

Appendix - Singapore Pedagogy Coding Scheme 2

Introduction

The Singapore Pedagogy Coding Scheme 2 (SCS2) has been adapted and redeveloped based on the Singapore Pedagogy Coding Scheme for classroom knowledge discourse (Luke, Freebody, Cazden, & Lin, 2004; Luke, Cazden, Freebody, & Lin, 2004) through a series of discussions among the Core 2 project team lead by Professor David Hogan. The coding scheme has been tested, adjusted, and finalized collaboratively by the project team as part of data collection, coding and analysis.

SCS2 is primarily based on the teaching and school reform literature drawing on normative models from instructional psychology, cognitive theory and pedagogical research. The theoretically framed coding scheme directs coder attention to teachers' pedagogical and instructional practices; the nature of intellectual development and knowledge work in Singapore classrooms; and the impact of various educational reforms on day-to-day classroom work and student learning. In general terms, SCS2 reliably captures the instructional order in classrooms: teacher goals and standards of understanding/performance; the design of assessment and instructional tasks, the social organization of lessons (the participation structure), the pattern of instructional activity, the use of classroom resources, the classroom learning environment, classroom management, and classroom talk. Above all, it focuses on the intellectual quality of the knowledge work reflected in teacher tasks and student work, as well as in classroom talk.

Extensive and specially designed, SCS2 facilitates coding of each lesson in 3-minute intervals, as well as larger events such as language activities or problem-solving activities. The decision to code every 3 minutes was made on a number of methodological and practical reasons: (a) There was a need to code the temporal development of intellectual work within lessons and across lessons; (b) Temporal analysis required breaking the lesson into smaller units for analysis. While statistically rich, initial attempts to code at a 1-minute interval proved to be too intensive. A 3 minute interval would provide 20 time points per average 60 minute lesson; (b) Given the detailed coding required per interval, coding at an interval longer than 5 minutes would reduce coding accuracy; a longer period of time would also incur cognitive burdens on coders.

Broadly, SCS2 is divided into the First, Second and Third Pass: the First and Second Pass caters to both English and Mathematics and the Third Pass is specific to the domains of English and Mathematics respectively (Table 1). Importantly, the coding of lessons from the First Pass to Third Pass signifies a move from clearly observable behaviours and social organisations of the classroom and students, towards more subjective, or inferential, practices of teachers and students. In other words, the passes are designed to facilitate coding from simple to complex patterns of classroom interactions and instructional practices.

Table 1: Singapore Coding Scheme 2: Overall Structure

	Focus	1. First and Second Pass: English and Mathematics	Third Pass:	
			2. English	3. Mathematics
First Pass	Lesson Topics/Objectives, Instructional Activities, Resources, Text Production	Scales 1 to 9	-	-
Second Pass	Prior Knowledge, Classroom Interactions, Monitoring, Feedback, Learning Support, Student Agency	Scales 10 to 17	-	-
Third Pass	Learning Activities, Epistemic Focus, Epistemic Talk, Domain-Specific Knowledge and Practices, Cognitive Activities, Performance Standards, Representations, Epistemic Pluralism/Orientations	-	Scales 18 to 30	Scales 18 to 30

Table 2: Singapore Coding Scheme 2: Scale Descriptions

First Pass: Framing the Lesson		
Scale	Focus	Description
1	Standard Information (9 variables)	Describes the lesson in terms of the school, teacher and lesson characteristics.
2	Lesson Topics/Objectives/ Recapitulation (36 variables)	Describes whether the teacher explicitly states the lesson topic, learning objective/s and the rationale for the same as well as the mode of articulation.
3	Instructional Activities (IA) (36 variables)	Describes the common instructional activities in the classroom such as the teacher's exposition, IRE sequences, students' presentations and demonstrations of understanding, pair/group work, drill and practice etc.
4 & 5	Resources/Tools (31 variables)	Focuses on the materials/tools used by the teacher and the student/s respectively. To assist in teaching and learning, classroom participants may use printed texts and worksheets, specific instructional and assessment materials, digital devices and a variety of media in addition to traditional materials such as the whiteboard, mathematical apparatus and student-produced work.
6	Teacher Communication (6 variables)	Describes teacher talk to individual students, and in group, or whole class contexts. Teacher communication may vary from the dominant curriculum talk focused on content and skills to talk of an organisational, or regulatory nature with occasional downtime and digressions (non-curriculum talk).
7	Activity Type (9 variables)	Describes the type of activities done in class, outside the classroom; or undertaken based on instruction/s given by the teacher. These include classwork, homework, tests and assessments that constitute key indicators of the social organization of the classroom.
8	Activity Scope (3 variables)	Describes the scope of an activity – whether an activity requires the use of a single subject or multiple subjects to perform, understand or enact it; or whether it incorporates meaningful integration across subject domains.
9	Text Production (41 variables)	Describes the various modes in which students produce text in the classroom. Other than the predominant oral and written text which varies in terms of length, students communicate meanings through pictorial, graphical or musical representations as well as via role play, acting and gestures. Additionally, the scale captures multi-modal representations.

Second Pass: Framing Instructional Activities		
10	Checking Background Knowledge (3 variables)	Describes whether the teacher checks for prior knowledge i.e. the knowledge students already possess through their past experiences. It is always teacher-initiated and may serve to activate students' underlying cognitive schema or simply help to check what students already "know".
11	Whole Class Discussion Interactions (7 variables)	Describes the social organization of classroom talk in whole class discussions. It includes explicit teacher instruction of social norms/protocols as well as instructions in "strategic questioning" and "understanding or exploratory talk" in whole class contexts. The focus is also on the social relations of talk or the implicit norms that regulate the formal social features of classroom talk such as positioning of discursive authority, wait time, inclusivity, and reciprocity.
12	Small Group Work (11 variables)	Describes the social organization of small group talk. It details teacher management of group work, and also captures the normative structure of student talk, in groups by revealing the presence (or absence) of a supportive environment, shared decision-making, informal support, inclusivity, and reciprocity.
13	Monitoring (4 variables)	Describes ways in which teachers monitor student learning (at the individual, group or class level) to provide feedback or ideally, to adjust teaching strategies. While supervisory monitoring is essentially about compliance with given instructions, the purpose of formative monitoring is to ascertain the level of student understanding or skill in a learning task.
14	Feedback (8 variables)	Describes the type and audience of feedback in the classroom. Feedback includes evaluative comments/remarks, detailed corrective responses and ideally, formative feedback which meaningfully informs students <i>and</i> teachers.
15	Learning Support (6 variables)	Describes the nature of 'scaffolding' by the teacher. The teacher's resource, idea, suggestion, or proposition may be planned and fixed, or may be given on a contextual and flexible basis. To assist learners in the successful completion of a task or activity, teachers may render procedural, strategic, or logistical learning support.
16	Locus of Epistemic Authority (9 variables)	Describes the locus of epistemic authority in the classroom which is generally the teacher in the Singapore classroom. Occasionally, the teacher may appeal to evidence or domain-specific knowledge, or may privilege other sources such as students' opinions and judgments. Epistemic authority may also shift to artefactual sources such as the textbook or other digital tools.
17	Student Agency/Co-regulation (9 variables)	Describes student agency which is important for developing metacognitive self regulation as well as facilitating the classroom as a co-regulated learning community. The extent to which teachers allow students to exercise autonomy over their learning conditions may be evident in the opportunities students have to formulate learning goals, choose lesson topics, and design instructional activities
Third Pass: General + Mathematics-specific/English-specific Codes		
18	Learning Activities (24 variables)	Describes the specific <i>learning activities</i> that students are instructed by the teacher to engage in over the course of the lesson. These include listening to the teacher's exposition, participating in IRE sequences, doing individual seatwork or pair/group work, reading and presenting, self and peer assessment etc.
19	Epistemic Focus (9 variables)	Describes the generic focus of the knowledge work in the classroom. By assigning various activities/tasks, teachers ask students to engage in different levels and forms of knowledge primarily - factual, procedural and conceptual. The knowledge focus may be epistemic, rhetorical, hermeneutical, or and perhaps, to a lesser extent, moral, civic and aesthetic knowledge may be evident. Note: Hermeneutical knowledge and Moral/Civic knowledge are not applicable in Mathematics.
20a	Mathematics-specific Knowledge (39 variables)	Describes domain-specific knowledge i.e. content-specific knowledge (e.g. Algebra, Geometry) as well as aspects of meaning making and conceptual depth including making sense of mathematical ideas through exploration, application and making conceptual connections across ideas. Also includes Mathematics-specific skills (e.g. computation, measurement, estimation), metacognitive skills involving awareness and self-regulation of thought processes, a range of strategic skills for problem-solving, and process skills for acquiring and applying mathematical knowledge.
20b	English-specific Knowledge	Describes domain-specific knowledge and skills. Listening, reading, viewing, writing and representing activities as well as areas of grammar and vocabulary may be particularly indicative

	(28 variables)	of subject-specific attributes.
21a	Mathematics: Problem as Setup/ Problem as Implemented: Cognitive Activities (59 variables)	Describes the <i>cognitive activities</i> involved in the problem as set up by the teacher and as implemented by the students. Includes problem tracking as well as how the problems are related to each other; repetition, simple chain, procedural complex chain, or conceptual complex chain.
21b	English: Cognitive Demands (CD)/ Cognitive Processes (44 variables)	Describes the <i>cognitive demands</i> of the task as set up by the teacher and if possible, the nature of the <i>cognitive processes</i> involved in the implementation of the task by the students. Based on Anderson and Krathwohl (2001), cognitive work includes aspects of recall, application, practice, interpretation, evaluation, justification etc.
22a	Mathematics- specific Instructional Tasks (9 variables)	Describes the kind of instructional activities teachers set up such as remembering, routine procedural practice, repetition work, review and revision, understanding activities, comprehension/knowledge manipulation, procedural activities with connections, and <i>doing</i> Mathematics.
22b	English-specific Instructional Activities (40 variables)	Describes the nature of instructional tasks that teachers ask students to engage in with reference to task setup. These involve the type and nature of information provided, the degree of structure, the cognitive operations and the steps involved as well as the authenticity of the language activity.
23	Mathematics- specific Disciplinary Practices (6 variables)	Describes domain-specific disciplinary work involving knowledge representation, knowledge generation, knowledge deliberation, knowledge validation/justification, and knowledge communication (presentation/syntax).
23	English-specific Disciplinary Practices (10 variables)	Describes domain-specific disciplinary practices such as coding/decoding, comprehension, interpretation and creative writing. Knowledge work in English also includes description, explanation, conveying, expression and persuasion.
24	Performance Standards (3 variables)	Describes the performance standards and exemplars used in class. The level and detail in communicating performance standards and examples of successful (or unsuccessful) performance help students to: 1) gauge what they need to do to achieve the standards, 2) assess their own learning, and 3) determine what they require for future work.
25a	Mathematics: Knowledge Representations (40 variables)	Describes modes of representation such as concrete, textual, numerical, pictorial, schematic, graphical and symbolic modes constructed by teacher/students or derived from conventional sources to organize and/or record mathematical Ideas and relationships, make/recognize connections among related mathematical concepts, model (realistic) problem situations, generalise mathematical ideas/concepts, visualise/measure space, or manipulate mathematical ideas/objects. Includes opportunities for students to select, create or apply representations or make connections for problem solving. Also includes orchestration (problem level) by teacher and/or students and representation tracking.
25b	English: Knowledge Representations (18 variables)	Describes conventional modes of knowledge representation or modes constructed by teachers and students to convey meanings such as realistic, symbolic, iconic, indexical and analogic modes that may interact in mutually reinforcing ways to perform a variety of functions: decorate, caption, duplicate and extend. Again, representations may be conventional or constructed by the teacher and/or student/s and may vary in their orchestration i.e. degree of aptness for particular purposes.
26	Structure of Classroom Interactions (20 variables)	Describes discursive agency – teacher talk and student talk in whole class, individual or group contexts. Besides the teacher’s exposition, the scale provides an indication of teacher/student questions (open, closed), teacher/student responses (short, medium, extended) as well as comments and exchanges initiated by classroom participants.
27	Epistemic and	Describes the nature of classroom talk. Whole class interactions may be in the form of the

	Non-Epistemic Focus of Classroom Talk & Social Organisation of Talk (33 variables)	teacher's lecture, IRE sequences, exploratory talk, or may involve varying combinations of the same. Epistemic or knowledge talk may be of a factual or procedural nature or may incorporate clarifying, making connections and doing explanatory work. Occasionally, classroom talk may revolve around epistemic justification and epistemic virtues. The scale encompasses reflexive talk as well as performative or assessment-oriented talk. Non-epistemic talk in the classroom chiefly relates to lesson/assessment organisation, task/topic management, homework and broader curriculum issues. Non-epistemic talk may also revolve around classroom norms or disciplinary issues as well as talk about virtues in general.
28	Epistemic Pluralism and Orientation (7 variables)	Describes the degree of epistemic pluralism in the Singapore classroom – whether knowledge is perceived as Truth or whether it can be contested. The scale explores whether epistemic agents (teacher/students) contest and subsequently, support or justify knowledge claims; compare and contrast information; engage in knowledge critique, or in collective deliberation.
Lesson- and Unit-Level Codes		
29	Lesson-Level Codes (17 variables)	Describes emergent properties of lessons not necessarily apparent at the phase level. The overall purposefulness of the lesson in terms of visible teaching and learning as well as the lesson progression and the structure of activities in view of the learning goals become evident at the lesson level. Lesson codes indicate the classroom climate (Mastery/Competitive Achievement Norms), instructional flexibility, the intellectual quality of knowledge work and the overall characteristics of dialogical spells, if any.
30	Unit-Level Codes (11 variables)	Describes emergent pedagogical properties of units that may not be obvious at the phase or lesson level. The scale reveals the purposefulness of the unit: thoughtful planning, appropriate sequencing of lessons, recapitulation and review of learning goals, as well as handover of content/skills to students. At the unit level, the activity sequence and structure, the teacher's pedagogical agility, the nature of assessment as well as the extent of knowledge transmission and knowledge building practices become evident.

References

- Luke, A., Freebody, P., Cazden, C. & Lin, A. (2004). Singapore Pedagogy Coding Scheme. Technical Report. Singapore: Centre for Research in Pedagogy and Practice.
- Luke, A., Cazden, C., Lin, A. & Freebody, P. (2004). The Singapore classroom coding system. Technical Report. Singapore: Centre for Research in Pedagogy and Practice.