EDUCATION RESEARCH FUNDING PROGRAMME

FINAL WRITTEN REPORT

Curriculum Implementation in Early Primary Schooling in Singapore (CIEPSS)

By

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2011

EXECUTIVE SUMMARY (300-600 WORDS)

Purpose / Research Question

This one-year project was an investigation into the ongoing implementation of recent policy initiatives that influence pedagogies, curriculum innovation, and instructional practices in primary education in Singapore. Investigation covered P1 and P2 in all core subjects: English, Mother Tongue (Chinese, Malay, Tamil) and mathematics. It included investigation of local contextual conditions which impact the work of policy developers and implementers at all levels within the system: class, school, zone, national. Our goal was to assist in developing a more complete understanding of the specific, local challenges of policy implementation.

Background

In 1997 “Thinking Schools, Learning Nation” (TSLN) signalled a shift in education in Singapore. As part of the TSLN vision, the government initiated and fostered greater autonomy at the school level particularly in regard to curriculum development and implementation. “Teach Less Learn More” (TLLM), introduced in the Prime Minister’s National Day Rally speech in 2004, emphasised the need “to improve the quality of interaction between teachers and learners” (MOE, 2005b, para. 3) to encourage students to learn more actively and independently. Schools are encouraged to find their own path to improve the quality of teaching and learning.

Despite hopeful reform agendas, failure to successfully implement and sustain curriculum innovations in education has been well documented (Cohen & Ball, 2000; Fullan, 2007). The difficulties faced by participants at all levels of curriculum implementation have highlighted the complex nature of implementation processes (Hargreaves, 1994; Marsh, 2007) and the interactions of individuals in those processes. Recent research has focused attention on the roles played by teachers and leaders in these processes: teachers in professional learning communities (DuFour & Eaker, 1998; Hord, 2004; McLaughlin & Talbert, 2001; Wells & Feun, 2007); teachers and their beliefs (Hargreaves & Goodson, 2006; Keys, 2007; Schraw & Olafson, 2002; Woolfolk-Hoy, Davis, & Pape, 2007); and school leaders (Elmore, 2000; Marzano, Waters, & McNulty, 2005; Riley & Louise, 2004). This study took into account the views of teachers and school administrators but also considered the views of students and parents. Throughout we investigated the potential of individuals and groups of individuals to participate as policy actors.

Participants

Participants included two teachers and their students (both at P2) at two schools for the case study component and 10 teachers (and their students) at 10 schools for the lesson observation component. All schools (case study and lesson observation components) were in the same school zone in Singapore

Research Methodology/Design

The study incorporated a multi-method approach including a qualitative and a quantitative component. The qualitative component included case studies at two schools; the quantitative component included observations of P1 and P2 lessons at 10 schools, with follow-up interviews for a subset of those observations. The combination of case study and individual lesson observations provided opportunities to address implementation processes across layers (e.g., national, zonal, school, classroom) and in multiple sites while maintaining a focus on teachers and students.

Findings/Results

While there are some moves toward school-based curriculum development in Singapore primary schools, our investigation of P1 and P2 teaching in 12 schools in one administrative 'zone' shows strong centralising forces. With reference to our first research question, the devolution of authority to schools (see pp.1-2), we find that authority for innovation tends to devolve to the school level but not to individual teachers. Although teachers might act as policy actors within their own classrooms, their efforts are generally targeted at small-scale adaptations which are intended to mesh with MOE policies. The school level acts as a strong filter for policy implementation as understood by those school administrators designated as key personnel for action or innovation. This seems to be consistent across academic subjects and schools. In general, teachers and school administrators expressed satisfaction with their understandings of policy implementation and their opportunities for innovation. This was particularly true when professional development was coupled with new initiatives. This would seem to support school-based professional development and a community of practice approach to curriculum innovation (e.g., Coburn & Stein, 2006).

We have also taken note of student voices and beliefs, at least to some extent. It is evident that children see schooling as being holistic: study and play; in classrooms and out; individually, with friends and with teachers. Children's wishes capture rather neatly the synergies of the Cohen, et al., (2000) framework on interactions of resources and instruction which refers to interactions not as "a particular form of discourse but to the connected work of teachers and students on content, in environments" (p. 10). These connections are paramount in curriculum innovation.

Conclusion

In this project we investigated teacher and student perspectives on classroom actions and policies while at the same time validating tools for this type of study in lower primary classes in Singapore (through the use of a combined case study/ pre-structured lesson observation methodology). Based on our findings, we note the crucial importance of considering how policies 'travel' through implementational layers in the Singapore system and the perceived boundaries for innovation and adaptation. MOE policies travel relatively well through the system in that they are largely accepted by schools and classroom teachers; sometimes being seen as less flexible than intended. We found little evidence that teachers see themselves as policy actors in their own right, instead they tended to see themselves as a important part of a cohesive, national implementation strategy with opportunities for innovation in lesson activities and resources. However, school-level intervention had a fairly direct impact on teachers' views of what they could/could not change in their classrooms, and school-level collaboration acted as an empowering force for teachers to adjust curriculum, at least through materials and activities selected for classroom use.

Keywords

policy implementation; curriculum innovation; primary education; language education; mathematics education; policy actor; school-based curriculum development

CURRICULUM IMPLEMENTATION IN EARLY PRIMARY SCHOOLING IN SINGAPORE (CIEPSS)

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INTRODUCTION

The one-year Curriculum Implementation in Early Primary Schooling in Singapore (CIEPSS)project was an investigation into the ongoing implementation of recent policy initiatives that influence pedagogies, curriculum innovation, and instructional practices in primary education in Singapore. Investigation covered Primary 1 (P1) and Primary 2 (P2) in all core subjects: English, Mother Tongue (Chinese, Malay, Tamil) and mathematics. It included investigation of local contextual conditions which impact the work of policy developers and implementers at all levels within the system: class, school, zone, national. Our goal was to assist in developing a more complete understanding of the specific, local challenges of policy implementation.

The objectives and research questions of the project are listed below.

Objectives[1]

1. Based on evidence from a sample of primary schools in one zone, to identify and discuss the possible system of variables within curriculum implementation of P1 and P2 policies in Singapore.
2. To contribute to theory building on cycles of curriculum implementation by highlighting connections, correspondences and distinctions in student voice, teacher perspectives and administrative (school and MOE) views.
3. To develop and validate tools for investigating policy-pedagogy links at lower primary in the Singapore educational context.
4. To examine teacher and student perspectives on classroom actions and policies.

The multi-site, multi-method study focussed on observational and interview data (teacher, school administrator, parents, students) with both structured, pre-determined data elicitation and analysis tools as well as more open-ended, exploratory methods. The study had two distinct but inter-related components: a case-study component undertaken at 2 primary schools and a lesson observation component conducted at 10 schools in the same zone as the case study schools. Both components addressed policy implementation and curriculum innovation in primary education.

Research Questions

1. What characterizes the on-going implementation processes of devolution of curriculum authority to schools in the early primary years (P1-P2)?
    a. What are the interactive factors affecting the implementation of this initiative?
        i. Who are the 'policy actors' in Singapore early primary years classrooms?
        ii. How do these policy actors interpret and mediate the curriculum initiatives?
        iii. How do the interpretations and mediations of the policy actors vary between subjects?

iv. How do the curriculum initiatives meet the needs of the policy actors at zone and school levels?

b. In what ways do these factors constrain or enhance the implementation?

2. In what ways are the interactions of teachers, students, content and environments in current curriculum initiatives enhanced or constrained by implementation processes?
   a. How are these interactions played out in the classroom?
   b. What are the teacher beliefs about these interactions and implementation processes?
   c. How do teacher beliefs influence these interactions in the classroom?
   d. What are the student beliefs about these interactions and how do they mesh with classroom practices?

RESEARCH BACKGROUND

In 1997 "Thinking Schools, Learning Nation" (TSLN) signalled a shift in education in Singapore. As part of the TSLN vision, the government initiated and fostered greater autonomy at the school level particularly in regard to curriculum development and implementation. Within this environment, the "dynamics of simultaneity" (Tan & Ng, 2007, p. 163) characterise an educational landscape with centralization at the national level (i.e., a central governing body) which sets system-wide goals, standards for learning outcomes, and high stakes assessments, but decentralisation at the local level (zones, clusters, schools, school-internal departments) which has responsibility for interpreting the goals and standards, preparing students for high stakes assessment, as well as on-going curriculum development, implementation, and evaluation of learning outcomes. Recent policy statements have suggested a move toward more school-based curriculum design, a strategy of decentralisation to promote curriculum innovation, with schools (and teachers) taking on a more prominent, authoritative role.

"Teach Less Learn More" (TLLM), introduced in the Prime Minister's National Day Rally speech in 2004, emphasises the need "to improve the quality of interaction between teachers and learners" (MOE, 2005b, para.3) to encourage students to learn more actively and independently. Schools are encouraged to find their own path to improve the quality of teaching and learning. The shift in the pedagogical landscape has had important curriculum implications for P1 and P2 classrooms. Amongst the recent initiatives impacting lower primary are smaller class size for P1 and P2; SEED (Strategies for Engaged and Effective Development); STELLAR (Strategies for English Language Learning and Reading programme); and More Responsive and Engaging Mother Tongue Language Curriculum (Chinese, Malay, Tamil). In addition, there have been syllabus revisions for English Language (2010), Maths and Mother Tongues (2007) as well as other initiatives such as SAIL (Strategies for Active and Independent Learning) and PETALS (Use of Pedagogies, Experiences of Learning, Tone of Environment, Assessment for Learning, and Learning content) intended to influence primary school education from P1-P6. Most recently PERI (Primary Education Review and Implementation) was introduced with the aim of increasing the quality of education at the primary level by 1) balancing the acquisition of knowledge with skills and values; and 2) through the provision of support structures i.e., investing in quality teaching force and enhancing infrastructure in schools.[2] (See Appendix A for websites describing each of these initiatives.)

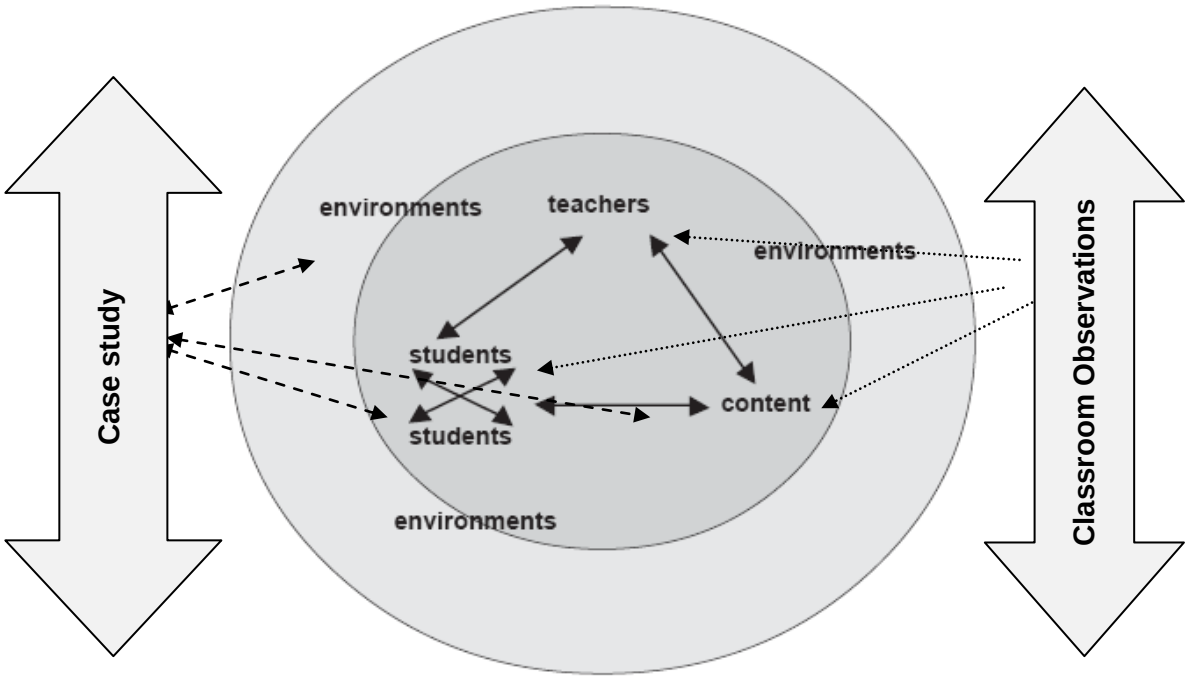
As is often the case with systemic initiatives, school communities are challenged to negotiate the tensions of existing practices and "newer" policy agendas (e.g., Alexander, 2001; Honig, 2006; Lefstein, 2008). Teachers and schools are immersed in well-established school organisation, curriculum and assessment histories and contexts. At the same time, they are actively considering the pedagogical demands of student engagement, attention to

individual needs, the affective and social development of students, and school-based curriculum development. Thus, investigations into curriculum implementation, and the work of teachers and students as part of curriculum implementation, must be seen within a theoretical frame which acknowledges the dialectical interrelationships of content, students, teachers and environments (Ball & Bowe, 1992).

Despite hopeful reform agendas, failure to successfully implement and sustain curriculum innovations in education has been well documented (Cohen & Ball, 2000; Fullan, 2007). The difficulties faced by participants at all levels of curriculum implementation have highlighted the complex nature of implementation processes (Hargreaves, 1994; Marsh, 2007) and the interactions of individuals in those processes. Recent research has focused attention on the roles played by teachers and leaders in these processes: teachers in professional learning communities (DuFour & Eaker, 1998; Hord, 2004; McLaughlin & Talbert, 2001; Wells & Feun, 2007); teachers and their beliefs (Hargreaves & Goodson, 2006; Keys, 2007; Schraw & Olafson, 2002; Woolfolk-Hoy, et al., 2007); and leadership (Elmore, 2000; Marzano, et al., 2005; Riley & Louise, 2004). Similarly, the CIEPSS study took into account the views of teachers and school administrators; however, we also considered the views of students and parents. Throughout we investigated the potential of individuals and groups of individuals to participate as policy actors.

The research project incorporated both quantitative and qualitative data collection and analysis methods. Figure 1, an adaptation from Cohen, Raudenbush, and Ball, (2000, p. 10), illustrates the connected components of the study and identifies the multiple foci of each of the methodological strands of the research design. Findings were sketched from each component of the project and drawn together through a synthesis of the component findings. The discussion highlights the continuing strength of centralising forces through the layers of policy implementation.

Figure 1. *Synergies of multiple foci, based on Cohen, Raudenbush and Ball, (2000, p.10)*



METHODOLOGY

This study incorporated a multi-method approach including a qualitative and a quantitative component. The qualitative component included case studies at two schools; the quantitative component included observations of individual lessons at 10 schools, with

follow-up interviews for a subset of those observations. The combination of case study and individual lesson observations provided opportunities to address implementation processes across layers (e.g., national, zonal, school, classroom) and in multiple sites while maintaining a focus on teachers and students.

Case studies are frequently used in research when a deep understanding of the context is essential. Most case studies in education (e. g., Ball, 1990; Cohen, 1990) draw data from small sample groups and rely on short-term intensive data collection periods (e.g., one week) or several visits over time. The case study for this project was located in two schools for two periods of five full days each in order to enhance opportunities for robust findings (see Yin, 2003, pp.46-53). The case study also incorporated data from multiple levels including national policy documents, school administrators, classroom teachers, parents and students.

In contrast to the intensive investigation in the case study component, the lesson observation component emphasised observations of individual lessons across 10 schools using a pre-planned coding scheme. Lesson observation with a pre-planned coding scheme has a long tradition in educational research (e. g., Brophy & Good, 1973; Flanders, 1970; Newmann & Associates, 1996), including research on language (e.g., Allwright, 1988; Spada & Lightbown, 1999) and mathematics (e. g., Ackers & Hardman, 2001; Goos, 2004; Schoenfeld, 2001). The advantage of structured classroom observations using a predetermined coding scheme is that a large sample of behavioural data can be gathered and analysed efficiently and reliably, comparisons within and across large data sets can be made, and judgements on 'typicality' can be justified (see Mackey & Gass, 2005, pp. 175-176; McDonough & McDonough, 1997). Classroom observations with pre-structured coding scheme have well known disadvantages as well. They are large-grained, "extremely blunt instruments" (Erickson, 2004, p. 575) that do not provide information on participant motivations or cognitions; they emphasize generalities and generalisations, over close examination and particularization; and, they focus on only a small amount of the information available in classroom interactions. Despite these limitations, lesson observations with a structured coding scheme were useful in this study for supplying a general picture of policy implementation and curriculum innovation at the classroom level. In addition to lesson observations, this component included follow-up interviews with a sub-set of teachers to provide a glimpse into the teacher's perspective and beliefs (c.f. Borg, 2006). In sum, the lesson observation component provided a basis for comparison with the more detailed case study component.

Selection of school sites: Administratively, schools in Singapore belong to 'clusters' and 'zones'. Zones are divided regionally – North, South, East and West. Within each zone, clusters of 12-15 schools are formed.[3] Because we wanted to work within the same administrative zone, two schools from the same zone were chosen for the case study. The basis of the selection was largely pragmatic: The first two schools from the same zone who agreed to participate in the research project were selected. Subsequently, schools from the same zone were solicited for the individual lesson observations. All schools in the zone were contacted except the two involved in the case study; 10 agreed to participate. Within each of these schools all teachers at P1 and P2 were provided with information about the project and asked if they would be willing to participate. Those who agreed and were able to schedule observations within the time frame of the study were observed.

All methods of data collection were trialled and refined during an earlier project (Dixon, et al., 2008). Brief descriptions for research procedures are given below. Detailed protocols for data collection (observations, interviews, focus-group discussions, drawing and telling sessions, and field notes) can be found in Stinson, Silver, Amasha, Pak, & Wright (2010). Detailed protocols for data analysis can be found in Silver, Amasha & Wright

(2011a). Details on the coding scheme used in the lesson observation component are available in Silver, Pak & Kogut (2011b).

Data Collection

Case Study Component Data Collection

The case study component (CSC) involved two researchers as an ongoing presence in one school each, for five roughly consecutive days in Terms 3 and again in Term 4 of 2009 (Table 1). Each of the researchers was attached to a particular P2 classroom in her respective school and spent the full complement of the school day observing that class with the exception of Mother Tongue classes. Mother Tongue (MT) classes were excluded because students were not together for these lessons (some going to Chinese, some to Tamil, and some to Malay). In addition, teachers, school administrators, parents and students at each school were interviewed.

Table 1. *Data collection schedule*

Data collection	School A	School B
Classroom observations (Term 3)	27/7/2009 to 29/7/2009, 31/7/2009 & 6/8/2009	3/8/2009, 4/8/2009, 6/8/2009 & 14/8/2009
Classroom observations (Term 4)	5/9/2009 to 9/9/2009	14/9/209 to 17/9/2009 & 2/10/2009
Interviews: Teacher	14/8/2009 & 13/11/2009	17/8/2009
Interviews: English HOD	-	17/8/2009
Interviews: Vice Principal	28/8/2009 & 30/11/2009	18/8/2009
Interviews: Teacher Mentor/Senior Teacher	28/8/2009 & 17/11/2009	-
Discussion Sessions: Parent Focus Group	21/11/2009	16/11/2009
Discussion Sessions: Individual Child Drawing and Telling	3/11/2009 & 4/11/2009	4/11/2009
Discussion Sessions: Student Focus Group	5/11/2009	4/11/2009 & 5/11/2009

CSC Classroom Observations

The researchers spent five complete days with one class (e.g., the same group of students) within a two-week period. The initial plan was to observe all lessons within a one-week period. This was not possible due to scheduling constraints at the schools (e.g., the teacher involved had to attend a course during curriculum hours, the school had planned programmes for the day so classes were cancelled). Extensive notes were taken during the classroom observations. Upon exit from the field site, researcher notes were expanded to create more complete field notes, referencing lesson artefacts and classroom photographs as needed.

While at the site, photographs of the empty classrooms were taken to show seating positions and displays on the walls. At times, the researchers also took photographs of students at work as a means of capturing learning processes that were deemed to be important in addressing the research questions. This was done on a limited basis so as not to disrupt the on-going lessons. No other recordings of any kind (audio, video) were taken for the CSC.

CSC Interviews

One-on-one interviews were conducted with the classroom teachers, and school administrators. Selection of school administrators depended on personnel whom the school identified as most involved in curriculum implementation and decision-making. Thus the

participating school administrators for the two schools were different. For School A, the interviewees were the form teacher of the class involved, Miss H; the Vice Principal, Mr Y; and the Teacher Mentor, Miss PC. Interviews were conducted twice; once in Term 3 and a follow-up interview in Term 4. For School B, interviews were carried out in Term 3 with the form teacher of the class involved, Miss M; the English Head of Department, Ms. L; and a Senior teacher, Miss T. No interviews were conducted in Term 4. Table 2 summarizes the staff who participated in interviews.

Table 2. *List of interviewees*

School A	**School B**
Teacher, Miss H	Teacher, Miss M
Vice-Principal, Mr Y	Vice-Principal, Miss C
Teacher Mentor, Miss PC	English Head of Department, Miss L
	Senior Teacher, Miss T

At both schools, interviewees were asked to select a convenient time to meet. Interviews were conducted with a pre-set list of initial questions as well as suggested 'probing' and 'follow-up' questions (Appendix B). These were adapted on a case-by-case basis during each interview. However, in each case, questions about curriculum implementation, innovation and changes were posed. For example, teachers and school administrators were asked "How do you feel about the new initiatives that are being implemented?" Teachers were specifically asked about teaching and learning (e.g., "Can you talk about the ways in which you think children learn best?") while administrators were asked about working with teaching staff (e.g., "How will you encourage and help your staff in implementing the initiatives?"). All sessions were audio recorded and then transcribed for analysis.

CSC Parent Focus Group Discussions

A few parents at each school participated in focus group discussions. At both schools, teachers suggested parent participants based on the parents' ability to speak English and their availability. A letter of invitation was sent to these parents. At School A, six letters of invitation were sent out and three parents responded positively. However, during the day of the focus group discussion, one of the parents fell ill and was unable to attend. The focus group discussion then proceeded with two parents. At School B, eight letters of invitation were distributed. Five positive responses were received; on the actual day only four parents turned up and participated.

During the focus group discussion, the researchers' role was mainly to facilitate; parents took the lead in the discussion. The same open-ended questions were asked across the two schools (see Appendix C for questions used; see Stinson, et al., 2010, for details). These sessions were audio recorded and transcribed.

CSC Student Drawing and Telling Sessions

Drawing and telling sessions were introduced in lieu of formal interviews with children to allow for the students' perspectives to emerge (Wright, 2008, 2010). Instead of just talking, students drew their responses while talking about their drawings. The context of the drawing-telling was established by using a script which encouraged the children to draw and talk about what they would like to have included in a (hypothetical) new school that was being built (see Appendix D for the script used; see Stinson, et al., 2010, for details). Four students from each of the two CSC schools participated in one-on-one drawing and telling sessions. The students were selected based on teacher recommendations. The teachers generally chose students who could understand instructions and articulate their ideas in English. These sessions were audio and video recorded. Audio recordings were subsequently transcribed.

CSC Student Focus Group Discussion

An adaptation of the drawing and telling procedure was necessary to accommodate the majority of the students in the CSC classes. Because of time constraints, it was not possible to carry out sessions with each individual student. As such, adapted drawing and telling sessions were carried out during scheduled Art lessons of the two classes. All students were given the same context using the script above. They were then interviewed in groups of 4 or 5 to elicit their thoughts while drawing. The sessions were audio recorded and transcribed. The four students, who had participated in the one-on-one sessions did not participate in the group discussions; they were asked to use this time to write about their drawings instead.

Lesson Observation Component Data Collection

For the lesson observation component (LOC), data collection was undertaken during the same time period as the CSC – Terms 3 and 4 of 2009. This included brief 'walking interviews' with each teacher prior to observation of an individual lesson, and follow-up interviews for a subset (28%) of the teachers. Teachers were asked to select a lesson that they felt was fairly 'typical' for observation. Observations and interviews were arranged at the convenience of each teacher.

Lessons in all core subjects – English, Maths, Mother Tongue – at P1 and P2 were observed, providing the opportunity for an interdisciplinary understanding of policy implementation. A total of 80 lessons were observed: 19 were in English Language, 18 in Math, 17 in Chinese Language, 16 in Malay Language, and 10 in Tamil Language. The different number of observations for Mother Tongue (MT) classes reflects the different offerings for MT and the size of the different ethnic groups in Singapore.[4] Table 3 show the number and distribution of lessons observed and analysed, as well as teachers interviewed.

Table 3. *LOC data collection: Total of observations and interviews*

Subject	**Observations**	**Interviews**
English	19	7
Mathematics	18	4
Chinese	17	5
Malay	16	4
Tamil	10	3
Total	80	23

Walking Interviews: Each teacher was briefly interviewed before the lesson in a 'walking interview' – so called because they were usually done while walking to the classroom with the teacher. The main priority of the walking interview was to quickly and informally gain a general picture of the classroom, the lesson, and the students who were going to be observed (e.g., "What is this lesson about? Is there anything I should know about this lesson before we start?").

Observations: Each lesson was observed by two trained research assistants who set up audio and video recording equipment, took notes of the lesson, drew out a class map, and filled in basic information on the coding sheet (see Silver, et al., 2011b, for details). Lesson artefacts (e.g., worksheets used, photos of other materials such as manipulatives, copies of PowerPoint slides) were collected if available. Video recording was done with one stationary camera on a tripod at the back of the room. The video recording, class map, observer notes, and artefacts were intended to help the research team gain a better understanding of how the different lessons components (activities, materials, participation patterns, etc.) worked together and to enable accurate coding.

After the lesson, a brief narrative description was prepared. Narrative descriptions provided a prose description of the dominant lesson features. These descriptions were used to identify lessons for further discussion by the research team, if needed. In addition, a subset of lessons (at least one per subject) was transcribed to provide an example of classroom interaction and cross check with coding. These lessons were selected by checking the classroom coding summary for features common to most lessons in that subject and from subject specialist perceptions of typicality – the goal was to select at least one lesson that was considered to be fairly typical.

Follow-up Interviews: Follow-up interviews were conducted to gain additional information about the lessons as well as insights into teacher thinking and beliefs on policy implementation, curriculum innovation and classroom teaching. Teacher volunteers were solicited by emailing the teachers after observations were completed. A total of 23 teachers volunteered to be interviewed (28% of the total).

Each interview was conducted using an unstructured protocol while the teacher and interviewer watched the video of the teacher's observed lesson. In each case, the teacher was encouraged to comment freely while watching the video. If no comments were made after 10 minutes, the interviewer posed a question such as "Can you tell me what is happening?" or "What can you say about student learning so far?" Interviewers were reminded that it was important not to offer opinions or judgements but to keep the focus on the teacher's own commentary. All interviews were transcribed for analysis.

Details on these procedures can be found in Stinson, et al., (2010).

Data Analysis

Case Study Component Data Analysis

The field notes and transcribed interviews from the CSC were analysed using the framework of content analysis (Berg, 2004). Emerging themes were identified by looking for ideas which surfaced repeatedly in the data, comments related to the research questions and objectives, and comments about known policy initiatives (e.g., alternative assessment, STELLAR, ICT). Thus, codes were derived out of the data with reference to the research objectives and questions. Based on initial analyses, three broad categories for coding were established reflecting our best understanding of the locus of policy implementation MOE Policies, School Policies, and Class Policies. Other codes were grouped within these three broad levels through multiple readings and discussion. This resulted in a hierarchical coding string with greater levels of specificity at lower levels of analysis. For example, MOE Policies'→MOE initiatives→STELLAR→No textbooks STELLAR. Details for procedures and definitions of the emergent codes can be found in Silver, et al., (2011a).

While the content analysis allowed for a detailed classification of comments from the transcribed CSC data, the categories and exemplars were often too particularised for use in understanding the larger picture of curriculum policy implementation. Therefore, the next stage of the analysis was to revisit the coded data to look for patterns within and across CSC data sets (e.g., student drawing and telling, teacher interviews) and generate a sort of "meta-code" (Miles & Huberman, 1994, p.69). We refer to these meta-codes as "conceptual categories" since the guiding question in re-examining the coded data was "What are the *overarching concepts* that emerge?" These conceptual categories were then synthesised and formed the basis of our findings on the CSC.

Lesson Observation Component Data Analysis

All individual lessons were coded using the CIEPSS coding scheme (Silver, et al., 2011b). Briefly, the coding scheme emphasized classroom participation patterns (e.g., whole class teacher fronted, individual private [seatwork], pair work), knowledge structures (following Luke, Freebody, Cazden, & Lin, 2004), instructional focus (features specific to each subject area), child-centred instruction (e.g., engagement, teacher style), and continuous assessment of student learning (e.g., documentation, student produced work). It was partially based on prior NIE and CRPP research and an early version as trialled in Dixon, et al., (2008).

All coders were trained to the coding system using sample recordings from a prior study as well as recordings from this project. Initial coding was done during the lesson observation. The lessons were also video and audio recorded. Therefore, it was possible to check and complete coding with reference to the video and audio recordings. A subset of at least two lessons per subject were watched and discussed by the PI, Co-PIs and RAs to ensure uniform understanding of the coding categories and to reconcile any coding difficulties across topics. Because of the different subject areas and the difficulty of verifying inter-coder agreement on MT lessons, all other lessons were watched by a team of two coders – one specialising in the subject area and one other member of the research team. As they watched the video together, they discussed the coding, questioning and clarifying until the coding was finalised. If any disputes on coding could not be resolved or any questions on coding remained, the problematic excerpt was shown to the research team as a whole and resolved by consensus. In sum, all lessons were coded by at least two coders, working collaboratively, with cross-checks across lessons and subjects and final resolutions by consensus.

Walking interviews, narrative descriptions and lesson artefacts were not analysed independently. Instead, they were used to illuminate and clarify aspects of the lesson for coding with the coding scheme. For example, one feature of the coding scheme was to determine the “skill focus” of an activity. In mathematics, if students were measuring and comparing items from pictures and graphs, the activity could potentially be coded as “data analysis,” “use of mathematical tools” or “measurement.” Based on comments from the teacher in the walking interview or details in the materials, coders would determine which code was the best fit for the activity.

To maintain consistency and to facilitate synthesis of the two project components (CSC and LOC), one of the researchers who had engaged in CSC content analysis used the same set of themes to analyse 3 follow-up interviews from the LOC. Again an iterative cycle of individual coding, discussion with one or more others in the research team, and re-coding was undertaken. In a few cases code definitions were expanded to take into account features in the LOC lessons but for the most part existing code definitions were not changed. New codes were added as needed to capture distinct details of the individual lessons which had not emerged in the CSC analysis. Subsequently all of the teacher interviews in the LOC were coded by the same coder. Coding was checked by a member of the research team by reading across all coded excerpts, cross-checking with the code definitions and examples of CSC coded data. Queries and conflicts were then reconciled by consensus.

FINDINGS

Findings Case Study Component

Data from the researchers’ field notes, their interviews with the teachers and other key school personnel (e.g., principal, PERI mentor), parents’ focus group discussions and some examples from the students’ drawing-and-telling focus group discussions were

synthesized according to the three policy categories established for analysis: MOE, School and Classroom.

MOE Policies. The PERI report (MOE, 2009) made three main recommendations: Balancing Knowledge with Skills and Values, Investing in a Quality Teaching Force and Enhancing Infrastructure. Several themes emerged in relation to the PERI report which surfaced repeatedly in the data sources:

- *Teacher free 'protected time'* was valued in both schools as a means for teachers to discuss matters pertaining to classroom pedagogy.
- *School-based professional development* was implemented systematically within each school and both schools reported that teachers were now more open to peer mentoring.
- *STELLAR*: Both schools adopted STELLAR for English Language teaching.
- *Single session timetabling* was implemented in one school and was viewed positively. The other school was operating on two sessions, which the teacher described as causing difficulties in relation to classroom arrangement and pedagogy. There were mixed feelings from parents in this school about the move toward single session classes.
- LSP: Participation in the *Learning Support Program* was apparent in one school, where early intervention was used to screen students who were behind the average reading age. This was not found in the other school as the classroom observed was for high-ability students who would not be expected to participate in LSP.
- *H1N1 procedures* were strictly followed in both schools during the period of possible epidemic threat and in some cases this influenced pedagogical choices (e.g., teachers reported lower use of peer work in order to avoid having student work in close physical spaces).

School Policies. Both schools had policies that were similar in relation to four issues:

- *Enjoyment, physical well-being and security* were highly important tenets in relation to the students within their schools.
- *School-based curriculum development* was also considered important, especially in relation to complementing the STELLAR curriculum. Both teachers adapted STELLAR materials to make these more relevant to their students.
- *School community spirit* was valued by both schools and each implemented a variety of methods to promote this.
- *Teacher professional development* was provided in both schools, on-the-job, and each school had a teacher mentor, held sharing sessions and organized learning partners (i.e., peer observation) for the teachers.

Four policies were also considered important in that they were implemented differently across the two schools:

- *Streaming* occurred at P1 in one school and at P2 in the other school.
- *Homework and stress* was mentioned as being a concern by some parents in one school, whereas it wasn't brought up in the focus group discussion with parents of the other school.

- *Formal examinations* were considered important by both schools. The teacher in one school placed considerable emphasis on assessments, giving students mock examinations and marking corrections in class. The teacher in the other school did a mock composition paper and discussed a sample oral paper with the students.
- *Alternative forms of assessment* was implemented in the classroom of one school and there were plans for teachers to conduct alternative assessment in the other school in the following year.

Class Policies. The physical environment of the classrooms were organized somewhat differently as a result of one school being a double session and the other being single session. In addition, the students in one class were of mixed ability, one had been diagnosed as ADHD and four were in the LSP. By contrast, students in the other class had been streamed at the end of P1 and were the top achievers within their level. Both teachers had taught the students since Primary One, and both taught most of the subjects to the students (i.e., English, Mathematics, Art and Social Studies) and one also taught Physical Education.

Eight themes emerged in relation to class policies in both classrooms:

- *The value of silence* was evident in both classrooms, although one teacher dealt with this through sternness whereas the other used rewards and gentle reminders.
- *Classroom procedures emphasized orderly behaviour* of students and smooth transitions between activities generally. One teacher in particular used techniques to communicate clear expectations and encourage student autonomy.
- *Movement through the classroom was restricted* in both classrooms. However, one teacher was more flexible about providing regular breaks (e.g., toilet, water, leaving the classroom).
- *Teacher autonomy in relation to curriculum content* was highly regarded by both teachers, and the Vice Principal from one school described the teachers as 'curriculum designers'.
- *Teaching of values and social skills to students* was evident in both classes, although one teacher was somewhat more explicit about what was appropriate and inappropriate. Parents in both schools found these values/skills to be very important.
- *Students as valued members of the class* was seen in one classroom through the displays of students' work and the students' choice of activities when their work had been completed. The other teacher also asked for the students' opinions and had them vote on the best groups' composed classroom pledge.
- *Student leadership* opportunities were provided in both classes through roles such as monitors or classroom technician.
- *Student enjoyment* was valued by both teachers and they planned activities to promote this, yet students from both classes said they would like more opportunities for relaxation and fun, particularly play time, both indoors and outdoors.

Three themes emerged, but with some differences in the way the two teachers applied them:

- *Allocation of time for specific subjects* varied across classes. One teacher placed a great emphasis on examinable subjects (sometimes omitting PE or Health Education to prepare students for exams). The other teacher (with a purported 'high ability

group' of students) had completed the syllabus already and thus had the liberty to carry out non-examinable subjects.

- *Students being released for recess* varied, with one class often being released late so that the teaching could be completed or students who had not completed their work could do so; this was not the case in the classroom with high ability students.
- *Group work and social interaction* is a policy emphasized in PERI. Implementation of group work was observed in many ways in one classroom and it received positive comments from students, parents and the Vice Principal. Group work was not very apparent in the other classroom, partly because of the strong emphasis on the preparation for exams.

Taken together these points highlight some degree of teacher autonomy in curricular implementation. However, they also suggest a strong prioritisation of academic subjects and examinations – in at least one class – over other types of learning and assessment, despite the recent PERI recommendations for emphasis on a more holistic education. They seem to be more in the mould of the 'efficiency-driven' education of the past (1979-1997) than the ability-driven or innovation and enterprise model of the present (see, e.g., Ng, 2004; Zulkifli, 2008).

Children's Group Draw-and-Tell Sessions

Fifty-one children were involved in the group drawing-and-telling. Some striking aspects of these drawings and the student comments were emphasis on physical settings, uses of time (e.g., time for formal study v. time for play), and integration of technology or ICT.

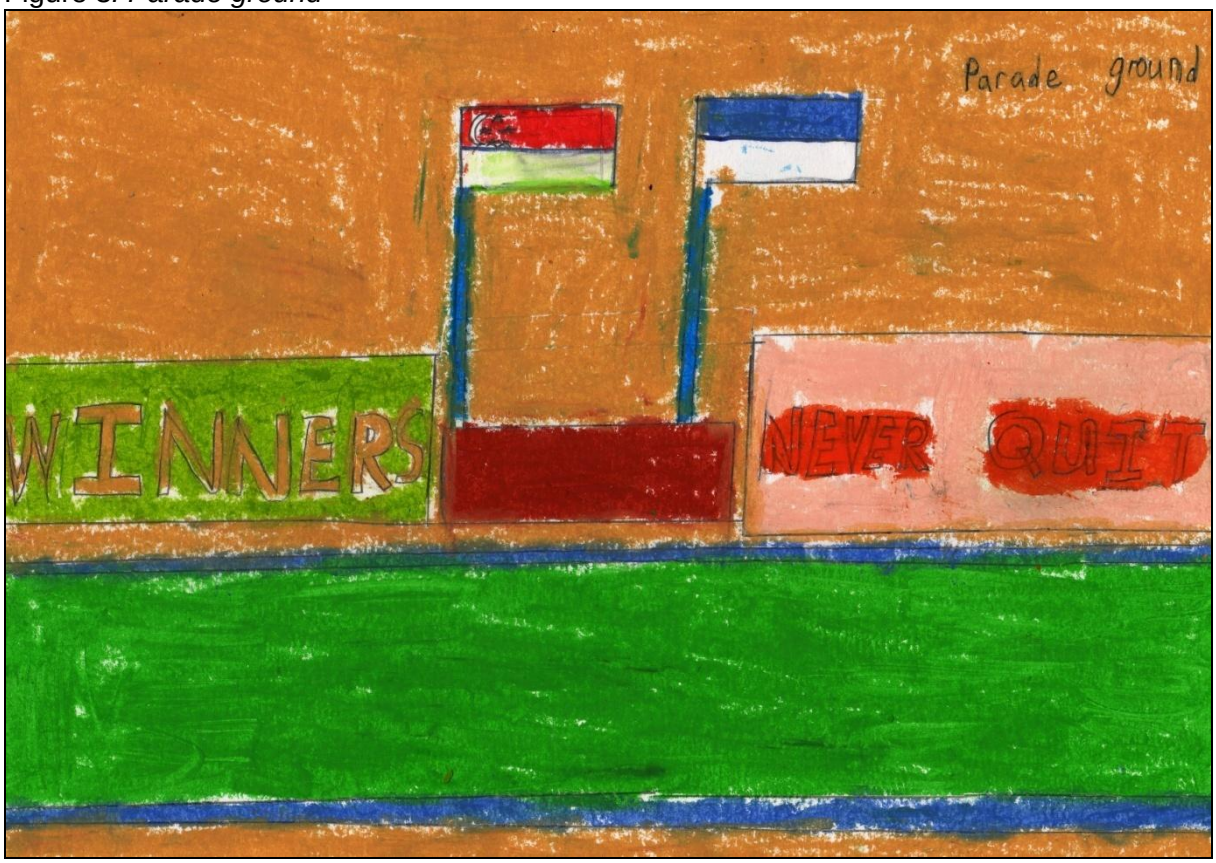
With reference to physical settings: some children imagined schools to be very big, with one child saying the classroom would have 1000 students, whereas other students wished for only 4 or 6 classrooms in the school and as low as 2 pupils per class. Eleven children mentioned that air-conditioning would be very important. Many children wished their school to have a lovely garden or surroundings, and fish ponds and were often drawn or described where the children would be able to watch the fish from a bridge in the eco-garden (Figure 2).

Many children desired more time and space for play, running and exercise and a range of sports. It is worth noting that these wishes are far from frivolous: Article 31 of the United Nations Convention on the Rights of the Child (1989) states that all children have the right to play. Many children wished for a swimming pool and one child hoped to have a lifeguard on duty so that students could swim anytime with the permission of the teacher-in-charge. One child wished that recess could be held in the classroom and that teachers would bring them their lunch; another wished that he could dance in his classroom and that there would be a spinning disco ball on the ceiling. One child wished that recess would last for 1.5 hours per day and the child who made the drawing below wished that the teachers would allow the students to play all day long for one week and alternate with one week of studying.

Finally, many children drew and/or talked about computers and other technology in the classroom. At minimum, they wished for at least one computer in every class and one child thought there should be a computer on every table for students to do their homework. Two children also seemed to imply an understanding of the important link between home learning and school learning – they wished that their parents could be in the classroom or be able to watch the students learn.

Figure 2. *Fish pond*

Figure 3. *Parade ground*

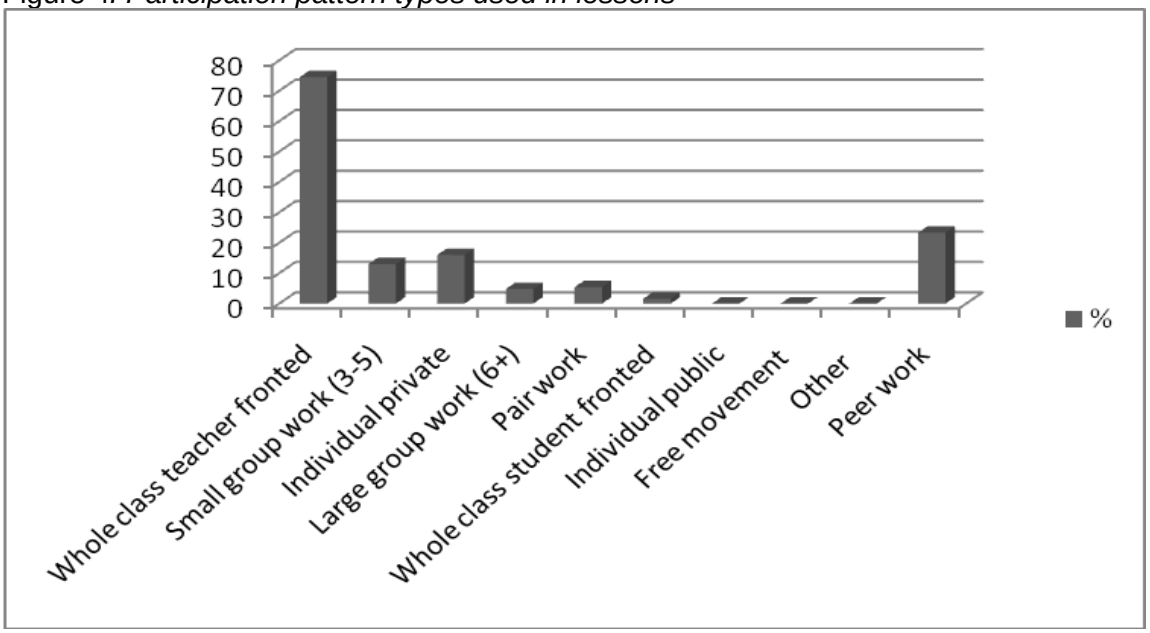


Findings Lesson Observation Component

A Singapore Pedagogy

The LOC included observations of lessons across all five core subjects in both P1 and P2. Across all observed lessons, we found more similarities than differences. First, in the coded individual lessons the dominant participation pattern (PP) across all subjects and grade levels was whole class teacher fronted (WCTF) – 74.5% of all PPs (Figure 4).The second most common PP was 'individual private' (i.e., seat work) at 16%, and the third most common was small group work (13%). Large group work and pair work were used much less frequently (4.8% and 5.4% of all PPs, respectively). If all peer work (large group, small group and pair) is taken together, these made up about 23% of the total PPs—still far behind the use of WCTF. Use of other types of PPs was negligible. When we consider *time spent* in the different PPs, rather than frequency, the picture changes only slightly. WCTF still dominated (3641 minutes out of 5051 total). However, small group work took up slightly more total time (524 minutes) than individual private (517 minutes).

Figure 4*. Participation pattern types used in lessons*



Second, physical settings in schools and physical arrangements in classrooms can be important for how they impact interaction Jordan & Henderson,(1995). This seems to be part of the rationale for flexible school design concepts as announced by the MOE in 2005 (MOE, 2005a). Although the proposal for flexible design concepts was for whole-school design, it seems that similar notions influenced classroom arrangements. For example, a number of schools redesigned their P1 and P2 classroom spaces as part of their efforts under SEED. The design of physical space was evident in the frequent use of cluster seating (students sitting at individual desks, clustered together) (66% of all PPs) and of 'floor seating' in which students sat together on the floor, usually at the front of the classroom (13% of all PPs, mostly evident in English language lessons). Sitting in single or double columns was relatively uncommon (9.7% and 4.8% of all PPs, respectively) in these lessons at lower primary.

The prevalence of cluster seating might suggest that students frequently worked together in peer groups. However, this was not the case. Most frequently, students sat in clusters but turned chairs and bodies to the front for WCTF interaction (note again the predominance of WCTF as shown in Figure 3). Floor seating allowed the students to be closer to the teacher and the materials presented; however, it was also associated most

frequently with WCTF interaction. Notably, learning centres or laboratory benches which might encourage 'hands on learning' and free movement of students around the room (e.g., to make use of materials in a classroom library or refer to class created materials posted on walls) were not observed in any of these lessons.

Third, in addition to the physical arrangement of seats, physical and social 'warmth' were also considered. These were coded based on the extent to which each was evident in a PP (almost always ↔ never). In this way, variations in physical/social warmth could be taken into account if there were shifts within a single lesson (e.g., if the teacher adapted the setting from one PP to the next). In reality, there was almost no variation across PPs within lessons. Specifically, physical warmth might be represented in features such as decorations on the walls, prominent display of student work, encouraging vs. discouraging signage, arrangement of space to allow access to the teacher and other individuals, etc. Physical warmth was 'almost always' evident in only 31.4% PPs, but 'sometimes' evident in 42.9% of PPs. Only a small percentage of PPs seemed to be 'almost always cold, sterile' (6.4%). On the other hand, the extent to which the environment encouraged or discouraged interaction in the classroom ('social warmth') was almost evenly split, with interaction being facilitated in 52.3% of PPs and discouraged to some degree in 47.8% of the PPs (Table 4).

Table 4. *Degree of social warmth*

	%
Environment almost always facilitates and encourages interaction	18.5
Environment sometimes facilitates and encourages interaction	33.8
Environment sometimes discourages interaction or makes interaction difficult	29.8
Environment always discourages interaction or makes interaction difficult	18
Total	100

Fourth, in terms of classroom management, there was limited evidence of teachers using either rewards-based or punishment-based management strategies. Teachers consistently used rewards-based strategies in only 8.3% of observed PPs and consistently used punishment-based strategies in only .5% of the PPs. In contrast, rewards-based strategies were 'almost never' visible in 42.9% of PPs and punishment-based strategies were evident 'almost never' in 71.8% of the PPs. If teachers were not using rewards or punishment, how were lessons managed? The predominance of WCTF interaction, with students facing front and 'eyes on the teacher', seemed to be the predominant strategy for managing students and keeping the lesson moving forward. Subsequent conversations with a subset of HODs and teachers from participating schools supported this hypothesis – all agreed that WCTF is used consistently as a way of managing student behaviour and keeping students on task.[5] It is true that very little disciplinary action was seen or was needed in the observed lessons. However, student compliance does not necessarily mean student engagement.

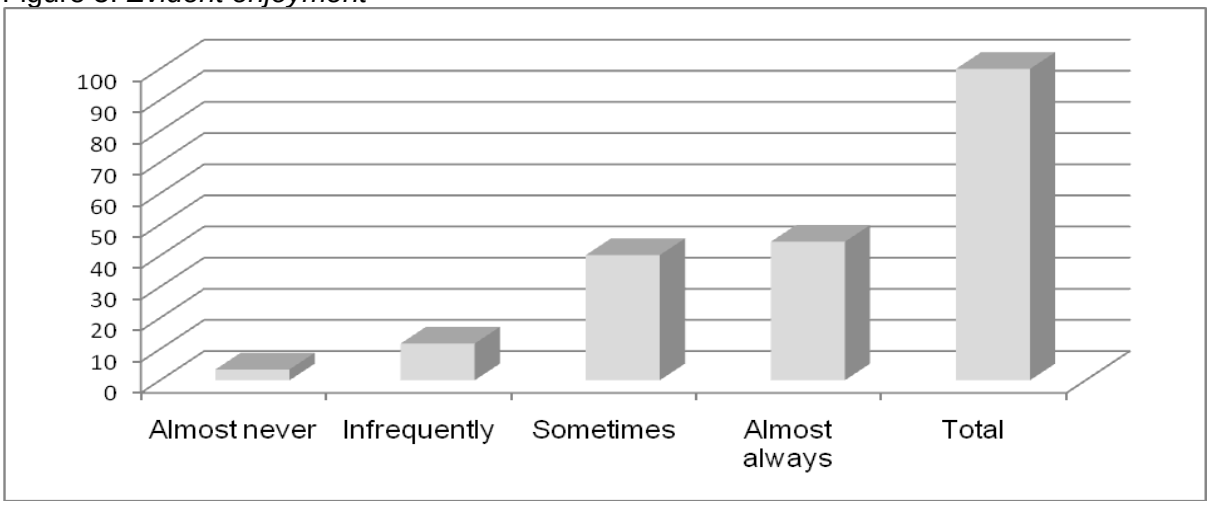
Fifth, student engagement has been a focus of recent curriculum innovations in Singapore including SEED, SAIL, and PERI. SEED, for example "…is a school-based initiative that comes up with strategies to better engage pupils in the early primary years. It helps our primary schools better enhance their foundation-year teaching programmes, pedagogy and assessment approaches" (MOE, 2005a). While student engagement seems to be a positive feature in education, it can be difficult to gauge. Skinner and Belamont point out it includes both behavioural and emotional components (1993, p.572). They suggest that ongoing participation and signs of affirmative emotion indicate engagement. Based on our observational data, most students participated in the assigned activity (i.e., were on task) most of the time (Table 5). Often, however, this merely involved listening to the teacher, especially during WCTF activities. Bloome and Aergumendo (1983) refer to this sort of compliance as 'procedural display' while Nystrand and Gamoran refer to this as 'procedural

engagement' because students are engaged in "the motions of schooling" (1991, p.262). In the observed lessons, during 44.5% of the PPs students 'almost always' showed enjoyment (e.g., smiling, laughing), during 40.2% of the PPs students 'sometimes' showed enjoyment (Figure 5). Though students were more likely to show enjoyment than not, the results are somewhat disappointing given the emphasis on greater student engagement in recent policy initiatives and the low threshold of the measure—a simple smile constituted 'enjoyment'.

Table 5. *Student participation*

	%
0% - 25% of students on task	0.5
26% - 50% of students on task	2.4
51% - 75% of students on task	26.3
76% - 100% of students on task	70.8
Total	100

Figure 5. *Evident enjoyment*



Sixth, looking beyond surface behaviours for enjoyment, recent initiatives from MOE suggest that teachers and students need a mindset that is open to innovation and enterprise, that they need to actively engaged in risk-taking, independent learning, and problem-solving. To what extent did we see evidence of these attributes in our observations? Unfortunately, very little.

Across all PPs, teachers rarely encouraged independent learning, collaboration or problem solving (Table 6). Risk-taking was discouraged in 44.5% of all PPs and 'sometimes' encouraged in only 40.2% (Table 7).

Table 6. *Encouraging a mindset of innovation and enterprise*

Encourage …	**Independent Learning**	**Collaboration**	**Problem Solving**
Almost never	50.1	61.9	91.7
A little	29.8	12.6	6.2
Sometimes	14.7	11.5	1.9
Almost always	5.4	13.9	0.3
Total	100	100	100

Table 7. *Encourage risk taking*

	%
Teacher always discourages risk taking; children are fearful of risk taking	17.7
Teacher sometimes discourages risk taking; children are fearful of risk taking	26.8
Teacher sometimes encourages risk taking	40.2
Teacher almost always encourages risk taking	15.3
Total	100

The picture that emerges is one of tightly-structured, teacher-focussed lessons with little opportunity for open-ended teacher-student or peer interaction, independent learning or student autonomy. This was true across all subjects and both grade levels. Similar results were found in the CRPP Core 1 research project (Hogan, 2009) which investigated classroom pedagogy at P5 and Sec 3 in the years 2004 and 2005. This suggests a persistently authoritarian and transmission-oriented pedagogy. This characteristic of pedagogy is further supported by the findings on common activity types, use of tools and materials within those activities, the way authoritative knowledge was conceived and conveyed, and the types of student-produced work.

Nystrand and Gamoran (1990) suggest that activity types can encourage students engagement. For example, classroom "Discussion" which is more open-ended, without pre-specified answers, and tasks which encourage information sharing tend to be engaging (Nystrand & Gamoran, 1990). In our view, types of activities or tasks used in a lesson can serve as indicators of types of interaction and of student participation, though not directly of student engagement. Therefore, lesson activities were coded for type, frequency, and time. The three most frequent activity types were "Classroom Management," "Instructions" and "Drill & Practice" – all teacher-led activities (Table 8). In terms of class time, "Drill & Practice" was used for the greatest amount of time, followed by "Classroom Management" and "Joint Work." In "Joint Work," "teacher and students work together, usually in turns with the teacher demonstrating something out loud and then the students (or an individual student) demonstrating/modelling/ practicing. For example, students taking turns to demonstrate how to solve a math problem on the board while other students look on and comment; 'book sharing' lessons when first the teacher and then one student after another take turns to read out a page" (Silver, et al., 2011b, p. 15). Although "Joint Work" involved students and teacher working together, it was dominated by the teacher. Typically, these were not activities which encouraged exploration of options and ideas; instead, they consistently focused on finding the (one) correct answer. Overall then, the findings on types of activities gave additional evidence of lessons which were tightly structured and teacher-dominated, rather than highly interactive and student-centred.

Tools and materials used by teachers and students during lessons show some adaptation for ICT and away from straight textbook teaching. Teachers regularly used projectors with PowerPoint slide shows or internet links, for example, and both teachers and students used 'other' materials more often than textbooks or worksheets. 'Other' materials included subject specific software (especially in Mother Tongue classes to deal with difference in writing systems); oversized sheet of paper ('mah-jong Paper') for making posters, graphs, etc.; songs; word and picture cards; materials for more drama-oriented teaching (face masks, animal character puppets); or a combination of these types of materials with worksheets. However, data on these categories is somewhat mixed in terms of demonstrating curriculum innovation. The dominant teacher and student tool was 'nil' and the dominant teacher material was also 'nil'. This indicates that teachers led most activities by talking. This is not surprising when we remember that the dominant activities were classroom management and giving instructions. However, even if we rule out these

activities, the lack of any tools or materials other than teacher talk dominated (Tables 9, 10 and 11). In addition, although a variety of student materials was used, the dominant materials within the list of 'others' were word and picture cards employed for "Drill & Practice" activities, a combination of PowerPoint slides with some sort of manipulative or object (e.g., instructions on the PowerPoint slide and paper to use for writing), or a combination of a PowerPoint slides and a worksheet (with instructions or a stimulus given on the slides).

Table 8. *Activity type by frequency*

	No.	**%**
Classroom management	312	27.3
Instructions	160	14.0
Drill & practice	105	9.2
T exposition	94	8.2
Joint work (teacher and students)	87	7.6
T questioning	82	7.2
Other	73	6.4
Reporting	43	3.8
T correction/answer checking	40	3.5
Choral Reading/Recitation	39	3.4
Decision-making	27	2.4
Writing	16	1.4
Game	14	1.2
Role play/Drama	12	1.1
Brainstorming	10	.9
Peer editing/correction	10	.9
Sharing/Telling	7	.6
T led elicitation and discussion	3	.3
Reading Silent	3	.3
Information-gap task	3	.3
Free-choice	1	.1
Assessment	1	.1
Admin matters	0	0
Discovery or inquiry-based	0	0
Opinion/debate	0	0
Total	1142	100.0

Table 9. *Dominant tools used by teachers*

	No.	**%**
Nil	308	46%
Projector	127	19%
Other	123	18%
OHT/Visualiser	51	8%
Whiteboard	61	9%
Learning centre	0	0%
Total	670	

Table 10. *Dominant materials used by teachers*

	No.	**%**
Nil	246	37%
Other	113	17%
PowerPoint/Internet	101	15%
Textbook/Activity book/Workbook	81	12%
Class produced materials	86	13%
Manipulatives	31	5%
Worksheet	11	2%
Artwork	1	0%
Total	670	

Table 11. *Dominant tools used by students*

	No.	**%**
Nil	597	89%
Other	38	6%
Whiteboard	20	3%
OHT/Visualiser	10	1%
Projector	5	1%
Learning centre	0	0%
Total	670	

The Ministry of Education's ICT Masterplan 2 was intended to encourage effective and pervasive use of ICT. Certainly what we saw in these observations indicated that the Masterplan (1 and 2) has been successful in providing infrastructure and encouraging pervasive use – projectors, PowerPoint and some other software had become part of the normal tools and materials for teaching. However, we also saw that these were generally surface level changes to pedagogy since the projected images were instructions or a stimulus for traditional paper activities, used in much the same way teachers have used whiteboards and chalkboards, overhead projectors and other displays in the past. These uses did not "customise education to meet the needs and abilities of our pupils" as envisioned in Masterplan 2 or TSLN (MOE, 2010). In particular there was no evidence of students as users of and creators with ICT. The dominant use of any classroom tool was by the teacher or was given from the teacher to students to use as directed.

Similarly, the teacher was the source of almost all knowledge introduced into the lessons. Notably, even though textbooks, worksheet, and internet were introduced in lessons, these were rarely referred to as viable sources for information and knowledge (Table 12). This is potentially problematic in a forward-looking pedagogy because showcasing the teacher as the source of authoritative knowledge does not encourage students to understand and use a variety of sources for independent learning. It maintains an education model which emphasises the teacher as the 'giver' of all knowledge. In addition, there was an almost complete lack of stated rationales for learning, be it learning of content or learning in particular ways. In only a few cases (1.8% of all activities), did teachers state a rationale for what was done. Other than those few cases, no rationales for activities, materials, topics or ways of learning were given.

In terms of student output and demonstrations of learning, we found that the dominant form of student produced work was short oral responses (39% of all work produced). This was true across activity type with the exclusion of "Classroom Management" and "Instructions" (in which students did not need to produce samples of work). Students also produced multiple choice responses or short written responses, multimodal texts, and

read aloud (10% each).There was limited use of cut and paste, drawing, physical displays and music, as well as some 'other' (unspecified) types of produced work (Table 13). Although these uses were limited, it is encouraging to see that some variety was integrated into some lessons. Less encouraging was the lack of on-going documentation of student learning during lessons. From our observations, documentation of student learning was done solely through teacher assessment of lesson products (e.g., marking of worksheet responses), with no involvement of students in assessment of their own learning and no documentation or discussion of the processes of learning. Finally, knowledge was represented as something to reproduce, rather than something to interpret or apply (Table 14).

Table 12. *Source of knowledge*

	No.	**%**
Teacher	1112	97.4
Student	22	1.9
Textbook	3	.3
Other	2	.2
Nil	1	.1
Internet	1	.1
Mass media	1	.1
Test/Exam	0	0
Data	0	0
Total	1142	100.0

Table 13. *Student produced work*

	No.	**%**
Nil	39	6%
Short Oral Response	258	39%
Written Multiple Choice/ Fill in the Blanks	69	10%
Multimodal Text	67	10%
Reading aloud	68	10%
Other	52	8%
Sustained Oral Response	33	5%
Written Short Answers	22	3%
Cut and paste	22	3%
Picture/drawing/painting	17	3%
Physical display	13	2%
Music	5	1%
Sustained Written Text	4	1%
Combination Written Text	1	0%
Total	670	100%

Table 14. *Representation of knowledge*

	Almost Never		**A little**		**Sometimes**		**Almost always**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Reproduction	175	26.1	81	12.1	98	14.6	316	47.2
Interpretation	565	84.3	86	12.8	13	1.9	6	0.9
Application	605	90.3	39	5.8	10	1.5	16	2.4

Simply put, students were to learn the content taught by the teacher, in the ways that teachers proposed, and this was true across all subjects and both grade levels. This allowed teachers to cover the specified content efficiently, to move ahead with lessons with minimal

disruption, and to maintain order in the classroom. The degree of similarity across subjects—despite different subject syllabi with different foci—speaks to a similarity of perspective on what it means to teach and learn, and suggests a common Singapore pedagogy which is difficult to shift substantially with top-down policy initiatives. However, there were several ways in which policy innovations clearly did influence classroom teaching, including use of tools and materials (ICT, textbooks), changes in physical environment, and, to some extent, teaching strategies. This topic is taken up in the final discussion.

Before moving on, it is worth noting some differences in classroom pedagogy across subjects. Briefly:

- Chinese and Malay tended to use more peer work than other subjects– both used peer work in almost 27% of all PPs whereas the other subjects used peer work in 20% of PPs or less. Also, individual seatwork was much less common in Chinese than in the other subjects (less than 1% of all PPs). This could be due to the greater emphasis on oral skills in the 2007 MT syllabi. Despite the greater use of peer work in these subjects, collaboration was rarely encouraged which is somewhat difficult to reconcile.
- Floor seating was particularly common in EL lessons. Similarly, EL lessons were much more likely to include choral reading/recitation (15% while all others were under 5%). Both findings were due to the frequency with which Big Book reading (part of each STELLAR unit) were included in the observations.
- Physical warmth was especially evident in EL lessons (63.6% of all PPs) and particularly low in Malay (5.1% of all PPs). This could be due to changes in EL rooms under SEED, changes which were more difficult to implement in Malay classrooms which were often shared with other subjects due to the smaller number of Malay classes.
- There was a substantial amount of “Drill & Practice” in Malay and Tamil (25% and 28% of all activities respectively) and much less in English and Chinese (both under 10% of all activities).
- Malay included very little “Joint Work” (6%) while all other subjects had more than 10% of all activities making use of “Joint Work” with Chinese the highest at 17%.
- Chinese was quite unique in terms of the frequent changes in PP types and activities with one activity flowing quickly into the next and movement between teacher-fronted, small-group, large-group participation patterns while following the same topic. This gave the Chinese lessons a more lively feel although they were still dominated by teacher-led activities overall.
- Student enjoyment was particularly evident in Chinese and Tamil (‘almost always evident’ in 56.1 and 57.6% of the PPs respectively).
- Chinese had a high emphasis on speaking skills while English had a high emphasis on reading skills, Malay on grammar and Tamil on vocabulary. There was also an emphasis on learning the Tamil alphabet in P1 as compared with Tamil P2 and ICT was often integrated with teaching the alphabet in those lessons. Similarly, ICT was often used for character learning in Chinese.
- All in all, Mother Tongue lessons made greater use of the projector and related media as compared either English or Maths, with Chinese at 20%, Malay at 16% and Tamil at 14% of all activities, including specialised software for these languages. These figures would be even higher with all ‘other tools and equipment’ included because of the tendency for MT lessons to make use of the projector along with flash cards/word cards/picture cards or worksheets. English and Math used the projector

and associated media in less than 10% of all activities. However, both English and Maths made more use of other tools and equipment overall including combinations of butcher paper (or mahjong paper) or worksheets with flashcards/word cards/picture cards, manipulatives, or class produced materials – but without accompanying projected images or instructions.

These differences across subject areas tend to reflect differences in the syllabi (for MTs and Maths) or specific curricula (e.g., STELLAR for EL at P1 and P2). The subject specific focus implicated some differences in activity and material types and meshed with implementation of other initiatives in complex ways. For example, although English electronic media is prevalent and easily available and though the ICT Masterplans encourage greater use of ICT in schools, the STELLAR curriculum emphasises the use of Big Books for teaching at lower primary –concrete artefacts that teachers and children can see, touch and work with. The use of Big Books also led to more floor seating, more whole-class teaching, and more choral reading in EL lessons. On the other hand, though electronic media is relatively less available in the MTs, due to the ICT Masterplans and the availability of materials via MOE's Edumall – provided partially because of low availability in the MTs – Chinese and Tamil teachers have rich resources they can call on. In addition, because of the need to teach the different writing systems, teachers frequently used "Drill & Practice" with ICT resources to help children begin to master writing in Chinese and Tamil.

Extended descriptions for each subject can be found in Abdullah (2010, 2011) for Malay; Curdt-Christiansen (2010; 2011) and Curdt-Christiansen and Silver (in press) for English; Lakshmi (2010; 2011) for Tamil; Yang (2010, 2011a, 2011b) for Chinese; and Yeo (2010; 2011), for Mathematics.

Summary of Findings

In looking at the results overall, including both CSC and LOC, we note several important trends in curriculum innovation and policy implementation. Firstly, national policies (MOE level policies) clearly influence classroom pedagogy. This is evident in, for example, the high degree of similarity for teaching methods and materials within each subject in the LOC (e.g., similarities in the teaching of Chinese or Maths across teachers and schools) and the types of infrastructure adaptation visible—or not—in classrooms (both CSC and LOC). It was particularly evident in reference to examinations and assessments. For example, one teacher explained her frequent use of "Drill & Practice" activities as being an important part of exam preparation:

> *Because all will go back, in the end all will go back to sitting there, to take exams without complaining. Uh, so this is our challenge, also students' challenge. Is it right? Because for me, for me, my exam and my lesson are exactly the same, is that right? So to sit here properly.*

Secondly, the influence of MOE policy is consistently mediated at the school policy level with designated school administrators taking on the role of policy actors/leaders. So, for example, the two CSC schools identified different staff members as most relevant for interviews on curriculum implementation and decision-making (HOD, form teacher, Vice Principal), but discussions with those administrators and teachers revealed similar patterns for policy implementation. In addition, teachers interviewed in the LOC referred to MOE polices which influenced their teaching (e.g., introduction of STELLAR in English language lessons, pressure of examinations, as above, and possible changes to the assessment system, greater use of ICT). These teachers also mentioned the mediating effect of school administrators, even in small details of classroom pedagogy. In one telling example, a teacher said:

So they, the principal, or the, MOE (Ministry of Education) doesn't want us to, sit in rows like this. Um. So we'll try our best to make them, move around. So one advantage of moving about is that they will like this very much. Then its disadvantage is, very noisy, bad classroom management. This is what I, have always been, exploring. (P1 teacher)

Although there was evidence that MOE policies were regularly mediated at the school policy level, there was little evidence of policy initiation or curriculum innovation at the class level. As noted above, both CSC schools felt it was important to let teachers adapt ways of presenting the curriculum (and this was also found in the LOC observations and teacher interviews), but this is not the same as initiating school-based curriculum development to address specific school goals or student needs. The perception of participating in a national, Singaporean educational system with a common curriculum and national assessments was evident in the many references to national policies and goals.

Class policies, on the other hand, were clearly teacher initiated. These most frequently had to do with classroom management and establishing teacher authority, selection of materials/resources and activity types, and coping with student engagement/ disengagement. The latter was mentioned frequently with links to classroom management, often in reference to students participating or being on task (e.g., *So this one I think basically they are doing their work lah*), but also with reference to student enthusiasm, enjoyment and produced work that was interesting or creative (e.g., "*And they were very enthusiastic in creating especially the end of the story you know.*" "*… but all these are like uh like unexpected things lah. They comes up. I didn't expect the children to be so observant and ask so many questions*").

DISCUSSION

The process of curriculum innovation through decentralisation involves the development, design, execution and evaluation of curriculum by the school community (most often teachers) and secondly, it is largely a collaborative effort (Bezzina, 1991). While there are some moves toward school-based curriculum development in Singapore primary schools, our investigation of P1 and P2 teaching in 12 schools in one administrative zone showed strong centralising forces. With reference to our first research question, the devolution of authority to schools (see pp.1-2), we find that authority for innovation tends to devolve to the school level but not to individual teachers. Although teachers might act as policy actors within their own classrooms, their efforts were generally targeted at small-scale adaptations which were intended to mesh with MOE policies. The school level acted as a strong filter for policy implementation as understood by those school administrators designated as key personnel for action or innovation, and this seemed to be consistent across academic subjects and schools. In general, teachers and school administrators expressed satisfaction with their understandings of policy implementation and their opportunities for innovation. This was particularly true when professional development was coupled with new initiatives (e.g., integration of ICT with new materials which matched the textbooks and workshops instructing teachers how to use the resources; training in the STELLAR curriculum coupled with school-based grade-level meetings to discuss the lessons, and opportunities for individual adaptations in the selection of specific activities). This would seem to support school-based professional development and a community of practice approach to curriculum innovation (e.g., Coburn & Stein, 2006).

With that in mind, two limitations of the current study are the observational foci and the time frame. Although the case study was able to track two teachers over teaching units larger than individual lessons or days, the one-week observations were still limited in terms of understanding the *processes* of policy implementation. In addition, though findings from

the case study component and the lesson observation component tended to support each other (and, in our view, validated the methodologies used), neither was able to investigate other aspects of curriculum development such as the planning of units of work, on-going action research or 'professional learning community' endeavours, and other events in the school calendar (e.g., Sports Day, School Festivals, etc.) which make up part of the extended curriculum. This meant we were also limited in viewing ways in which collaboration was (or was not) enacted as part of implementation processes. A longitudinal study would be necessary to investigate these aspects of policy implementation and curriculum innovation.

With reference to the second research question, concerning the way that interactions enhance or constrain implementation processes (p. 2), we have already noted the importance of the different levels of policy enactment, the ways they interact, and the ways they play out in classrooms. Information on teacher beliefs about these implementational processes is somewhat limited since teachers tended to take the priority of MOE policies as a given – noting ways in which they could adapt to the policies but without comment on the way policies filtered down. However, we note again that teachers and school administrators were quite positive when policy implementation, curriculum innovation, and professional development were linked, especially when this included school-based professional development and 'white space' for collegial planning/discussion. A final interview excerpt highlights these key points.

Of course, teachers will be saying, ***well if this is from MOE, then it's, that's it, you know.*** *That should be it, you know.* ***But I, eventually they did see that yah****, the kids were finding it very easy…So, we kind of got, er****, got them to work on the resources****. [__]* ***Also, we didn't want to move away from the, er, kind of, er, testing mode, in the sense like MCQ and all. We felt it's important to introduce them to those elements.*** *But of course, not too much of it…Yah, and then, the drama bit, they, there was not much guidelines. So we put in those, er, structures for the lesson plans and all. How we can carry it out…****So, er, some, the guidelines that were given in the lesson plans were quite, er, general and sometimes a little, be honest, a little skimpy. So we beef it up, so that, whoever the teacher is, when they pick it up, they are able to use it.*** *Yah, so we looked at it, at it from that point. And then, er, it was initially tough but what was important that I felt that* ***our school has a structure,…, er, an hour blocked off during the teachers' free periods, and it's a common period where all the level teachers will come together. And that's where we have lesson sparring.*** *So let's say for example, a particular teacher is, er, has done this unit. We come together, we sit down and then we talk, okay this is how I'm going to run through, the less, she will run through the lesson plan with the teachers. And the teachers, like, hey, maybe this won't work. Er, my kids will struggle through this. Maybe you can bring down the level of difficulty. So they get, er, they actually get help from their peers as well.* ***So in that way, I think it also improves the teachers, er, teaching ability as well as pedagogy as well****.*

Note: bold face has been added to highlight key points; square brackets indicate that two sentences which repeated the same idea were deleted.

In lines 1-2, we see the emphasis on following MOE policies; however, this is filtered and moderated at the school level by the HODs and teacher mentors who pointed out that the materials were easy for students and encouraged adaptation (line 3). The teachers did make changes to materials though, notably, without questioning or critiquing the curriculum as a whole and, in particular, while keeping an eye on the relevance to the ever-important examinations. As changes were made, a goal was not only to make the materials more appropriate for students but also easy for teachers to use (lines 11-12) and, implicitly, to maintain conformity across classes. This was achieved through collegial sharing and collaboration – made possible by MOE policies on 'white space' which the school has

implemented by requiring teachers at the same grade level to meet and share (lines 13-16). This has resulted in on-going school-based professional development and teacher learning (lines 21-22).

Finally, it is worth returning to the information gleaned from the student drawing-and-telling sessions. Recent research has focused attention on the roles played by teachers and leaders in these processes: teachers in professional learning communities (DuFour & Eaker, 1998; Hord, 2004; McLaughlin & Talbert, 2001; Wells & Feun, 2007); teachers and their beliefs (Hargreaves & Goodson, 2006; Keys, 2007; Schraw & Olafson, 2002; Woolfolk-Hoy, et al., 2007); and leadership (Elmore, 2000; Marzano, et al., 2005; Riley & Louise, 2004). This study of policy implementation and curriculum innovation in Singapore P1 and P2 classes similarly emphasises these points. However, we have also taken note of student voices and beliefs. It is evident that children see schooling as being holistic: study *and* play; in classrooms *and* out; individually, with friends *and* with teachers. A few key points stand out: although students talked about playing and recess, they also talked about learning and classroom spaces. Students expect to learn at school; however, they wish they had more opportunity to engage in active and imaginative activities while learning. In addition, children care about their school environment in terms of comfort (the wish for air-conditioners), in terms of aesthetics ("lovely gardens," classroom decorations, and a "disco ball"), and in terms of what the environment offers for learning: fish ponds and eco-gardens to investigate, computers to use in classrooms, variety in subjects taught ("Science, Geography and History in P1 so the children don't get bored"). They also care about methods, resources and modes of learning, wishing for "adventures in the classroom," "a spell room with displays of different words in Chinese, Malay, Tamil and English," "an invent room for students to invent new things," and "a white board so the teacher can explain things to the children and a telephone booth in case the teacher needs help." Finally they care about interactions that are both traditionally academic ("Teachers ask/write questions and children stand to speak," "It would be boring if there were no more exams or homework") and social (class with one student and her best friends, recess with food in the classroom brought by the teacher who joins them). These wishes capture rather neatly the synergies of the Cohen, et al., (2000) framework (see again Figure 1) which refers to interactions not as "a particular form of discourse but to the connected work of teachers and students on content, in environments" (p. 10).

CONCLUSION

In this project we have investigated teacher and student perspectives on classroom actions and policies while at the same time validating tools for this type of study in lower primary classes in Singapore (through the use of a combined case study/ pre-structured lesson observation methodology). Although we would not presume to build a model for effective curriculum implementation on this limited sample (limited in terms of time and number of schools/observations), we note the crucial importance of considering how policies 'travel' through implementational layers in the Singapore system and the perceived boundaries for innovation and adaptation. MOE policies travel relatively well through the system in that they are largely accepted by schools and classroom teachers; sometimes being seen as less flexible than intended. We have little evidence that teachers see themselves as policy actors in their own right, instead they tend to see themselves as a important part of a cohesive, national implementation strategy. School-level intervention has a more direct impact on teachers' views of what they can/cannot change in their classrooms, and school-level collaboration can act as an empowering force for teachers to adjust curriculum, at least through materials and activities selected for classroom use.

ACKNOWLEDGEMENTS

This paper makes use of data from the research project — Curriculum Implementation in Early Primary Schooling in Singapore (CIEPSS) (CRP 47/08 MS), funded by the Centre for Research in Pedagogy and Practice, National Institute of Education, Singapore. The views expressed in this paper are the authors and do not necessarily represent the views of the Centre or the Institute.

The team of CRPP researchers wishes to acknowledge the contributions of Madonna Stinson and Mary Dixon who conceptualised this project an drafted the initial grant proposals. The team would also like to acknowledge Peter Taylor for the training sessions on content analysis and focus group discussions. We appreciate the contribution to data collection and analysis from the following research assistants:

1. Cai Li
2. Wartik bte Hassan
3. Alamu Venkatachalam
4. Tan Ying Quan
5. Santhakumari d/o N. Krishnan

We also thank Aye Chan for assistance in compiling some of the statistical data.

Finally, the research team gratefully acknowledges the generosity of time and commitment from all of the study participants – students, teachers, parents and school administrators of the participating schools.

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NOTES

[1]Due to changes in project from inception to completion, the original objectives and some methods were revised. These changes are explained in the Final Progress Report. This written report focuses on the findings of the project and therefore presents only the final version of objectives and research questions.

[2]A list of policy initiatives is given in Appendix B along with key websites for those seeking further information.

[3]See http://app.sis.moe.gov.sg/schinfo/schoolclusters.asp for more information.

[4]According to Principals at these schools, students of any ethnicity can attend the school even if the relevant MT is not offered. However, the schools do recommend that parents seriously consider sending their children to schools that offer the MT most closely related to their ethnicity. If the relevant MT is not offered, the family will choose an MT for the student to pursue (e.g., if Tamil is not offered, a child of Indian ethnicity would take Chinese or Malay as Mother Tongue at the family's choosing).

[5]This was discussed at a symposium with a subset of school administrators and teachers held 19 March, 2011.

APPENDIX A

NAME OF MOE POLICY/INITIATIVE	WEBSITE URL
TLLM (Teach Less Learn More)	http://www3.moe.edu.sg/bluesky/tllm.htm
SEED (Strategies for Engaged and Effective Development)	http://moe.gov.sg/about/yearbooks/2005/enrichment/sowing_project_seed.html http://www3.moe.edu.sg/corporate/contactonline/2006/issue08/sub_BigPicture_Art02.htm
STELLAR (Strategies for English Language Learning and Reading programme)	http://www.stellarliteracy.sg/
More Responsive and Engaging Mother Tongue Language Curriculum (for Chinese, Malay, Tamil)	http://www.moe.gov.sg/education/primary/changes/#cl-curriculum http://www.moe.gov.sg/education/files/edu-booklet/edu-booklet-english.pdf (pgs13-14) http://www.moe.gov.sg/media/press/2006/pr20061115.htm (Chinese) http://www3.moe.edu.sg/corporate/contactonline/2005/Issue22/big_pic/bigpic.htm
SAIL (Strategies for Active and Independent Learning)	http://www.moe.gov.sg/media/press/2004/pr20040325.htm http://www.moe.gov.sg/media/speeches/2004/sp20040325.htm
PETALS (Use of Pedagogies, Experiences of Learning, Tone of Environment, Assessment for Learning, and Learning content)	http://www.moe.gov.sg/media/press/2008/01/more-support-for-schools-teach.php
PERI (Primary Education Review and Implementation)	http://www.moe.gov.sg/initiatives/peri/files/peri-report.pdf

APPENDIX B

Teacher interviews were conducted one-on-one. In School A, the initial interview was followed-up with second interview for the purpose of confirming the transcript of the first interview and also for both parties to clarify any doubts. In School B, the teacher and school administrators were interviewed only once due to time constraints. Teachers were asked to select a convenient time for the researchers to conduct the interviews. The same questions were asked for both teachers at School A and B:

Interview Questions for Teachers

1. What is the focus of curriculum change in this school?
2. How do you feel about the new initiatives that are being implemented?
3. Who decides what teaching strategies/content in your classroom?
4. Where do you find help in understanding and implementing new curriculum ideas?
5. Since .. (refer to question 1) has been started, can you talk about a lesson that you think worked well?
6. How do you know when the students are really engaged?
7. Can you talk about the ways in which you think children learn best?

Possible probing questions:
On Tuesday, you were doing .. Was that something you were encouraged to do?; Can you give me an example of that? What do you mean by ...?; Can you talk me through ...?;)
[Constant final question : Is there anything else you would like to tell me? Or is there a question you hoped I would ask?]

Further questions

1. What were some of your thoughts about .. before it was implemented? Have these views changed? If so, how? If not, why not?
2. How would you describe ...to somebody outside the school?
3. What changes have you noticed in your classroom since you began to work with ...?
4. Can you share times when you have received assistance from colleagues or elsewhere in helping you with this ...?
5. What are some of the strategies/approaches that you now use in relation to ...?
6. What are some of the positive student outcomes you have seen (anticipate) as a result of ...?
7. What techniques/tasks to help you identify and monitor student learning? (assessment)
8. Can you describe any challenges you have faced in implementing ...?
9. Have you got any concerns for the future of ...?
10. What support are you getting? What further support would you like?
11. Is this .. for every child?

These sessions were audio recorded and transcribed for analysis.

School administrator interviews

School administrators were also interviewed one-on-one. As with the teacher interviews, the school administrators were asked to select a convenient time for the researcher to carry out the interview. The list of interview questions for the Teacher Mentor at School A and the English HOD and Senior Teacher at School B are shown below:

Interview questions for HOD, Senior Teacher and Teacher Mentor

1. How to you feel about implementing new initiatives in your school?
2. What would you say is the 'push' or focus of curriculum/pedagogical change here?

3. Who/where do you expect to find help or guidance in implementing new initiatives?
4. How will you be monitoring the progress of the new initiatives?
5. How will you encourage and help your staff in implementing the initiatives?
6. What information and/or PD have you been able to provide to help staff understand the changes?
7. What processes are in place to listen to the teachers' suggestions for plans and practices in carrying out the initiatives ?
8. Is there a question or something you hoped I would ask you about and I didn't? What else would you like to share with me, or emphasize again, about your experiences in managing changes in your department?

The list of interview questions for the Vice-Principals of both schools differed slightly depending on what was already known about each school. Questions included:

Interview questions for Vice-Principals

1. What is the focus of curriculum (change?) in this school?
2. How would you describe the essence of this change?
3. How do you feel about implementing the new initiatives from _____?
4. Can you please talk about the procedures you have in place to build confidence in your staff in implementing the new initiatives?
5. Can you describe the processes for developing teaching plans and practices at this school?
6. Where do you get the guidelines for new initiatives?
7. Where can you find advice/information about PD for your staff in relation to _____?
8. What PD have you found to be very useful for your staff?
9. How will you know if an initiative has been successful/is worth pursuing?
10. Where would you like to see the changes heading from here?
11. What challenges can you identify for _____?
12. What strengths/weaknesses do you think _____ has?
13. How do you identify progress with regard to _____?
14. Who do you report [your concerns] to with regard to? Can you talk me through that process?
15. Is there a question or something you hoped I would ask you about and I didn't? What else would you like to share with me, or emphasize again, about the experiences in this school?

These sessions were audio recorded and transcribed for analysis.

APPENDIX C

The following questions were asked during the parent focus group discussion:

1. If you were in charge of education for Singapore (i.e., if you were the one shaping educational policy), what types of educational opportunities would you like to see more of for P1-P2 children? Why? What would you like to see less of? Why?
2. Have you heard or read about the new ideas the Ministry of Education has for P1 and P2? If yes, how do you feel about the new initiatives that are being implemented?
3. There are three policy changes MOE has recently proposed for early primary education – called PERI. I would be interested in your views on how you feel about each of these three initiatives:
4. single session schools (i.e., instead of a morning and an afternoon session in primary schools, only one group of children would attend that school per day);
5. formative assessment (i.e., this would involve more classroom-based assessment, such as children's portfolios of their learning, and less emphasis on high-stakes examinations);
6. a stronger emphasis on social-emotional aspects of education (i.e., in addition to academic subjects, there would be more time and space for subjects such as art, music and physical education within the week's curriculum).

APPENDIX D

The following script is used to establish the context of the drawing-telling sessions:

> *I would like you to use your imagination and make a drawing and to talk to me as you draw. Let me tell you a bit of a story first.*
> *There is a teacher I know who has the idea to build a new school near your house. She wants to ask children for advice on what would be good to have in a school and what things would be good to help children learn. She feels that you can help her make this new school because you are in Primary Two. What things can you draw and tell me about the school and Primary Two classes – what should they be like? She might be interested in the kinds of places/spaces that should be in the school and classroom, what the teachers should be like and what kinds of activities that the children should do to learn.*
> *Do you think that you could draw some ideas about some of these things? OK, good. You can take as much time as you like. And it would be good if you could talk to me as you draw so I can understand as much as I can.*