999)

Appendix B: The COS-5 (Pianta) Instrument Frequency of Behaviour

1 CHILD-LEVEL SETTING	MINUTE INTERVAL									
Whole class	1	2	3	4	5	6	7	8	9	10
Large group >6	1	2	3	4	5	6	7	8	9	10
Small group 6 or fewer	1	2	3	4	5	6	7	8	9	10
Individual	1	2	3	4	5	6	7	8	9	10
11 CONTENT OF TC ACTIVITY										
Literacy/Language Arts	1	2	3	4	5	6	7	8	9	10
Word-level Activities	1	2	3	4	5	6	7	8	9	10
Comprehension	1	2	3	4	5	6	7	8	9	10
Part of Literacy hour 1 2 3 4*	1	2	3	4	5	6	7	8	9	10
Part of Literacy hour W / S / T	1	2	3	4	5	6	7	8	9	10
Mathematics	1	2	3	4	5	6	7	8	9	10
Computation	1	2	3	4	5	6	7	8	9	10
Concept Development/Problem Solving	1	2	3	4	5	6	7	8	9	10
Part of NNS O / M / P*	1	2	3	4	5	6	7	8	9	10
Science	1	2	3	4	5	6	7	8	9	10
Social Science	1	2	3	4	5	6	7	8	9	10
Enrichment	1	2	3	4	5	6	7	8	9	10
Computers/Technology	1	2	3	4	5	6	7	8	9	10
Free time	1	2	3	4	5	6	7	8	9	10
Transitions/Management/Business	1	2	3	4	5	6	7	8	9	10
111 TEACHER BEHAVIOUR										
Attends to TC	1	2	3	4	5	6	7	8	9	10
Teaching Basic Skills/facts	1	2	3	4	5	6	7	8	9	10
Teaching Analysis/Infer/Plan	1	2	3	4	5	6	7	8	9	10
Managerial instructions	1	2	3	4	5	6	7	8	9	10
Monitoring/Checking work	1	2	3	4	5	6	7	8	9	10
Display Positive Affect	1	2	3	4	5	6	7	8	9	10
Displays Negative Affect	1	2	3	4	5	6	7	8	9	10
Disciplines	1	2	3	4	5	6	7	8	9	10
1V CHILD ACADEMIC BEHAVIOUR										
Engaged in learning	1	2	3	4	5	6	7	8	9	10
Highly Engaged	1	2	3	4	5	6	7	8	9	10
Unproductive/Spaced Out /Disengaged	1	2	3	4	5	6	7	8	9	10
Off-task – Alternative Academic Activity	1	2	3	4	5	6	7	8	9	10
Learning/Performing Basic Skills/Facts	1	2	3	4	5	6	7	8	9	10
Learning/Performing Analysis/Inference etc.	1	2	3	4	5	6	7	8	9	10
Collaborative Work	1	2	3	4	5	6	7	8	9	10
Requests Attention/Help/Information	1	2	3	4	5	6	7	8	9	10
Volunteers	1	2	3	4	5	6	7	8	9	10
V CHILD SOCIAL BEHAVIOUR										
Positive /Neutral Engagement with Peers	1	2	3	4	5	6	7	8	9	10
Negative/Aggressive Engagement with Peers	1	2	3	4	5	6	7	8	9	10
Positive Affect Toward Teacher	1	2	3	4	5	6	7	8	9	10
Negative Affect Toward Teacher	1	2	3	4	5	6	7	8	9	10
General Disruptive Behaviour	1	2	3	4	5	6	7	8	9	10

END-OF-BEHAVIOURAL RATINGS:

Classroom level setting

Teacher suggests/offers collaborative activity

1.....Whole, 2.....Groups, 3.....Individual, 4.....mixed
.....A lotSomewhatNever

Test/Quiz administered during any portion of observation N
(Adapted from NICHD FSV01G5)

Y

**A Measures of Quality -
Child Codes**

1	2	3	4	5	6	7
Uncharacteristic		Minimally characteristic	Norm Exception: 5	Very characteristic		Extremely characteristic

Child code Scores should reflect global classroom observations related to TC's point of view.	Rating						
1 Positive Affect (1-7)	1	2	3	4	5	6	7
2 Self Reliance (1-7)	1	2	3	4	5	6	7
3 Sociable/Cooperative with Peers (1-7)	1	2	3	4	5	6	7
4 Attention (1-7)	1	2	3	4	5	6	7
5 Disruptive (1-7)	1	2	3	4	5	6	7
6 Activity Level (1-7)	1	2	3	4	5	6	7
7. Child-Teacher Relationship (1-7)	1	2	3	4	5	6	7

**End-of-cycle ratings:
(Adapted from NICHD FSV01G5)**

General Observations on the whole class				
1	The children respected by peers.	1 None/Some of the time	2 Most of the time	3 All of the time
2	Children are responsible for time and materials (independence) tangible responsibility	1 None/Some of the time	2 Most of the time	3 All of the time
3	The learning intentions of the lesson/activity is clear to children	1 Not clear	2 Clear to some	3 Clear to all
4	Children could reflect on their learning through review	1 No evidence	2 Some evidence	3 Very evident
5	The teacher's materials/resources were well organised/managed and 'fit for purpose'	1 Not well organised	2 Some organisation	3 Well organised

**B - Measures of Quality -
Classroom Codes**

1	2	3	4	5	6	7
Uncharacteristic		Minimally characteristic	Norm	Very characteristic		Extremely characteristic

Classroom codes Scores should reflect global classroom observations	Rating						
1 Richness of Instructional Methods (1-7)	1	2	3	4	5	6	7
2 Over-Control (1-7)	1	2	3	4	5	6	7
3 Chaos (1-7)	1	2	3	4	5	6	7
4 Detachment / Teacher (1-7)	1	2	3	4	5	6	7
5 Positive Classroom Climate (1-7)	1	2	3	4	5	6	7
6 Negative Classroom Climate (1-7)	1	2	3	4	5	6	7
7 Productive Use of Instructional Time (1-7)	1	2	3	4	5	6	7
8 Evaluative Feedback (1-7)	1	2	3	4	5	6	7
9 Teacher Sensitivity (1-7)	1	2	3	4	5	6	7

End-of-cycle ratings:

1 The teacher is clear about what she expects the children to do in their activities.

1	2	3	4	5
Not clear, very confusing to all	Clearer but, majority of children still confused	Some clear and some confused	Mostly clear	Extremely clear to all

2 The teacher ensures that concepts/ideas are clear to the children.

1	2	3	4	5
Not clear, very confusing to all	Clearer but, majority of children still confused	Some clear and some confused	Mostly clear	Extremely clear to all (Excluding SEN child)

Appendix C: Training and Reliability

Training

The COS-5 and IEO instruments are complex requiring intensive training to prepare researchers for their use in Year 5 classrooms. Ten Research Assistants were recruited and all had extensive experience of working in primary schools both as practitioners and researchers.

A total of 12 days were needed to complete the training for both the IEO and COS-5 instruments, excluding time for researcher review of materials and classroom and video training. The training programme covered:

- a) review of the documentation associated with the instruments
- b) familiarisation with definitions
- c) instructions on administration
- d) video training on scoring
- e) reviews of scoring
- f) individual and paired observations in naturalistic settings.

Following initial in-house and video training, the researchers then tested the instrument in the field with both individual and paired observations. These observations were completed in Year 5 classrooms of schools unrelated to the project. At each stage of the training, researchers had to compare assessments and give justifications for their judgements. This was seen as an important part of validating the reliability of the observations. Both the COS-5 and the IEO rely on numerical ratings and qualitative justifications.

Reliability

Checks on inter-observer reliability were conducted at each stage of the training in order to ensure consistency across coders. Final inter-observer reliability was achieved after the extensive training period. The format for reliability was video tapes of whole lessons which observers coded in isolation. This follows the procedures used by the NICHD for reliability. In EPPE 3-11 ten researchers coded eleven lessons for the COS-5 instrument and six lessons for the IEO. The lessons covered Literacy, Mathematics, Geography and Start of the afternoon.

For the COS-5 instrument inter-observer reliability was available from the NICHD study (reliability for the IEO was unavailable). The NICHD (2001) reported "average exact agreement with the gold-standard videotape test for the time-sampled codes, estimated by correlation with master-coders scores, was .848.....average live reliability across all global ratings, estimated using correlations was .714" (NICHD, 2001, p 6). In the EPPE 3-11 reliability inter-rater agreement was also assessed using simple correlations for comparison with the NICHD data, exact agreement with the gold standard was $r=0.82$ - with a range of 0.75-0.87, and average exact agreement across all raters was $r=0.80$ with a range of 0.68 – 0.95.

In addition inter-observer agreement was assessed for each instrument using the Kappa statistics. Each observer was compared against a gold standard for each lesson type; nine pairs of comparisons were calculated for each lesson type within each instrument. The derived scores were then averaged across lessons and across observers for each instrument. Inter-observer agreement was high for both the COS-5 (weighted Kappa scores, 0.56 - 0.920; with a mean of 0.80) and the IEO (weighted Kappa scores, 0.55 - 0.84 with a mean of 0.74) instruments.

Appendix D: Data Entry and Analysis

Data Entry

As noted above, the Frequency of Behaviour Coding observations consisted of ten 60-second intervals, which included 30-seconds of uninterrupted observation and 30 seconds of recording. Each of these intervals was entered as an individual variable receiving either a value of 1 (observed) or 0 (not observed). For example, 'Small group setting 1' would refer to the child working in a small group during the first minute (interval) of the 10 minute observation. All individual intervals within a specific code were then added together to create a single score out of 10 for that code for a given cycle (e.g. If 'Small group setting' was observed occurring in 6 of the 10 intervals, it would receive a score of 6). This procedure was applied for each of the Frequency of Behavioural Coding cycles in each school. Only the total scores for each code were used for further analysis.

The 'Other Pedagogical Strategies' and the 'Measuring of Quality Coding System' were each entered as a single variable which could take any value between 1 and 7, corresponding to the seven-point Likert-like rating scale on which these observations were based. Data files were then aggregated to yield a mean score for each individual Year 5 class.

Data for the IEO were entered separately as these scales were applied once in each classroom. The IEO scales were applied in both Literacy and Numeracy lessons; however the categories applied in each of these subject settings were different and therefore treated as two separate scales. Each code of the Numeracy and Literacy Scale was entered as a single variable with values corresponding to the scales on which the observations were based (1 to 5 point Likert scale). These variables were then merged with the aggregated COS-5 codes file.

After the fieldwork was completed (Summer 2005), the Research Assistants were consulted at the data entry stage to ensure consistency across the data. This was seen as an essential part of the Research Assistants' role, particularly in ensuring common understandings by the data enterers of the meanings of professional terms and descriptions.

Data Analysis

The scales within the COS-5 (Frequency of Behaviour, 'Measuring of Quality and 'Other Pedagogical Strategies') and IEO instruments were first explored individually. Central tendencies (mean, standard deviations, variance, and range) for each code/variable on these scales were computed to provide a general description of the distribution of each of these variables across schools.

The relationships amongst the various COS-5 scales and between the COS-5 and the IEO instruments were explored. With this analysis we sought to identify similarities and difference between the two instruments. In other words, are there any school, classroom, or teacher variables that are uniquely measured by one instrument but not the other? These analyses also provided indicators of validity (for example, are different instruments tending to measure particular features in a broadly comparable way?).

Appendix E: Indicators of classroom behaviours using the COS-5 (Pianta) Measures of Quality

Child Codes

1 Positive Affect

- Reflects happy mood and pleasant state of TC seen during interactions-personal contentment. Rating based on quantity and quality of behaviour.
- High = sparkle/radiate/smiles/laughter/enthusiasm.
- Mid = 4 – overall content/neutral but with engagement.
- Low = flat/not content/no positive mood/disengaged/glum/bored/detached.

2 Self-Reliance

- Display autonomy, responsibility, initiative, self-direction, leadership, and assertiveness.
- High = need little adult direction, willingness to take risks, assertive with peers.
- Low = lacks confidence, needs adult help before trying, dependent, passive, hesitant.

3 Sociable/Co-operative with Peers

- Positive engagement, seeks contact, initiates and responds to others initiation
- High = joins in – initiates talk and interaction, co-operates, sociable – shares, helps peers.
- Low = withdrawn, disengaged, no interest in peers, no compromise, negative engagement, stubborn, bossy, obstructive, dominate.

4 Attention

- Level of sustained, focused or directed attention to ongoing classroom activities. If unsure code midpoint 4.
- High = sustained forms, tuned in, on task.
- Low = easily distracted, creates diversions, fidget, play aimless, disengaged, daydreams, needs teacher prompting, unfocused.

5 Disruptive

- Movement up the scale will depend on the number of children and adults affected by the child's behaviour
- A score of 5 or higher would suggest an increasingly disruptive child. For instance a child that shouts out continuously, causing the teacher to have to stop the lesson or hindering other children's capacity to work.
- A score of 3-4 would be recorded for the TC who has a couple, brief instances of inappropriate behaviour that disrupts others (the more children affected the higher the score)
- A score of 2 would be recorded for the child who has one disruptive moment, which has no lasting effects on others and a score of 1 would be given to the child who displays no disruptive behaviours throughout the observed lesson.
- This scale should not take as evidence the child that does not remain on task – but rather the degree his behaviour effects those around him.
- High = does not follow rules, makes noises, calls out, taps pencil – these behaviours must **annoy and disrupt others in order for a score of 5 or more.**
- Mid = (4) a couple/few instances of inappropriate behaviour causing disruption to others
- Low = compliant, not disruptive at all, can be inattentive if quiet but does not disrupt others

6 Activity level

- High = overactive, hyper – lots of movement, not sit still, moves around.
- Mid = 4 = some movement but appropriate to situation so some fidget and shuffle = normal.
- Low = inactive passive.

7 Child-Teacher Relationship

- High = positive response to teacher, co-operates, comply, enthusiastic response, respect, initials teacher responses, affection seen.
- Mid = limited interaction but child follows rules and instructions.
- Low = negative engaged, rejects, defiance, ignore, misbehave, argue demand, criticise

Classroom Codes

1 Richness of Instructional Methods

- High = 7 = range skills, hypothesis, variety, depth strategies, intellectually engaging, thought provoking, reciprocal discussion, model explain.
- Mid = no higher level thinking skills used.
- Low = basic format.

2 Over-Control

- High = 7 = rigid structure, regimented, driven by teacher needs and agenda not child's needs or interests. Little movement, whole class activities, quiet no individualisation, teacher not child talk, stifled not creative, teacher directed, not necessarily successful.
- Low = respect child autonomy and responsibility, see child as an active participant.

3 Chaos

- High = noise, confusion, unruly, chaotic, cant see instruction or learning, ineffectual control, misbehaviour especially during transitions, ignore sanctioned activity, disruptive behaviour, inappropriate behaviour, rude, poor discipline.
- Low = organised, respectful, attentive, clear expectations

4 Detachment/Teacher.

- Degree teacher = detached from class or child activity or child understanding or interest level.
- High = lack of assistance, feedback, not responding, no notice of task or poor behaviour, teacher sits as desk, lack of interest, not monitoring children's work or behaviour.
- Low = involved and responsive and alert to child's needs.

5 Positive Classroom Climate

- Emotional and social tone of classroom respectful, safe, welcoming, friendships, happy place.
- High = listen politely, genuine respect to teacher and child.
- Low = neutral climate, flat, dysfunctional, fearful, disrespect, negative.

6 Negative Classroom Climate

- Capture climate that is hostile, angry, and punitive.
- High = hostile, angry, punitive, controlling, teacher angry, hostile, irritable, lacks concern. Also consider child behaviour to each other. Shame, humiliation, sarcasm, abruptness.
- Low = shows little of above

7 Productive Use of Instructional Time

- How well time is managed.
- High = smooth transitions, routines automatised by all, good planning, preparation materials, efficient routines when finished work, transition and management time limited activities for all therefore productive, no waiting, no disruption.
- Low = time wasted, little of above.

8 Evaluative Feedback

- Consider frequency and quality to all class.
- Should be in response to a child's performance on a particular task or skill
- Presence of embellishments (repetition of child's skills; extension of child's skill)
- High = feedback to extend child knowledge and understanding and skills to consolidate, reinforce, done often and dependably.
- Low = perfunctory, occasional, lack of depth and information.

9 Teacher Sensitivity

- High = aware of child needs, moods, interests, capabilities, uses sensitive discipline, takes interest in child, responses facilitate child's learning.
- Low = none demonstrated.

Appendix F: Indicators of classroom behaviours using the IEO (Stipek) scale

General Classroom Management and Climate Scales

A Classroom Climate: extent classroom is a place pupil's feel safe and respected. Look at how teacher and children speak to one another, friendships amongst pupils, how rules are made and enforced (discipline), the pace of the lesson observed, opportunity for collaboration, how decisions are made, how individual ideas are expressed and used (accepted/rejected).

HIGH: children and adults use respectful tones when speaking, smiles are shared, children, staff and visitors are made to feel welcome, friendships are visible between children, evidence of willingness to share and help each other, individual ideas (ways of approaching a Maths question or opinions about a book character etc) are welcomed and accepted, disagreements are academic and not personal, teacher uses sensitive discipline and deals with the behaviour rather than signalling out child, children have some autonomy etc.

LOW: classroom is dysfunctional, threats are overheard, disciplines are overt and personal, children are singled out when errors are made, a tendency to always promote 'bright' children, children show negative affect to teacher and/or to each other. There is little to no evidence of respect between children or between children and adults in the room. Children are verbally attacked when expressing ideas, there is screaming and evidence of annoyance in the tones of adults and children, random acts of violence etc.

B Classroom Routines: The use of instructional time. Look at how transitions are managed both within and between lessons, structure/organisation of the day, pace of the lessons, level of preparation of materials, how children are involved in the routine business of the day (including start of day, taking register, collecting money), do children manage materials etc.

HIGH: the classroom resembles a 'well oiled machine', transitions are smooth with little to no time lost to instruction, teacher's expectations are clear and the children understand what they should be doing, children are responsible for materials and involved in completing class activities (collecting dinner money, taking register, preparing materials and they know where they are and have access to them at all times of the day), learning assistants are available and their role is clearly defined etc.

LOW: All or most of the transitions are chaotic, children walk around aimlessly as teacher sorts out register or other start of day activities, teacher expectations are unclear, learning assistant is used to run errands for the teacher (photocopying, putting up displays) and is therefore not available for the children etc.

General Instruction Scales

C Cross-Disciplinary Connections: Extent to which lesson/activity is connected to multiple subject areas. Look for *explicit* and *explored* connections made between subjects.

High: Explicit connections are made between subjects and these connections are explored by the children. For instance, skills developed in Maths are used as a tool to support learning in Science, where the skills are directly linked back to Maths. Evidence where the study of one subject enriches the study of the other. The connections are explored in depth and are used to generate meaning and extend pupils' understanding.

LOW: Subjects are studied in isolation. Connections are either mentioned in passing or not mentioned or realised by children at all, even though connections exist.

D Linkage to life beyond the classroom: Extent to which lesson/activity is connected to competencies or concerns beyond the classroom. Look for attempts made to connect children's outside lived experiences or current issues with in-school events.

HIGH: students worked on at least one topic/lesson that was directly connected to their personal experience or a contemporary/current event outside of school. The connection is made explicit and the children recognise the connection, as demonstrated through their verbal contributions. These connections are explored in depth and used in a way to create personal meaning and significance in the subject. The adult helps make the skill relevant to child's life beyond the worksheet or classroom activity. There is the creation of concrete/tangible evidence of their attempt to understand a topic or solve the problem.

LOW: there are no clear connections to anything beyond the classroom itself. All activities are approached with the expectation of doing well in class rather than locating the relevance of the activities outside the classroom setting. Connections between classroom skill and outside classroom functions are not explored or presented.

E Social support for student learning: Extent classroom learning environment is characterised by an atmosphere of high academic expectations for all students coupled with mutual respect and support among teacher and pupils. Look at how children are supported by teacher and each other.

HIGH: children are supported by high expectations conveyed and set by the teacher for ALL children.

Children are encouraged to take risks, seek and explore challenges and learn from errors. The adults value all children and see everyone as capable of contributing. Everyone's contributions are taken seriously and

any errors are explored and used as a point of departure rather than glossed over in search of the 'correct' answer. All children are encouraged, not only the 'strongest.'

LOW: The teacher used put-downs when referring to children's academic efforts, product over process, pupils interfere with each other's efforts to learn (constant interruptions, noise level etc). In general, social support is negative. Children are discouraged to take risks because of the fear of put-downs or being laughed at. Mistakes are glossed over or ignored.

F Student engagement: To what extent are students engaged in lessons. Look for evidence of engagement.

HIGH: There is serious engagement identified by on-task behaviour, attentiveness, completion of tasks, displays of enthusiasm, initiative taken by children and accepted and extended by teacher, children contribute both in whole class and group discussions and activities. This would describe the majority of the time.

LOW: For the majority of the observation children are disengaged, to the point of distraction. There is little attention and the disruption of others makes those who would like to attend to task incapable of doing so. There is a lot of evidence of daydreaming, off-task talk and general disruptive behaviour. Children show little to no interest in lesson/activity.

Mathematical Instructional Scales

G Use of Maths analysis: What extent do children use Maths analysis? Look for evidence of Higher order thinking.

HIGH: Involves inventing original procedures where children construct original ways to solve Maths problems and these methods are explored and tested seriously by class/teacher. Children also are involved in searching for Maths patterns, making Maths conjectures with justifications, organising, evaluating (other pupils as well as their own strategies to see if they are valid), arguing and defending one's work/ideas/methods and making models to represent ideas/answers.

LOW: Thinking is restricted to mechanically recording or reporting of Maths facts, rules, definitions or mechanically applying algorithms. There is a lot of receiving, reiterating, reciting and performing routine procedures. There is little or no evidence of Maths analyses observed.

H Depth of knowledge and student understanding: Extent to which Maths knowledge is treated deeply in class.

HIGH: Evidence of the development of relatively complex understanding of lesson's concepts. There is evidence of the development of relatively systematic, integrated or holistic understandings of Maths concepts. Students are seen to produce new knowledge when connecting Maths topics to one another, when solving problems, making conjectures, justifying their hypotheses and making conclusions. The teacher structures lessons so that most students are engaged in at least one of the following: demonstrating their understanding of the problematic nature of information or ideas, demonstrating complex understanding by arriving at a reasoned, supported conclusion or explain how they solved a *complex* problem.

LOW: Knowledge is thin as concepts are treated superficially and as non-problematic (e.g. only one way to solve a problem etc). Children are able to present mainly fragmented pieces of information. Pupils cannot or do not use knowledge to make clear distinctions, arguments, solve problems. There is little or no attempt to make connections between Maths concepts (rote memorisation). The teacher may attempt to elicit deeper understanding, but the children are unable or unwilling to respond beyond basic recitation. There is fragmentation in the way Maths knowledge is presented.

I Basic skill development in the context of problem solving: Extent to which students learn basic skills in the context of problem solving. Look for evidence of basic skills teaching and note if this is done in isolation or in the context of solving a problem (may or may not have basis in real world context).

HIGH: Students take time out from solving problems to learn the meaning of specific terms in the problem, how to use a particular tool, how to represent quantities symbolically, how to perform a basic skill which is then used in solving a problem. There is evidence of in depth attempt to link basic skills teaching within the context of problem solving. The teacher makes the link explicit and the children are able to see the link.

LOW: Basic skills might simply not be taught at all. Or if they are taught, the teaching is done in isolation from problem solving. The teacher might drill children using flash cards or rapid verbal questioning. There is often a focus on memorisation or recitation. Children are also often involved in repetitive computations (worksheets/sums) without any visible attempt to link this skill development to actual problem solving.

J Maths discourse and communication: The extent to which classroom discourse in Maths is devoted to creating or negotiating shared understandings of Maths. Look for evidence of pupil talk- is it superficial, short, and brief? Or does it contain opportunities to make meaning and facilitate understanding?

HIGH: Discourse is sustained and leads to shared understanding in this class. There is considerable teacher pupil and pupil-pupil discourse about Maths ideas, this interaction is reciprocal and it promotes the extension of understanding towards a shared understanding of concepts being taught. The following MUST be in evidence in order to give the class a high score:

a. *talk is about Maths and includes higher order thinking (HOT) – including making distinctions, applying ideas, forming generalisations and raising questions.*

b. *There is a sharing of ideas (not scripted as in teacher led recitation). Evidence: participants explain themselves or ask questions in complete sentences, when speaker responds directly to the previous speaker's comments/answer (expanding on each other's ideas and explanations).*

c. *Dialogue builds coherently to promote improved, shared understanding of math topic (similar to b)*

LOW: In this class, the discourse consists of mainly a lecture from teacher with recitation. It appears the communication is scripted, where the teacher controls the destination of the lesson and ideas. There is often a question (initiated by teacher) followed by a chosen child's response and then a teacher feedback statement. The children are mainly engaged in reporting experiences, facts, definitions and/or procedures. Oral equivalent of fill in the blank or short answer questions.

K Locus of Maths authority: Extent to which the lesson supports a shared sense of authority and responsibility for validating students' Maths reasoning. Who is involved in validating student's Maths reasoning? * Does not measure students' control over the content – the teacher may still determine what, is important and worthwhile content wise, without lowering the 'Locus of Maths authority'.

HIGH: In this classroom, the teacher and the students hold each other accountable for convincing themselves and each other that their reasoning is sound and the answers are correct. There is a shared Maths authority. The teacher often answers a question with a question or offers instrumental help (good scaffolding), pushing students to make their own decisions. Children turn to themselves or each other for help, before consulting the teacher.

LOW: In the main, only the teacher and/or the text book are considered the legitimate source of Maths authority. They provide the validation of correct methods, explanations and answers. At times there seems no one has a means of validating an answer or explanation. Children only accept an answer as correct once the teacher has validated it. At times the teacher becomes annoyed when asked questions by children because s/he has an expected destination and considers such questions a digression. This sort of behaviour (child questioning or pupil voice) is prevented by her control of the discourse and validation of the correct response. Children turn to teacher for help, rather than each other.

Reading Instructional Scales

L Reading as meaning making: Extent to which students try to derive meaning from the texts they read – look for evidence of children making meaning and children trying to understand the substance of what they are reading. H.O.T – involving text: making meaning that goes beyond decoding words, choral reading, and recitation, memorising or applying phonics rules.

HIGH: In this classroom, children are engaged in reading that involves trying to understand the meaning of the text. They are trying to guess the meaning of words based on context when encountering unfamiliar words, using prior knowledge about a situation to help predict what will happen next, arguing and hypothesising or looking for patterns amongst works from an author or between authors. There are often long discussions that emerge from issues encountered in the text, such as the nuances of a new word. The teacher asks open ended questions that allow for speculation and diverse responses, she encourages students to read things that interest them and lead to an atmosphere of reading as an activity of meaning making.

LOW: In this classroom the children are mainly engaged in activities which require decoding, choral reading, recitation, memorisation or application of phonics rules. Skills are taught in isolation and based on low-level skills, such as decoding. There is little focus on the meaning of what is being read. When reading with small groups, teacher tends to focus on decoding rather than content and meaning (for example corrects children misreading of words, but does not discuss the word's meaning).

M Basic skills development in the context of reading: Extent to which students learn basic reading skills within the context of reading for meaning. Skills needed in order to understand what you read, conventions of reading: phonics, voice, tense, sentence, structure, syllabification, syntax, grammar, (rich) vocabulary, word recognition, meaning of verbs, nouns, adjectives, adverbs, pronouns and other parts of speech. * an episode of basic skills instruction does not necessarily lead to a lowering of this score – the issue is whether the skills taught are ever explicitly stated within the activity of reading for meaning.

HIGH: in this class, children take time out of reading a passage to figure out the meaning of a word, phrase, literary devices (metaphors, similes etc) based on the text (rather than looking in a dictionary or the teacher providing the answer). Students have their own dictionary made up of words that they encounter during their reading. There are times when the teacher commences a lesson with the instruction of basic skills, which

then appears in the passage that is to be read. This connection is made explicit and is explored (furthering the lesson).

LOW: reading skills are taught in isolation or simply not taught at all. There are connections between the skills instruction and the texts being read but these connections are neither mentioned by the teacher nor do they seem to be recognised by the students. Connections that are made are not explored or used to develop the lesson or understanding.

Writing Instructional Scales

N Higher order thinking in writing: Extent to which students plan for, edit, revise and otherwise engaged in H.O.T when they write something, beyond merely practicing how to spell words, the rules for grammar and filling in the blanks with pre-specified answers. *NOTE: Higher order thinking in writing = construction of original text

HIGH: Children in this class try to decide on the substance of what they want the reader to read. They have an intention, a story to tell, a point to make or a message to communicate to a desired audience. They consider, prior to writing, how to get that point, story, message across (planning). Pupils are often engaged in creating outlines to follow or are in the process of editing and revising work. They are using their prior knowledge or experience to help them to compose their new piece of writing. Teacher provides age-appropriate and skill appropriate opportunities for different kinds of writing for different purposes. They provide appropriate scaffolding for students, such as supporting them to create drafts of their texts, giving substantive feedback (on ideas, not only grammar and spelling), and encouraging the writers to share with others. Children are engaged in listening to and offering suggestions for improving their peers' work.

LOW: The children in this class are often involved in lower-order thinking, which might include skills taught in isolation from larger enterprise of writing. Students are often found practicing and drilling on a long list of vocabulary and spelling words but never given opportunity to use them in a substantive way. Students practice fill-in-the-blank activities without using them to actually write something meaningful.

O Purposeful development of writing skills: Extent to which students learn basic writing skills as they write. A wide range of skills are needed in order to write, the conventions of writing: spelling, voice, tense, sentence, structure, syllabification, syntax, grammar, rich vocabulary etc. Writing for a purpose, a story vs. a poem vs. a memo, vs. an essay etc.

HIGH: The pupils in this class take time out to correct an invented spelling while writing. Lessons may begin with instruction of a particular type of writing skill, such as grammar or capitalisation, but this skill is directly and explicitly linked to the activity children will be engaged in after instructions. Students are often seen writing new words into a personal dictionary or using this dictionary to support their writing.

LOW: Writing skills are taught in isolation as bits of information whose purpose, according to the students' perspective, is vague. Sometimes, writing skills simply are not taught. There may be connections between basic skills instruction and writing but these connections remain unexplored or unmentioned by teacher. Children are often found memorising lists of vocabulary or spelling but never rely on this list when engaged in their own writing.

Instructional Conversations

P Instructional conversations: extent which classroom conversations are devoted to creating or negotiating shared understandings of the content. Consider both content and nature of the conversation. Look at who controls the conversation, are children actively involved or are they simply passive respondents? Note: read bottom of page 25 for notes on this scale.

HIGH: In this class there is considerable teacher-pupil and pupil-pupil interaction about the ideas of a topic, this interaction is reciprocal and promotes shared understanding. The talk in this class is about the content being studied. Children are often found making distinctions, applying ideas, forming generalisations and raising questions (beyond procedural). The conversations involve a sharing of ideas and are not completely scripted or controlled by one party. This sharing is evidenced in the pupils' explanations of themselves or in their asking of questions in complete sentences and also when they respond to others directly. There is a building on from one another's ideas. There are sustained explorations of content in this class.

LOW: Children are often involved in simply reporting experiences, facts, definitions or procedures. The teacher controls the conversation in this classroom. The teacher is often seen asking closed questions and the children are seen responding in short answers. Seems like a fill in the blank conversation rather than a dialogue.

Appendix G: Quality Measures – the Classrooms Codes

n=125	Richness of Instruction	Over-Control	Chaos	Detachment /Teacher	Positive Climate	Negative climate	Productive Use of Time	Evaluative Feedback	Teacher Sensitivity
Richness of Instruction	1								
Over-Control	-.27**	1							
Chaos	-.39**	.28**	1						
Detachment/Teacher	-.58**	.37**	.51**	1					
Positive climate	.62**	-.37**	-.59**	-.43**	1				
Negative climate	-.48**	.46**	.72**	.54**	-.78**	1			
Productive Use of Instructional Time	.75**	-.18*	-.54**	-.44**	.75**	-.54**	1		
Evaluative Feedback	.75**	-.35**	-.43**	-.63**	.52**	-.50**	.59**	1	
Teacher Sensitivity	.85**	-.49**	-.45**	-.65**	.79**	-.67**	.71**	.77**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix H: Correlations between the Quality Measures – Other Pedagogical Strategies

n=125	Children are responsible for time and materials	Learning intentions are clear to children	Children could reflect on their learning	Teacher's material well organised	Teacher clear about their expectation of children	Teachers ensure concepts are clear to children
Children are responsible for time and materials	1					
Learning intentions are clear to children	.10	1				
Children could reflect on their learning	.27**	.35**	1			
Teacher's material well organised	.44**	.57**	.36**	1		
Teacher clear about their expectation of children	.25**	.76**	.32**	.56**	1	
Teachers ensures concepts are clear to children	.30**	.75**	.44**	.65**	.89**	1

** Correlation is significant at the 0.01 level (2-tailed).

Appendix I: Correlations between the Literacy items in IEO (Stipek) instrument

n=93	Classroom Climate	Classroom Routines	Cross-Disciplinary Connections	Linkage to life beyond the classroom	Social support for student learning	Student engagement
Classroom Climate	1					
Classroom Routines	.77**	1				
Cross-Disciplinary Connections	.30**	.33**	1			
Linkage to life beyond the classroom	.28**		.43**	1		
Social support for student learning	.73**	.62**	.30**	.27**	1	
Student engagement	.66**	.70**	.24*	.22*	.62**	1
Reading as meaning making	.58**	.45**	.28*	.37**	.56**	.64**
Basic skills development in the context of reading		.44**				.35*
Higher order thinking (HOT) in writing	.35**	.29**		.40**	.41**	.44**
Purposeful development of writing skills	.21*	.29**	.22*		.27*	.30**
Instructional conversations	.62**	.504**	.43**	.32**	.65**	.46**

n=93	Reading as meaning making	Basic skills development in the context of reading	Higher order thinking (HOT) in writing	Purposeful development of writing skills	Instructional conversations
Reading as meaning making	1				
Basic skills development in the context of reading	.39**	1			
Higher order thinking (HOT) in writing	.41**		1		
Purposeful development of writing skills		.54**	.46**	1	
Instructional conversations	.52**	.35*	.54**	.41**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix J: Correlations between the Numeracy items in IEO (Stipek) instrument

n=93	Classroom Climate	Classroom Routines	Cross-Disciplinary Connections	Linkage to life beyond the classroom	Social support for student learning	Student engagement
Classroom Climate	1					
Classroom Routines	.81**	1				
Cross-Disciplinary Connections			1			
Linkage to life beyond the classroom	.28**	.24*	.24*	1		
Social support for student learning	.75**	.70**			1	
Student engagement	.74**	.77**		.26*	.76**	1
Use of Maths analysis	.47**	.50**		.35**	.38**	.40**
Depth of knowledge and student understanding	.51**	.54**		.32**	.52**	.45**
Basic skill development in the context of problem-solving	.45**	.50**		.29**	.42**	.36**
Maths discourse and communication	.51**	.48**		.35**	.54**	.43**
Locus of Maths authority	.58**	.62**		.25*	.58**	.49**

n=93	Use of Maths analysis	Depth of knowledge and student understanding	Basic skill development in the context of problem-solving	Maths discourse and communication	Locus of Maths authority
Use of Maths analysis	1				
Depth of knowledge and student understanding	.75**	1			
Basic skill development in the context of problem-solving	.67**	.69**	1		
Maths discourse and communication	.68**	.80**	.65**	1	
Locus of Maths authority	.66**	.68**	.57**	.68**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix K: Relationship within the Ofsted measures and between the Ofsted measures and FSM

	Effec	imp	T KS1	T KS2	ass	L KS1	L KS2	lead	exc	attitu	attend	FSM
Effectiveness	1											
Improvement	.85**	1										
Teaching KS1	.60**	.48**	1									
teaching KS2	.80**	.68**	.59**	1								
Ongoing assessment	.62**	.46**	.59**	.64**	1							
Learning KS1	.63**	.51**	.92**	.65**	.63**	1						
Learning KS2	.80**	.70**	.58**	.96**	.61**	.68**	1					
Leadership	.70**	.60**	.55**	.64**	.60**	.58**	.64**	1				
Behaviour including exclusions	.63**	.54**	.55**	.71**	.48**	.59**	.68**	.48**	1			
Attitudes to the school	.59**	.53**	.50**	.67**	.42**	.55**	.67**	.51**	.77**	1		
Attendance	.32**	.21*	.34**	.23*	.153	.35**	.25*	.14	.31**	.26**	1	
FSM	.12	.03	.08	-.07	.08	.05	-.04	-.03	.12	.087	.51**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix L: Associations between the COS-5 and school characteristics

Associations between the COS-5 child and classroom factors and school characteristics

School level characteristics	COS-5 (Pianta) - Child and Classroom factors				
	Quality of Pedagogy	Disorganisation	Child positivity	Positive engagement	Attention and Control
%FSM (n=125)		0.36**			
Ofsted School effectiveness (n=107)	0.18 <i>p</i> <0.06				0.20*
Ofsted Improvement since last inspection (n=107)			0.21*		
Math value added residual (n=123)	0.20*				

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Associations between COS-5 child codes and school characteristics

School level characteristics	COS-5 (Pianta)- Child classroom behaviour codes						
	Positive affect	Self-reliance	Sociable/ co-operative with peers	Attention	Disruptive	Activity level	Child-Teacher Relationship
%FSM (n=125)					0.34**		
Ofsted School effectiveness (n=107)	0.19*	0.36**		0.26**			
Ofsted Improvement since last inspection (n=102)	0.20*	0.39**		0.24*			
Ofsted Leadership (n=105)	0.20*			0.22*			
Ofsted Teaching KS2 (n=102)		0.20*					
Ofsted Learning KS2 (n=102)		0.20*					
Mathematics value added Residual (n=123)		0.18* (<i>p</i> =0.051)					

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Associations between COS-5 classroom codes and school characteristics

School level characteristics	COS-5 (Pianta) - Classroom codes								
	Richness of instructional methods	Over control	Chaos	Detachment/Teacher	Positive classroom climate	Negative classroom climate	Productive use of instructional time	Evaluative feedback	Teacher sensitivity
%FSM (n=125)		0.19*	0.27**		- 0.33**	0.42**	- 0.21*		- 0.25**
Ofsted School effectiveness (n=107)	0.23*			-0.25**	0.23**		0.27**		
Ofsted Improvement (n=102)				-0.24**	0.20**		0.21*		
Ofsted Teaching KS1 (n=102)	0.24*								
Mathematics value added residual (n=123)	0.20*			-0.20*		-0.20*		0.24**	0.23*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed)

Associations between COS-5 classroom codes and school characteristics

Ofsted judgements on pupil outcomes	COS -5 (Pianta) - Classroom codes							
	Richness of instructional methods	Over control	Chaos	Detachment /Teacher	Positive classroom climate	Negative classroom climate	Productive use of instructional time	Teacher sensitivity
Behaviour including exclusion (n=102)								
Attitudes to school (n=102)			- 0.20*				0.24*	
Attendance (n=102)			-0.30**		0.22*	- 0.26**	0.20*	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix M: Associations between the IEO and school characteristics

Association between IEO (Stipek) Literacy items and school characteristics

School level characteristics	IEO (Stipek) – Literacy items							
	Classroom Climate	Classroom Routine	Cross-Disciplinary connections	Student Engagement	Social support for learning	Reading as meaning making <i>n=43</i>	Purposeful development of writing <i>n=43</i>	Instructional conversation
%FSM (n=93)	-0.31**	-0.24*		-0.28**	-0.33**			
Ofsted Effectiveness (n=81)	0.27*	0.33**	0.31**				0.41**	0.22*
Ofsted Improvement (n=77)							0.38**	
Ofsted Leadership (n=82)		0.33**	0.31**	0.22*			0.41**	
Ofsted Ongoing Assessment (n=69)	0.30*	0.26**	0.24*			0.40**	0.25*	
Ofsted Teaching KS1 (n=62)		0.26*	0.28*	0.22*			0.34**	
Ofsted Learning KS1 (n=62)		0.26*		-0.28			0.38**	
Ofsted Teaching KS2 (n=80)		0.25*	0.25*				0.28*	
Ofsted Learning KS2 (n=80)			0.25*					
Mathematics value added Residuals (n=91)		0.30**						
English value added Residuals (n=91)	0.24*	0.29**				0.28 (<i>p</i> =0.054)		

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Association between IEO (Stipek) Numeracy items and school characteristics

School level characteristics	IEO (Stipek) - Numeracy items						
	Classroom Climate	Classroom Routine	Student Engagement	Cross Disciplinary connections	Use of Maths Analysis	Depth of knowledge and student understanding	Locus of Maths authority
% FSM (n=93)	-0.21*	-0.22*				-0.26*	-0.35**
Ofsted Effectiveness (n=81)	0.31**	0.36**	0.27*		0.28*	0.26*	0.24*
Ofsted Improvement (n=77)							
Ofsted Leadership (n=82)	0.22*	0.33**			0.23*		0.29*
Ofsted Ongoing Assessment (n=69)					0.25*		
Ofsted Teaching KS1 (n=62)		0.27*			0.38**	0.26*	0.26*
Ofsted Learning KS1 (n=62)	0.24*				0.41**		
Ofsted Teaching KS2 (n=80)		0.26*			0.32**		
Ofsted Learning KS2 (n=80)		0.23*		0.24*	0.31**		
Maths value added Residuals (n=90)		0.19 (p=0.071)			0.24*	0.20 (p=0.065)	0.27**
English value added Residuals (n=90)	0.22*	0.24*	0.19 (p=0.076)				

School level characteristics	IEO (Stipek) – Numeracy items		
	Social support for learning	Basic skill development in the context of problem solving	Maths discourse and communication
%FSM (n=93)	-0.21*	-0.21*	-0.28*

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Appendix N: The National Literacy Strategy

Example of suggested outline of the Literacy Hour from the National Literacy Strategy:

- Whole class (15 minutes): Shared text work (balance of reading and writing).
- Whole class (15 minutes): Focused word work (balance over term of focused word or sentence work).
- Group and Independent work (20 minutes): independent reading, writing or word work, while teacher works with at least two ability groups each day on guided reading.
- Whole class (10 minutes): Plenary – review, reflect, consolidate teaching points and presenting work covered in the lessons (DfES, 2001a).

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