

# Finding Culture in the Classroom: Lessons from Mathematics Classrooms in Melbourne, Hong Kong, San Diego, Tokyo and Shanghai

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## Abstract

The general message of the paper concerns the cultural nature of not just classroom practice but also classroom research and, inevitably, of the theories developed on the basis of that research. The accommodation, utilisation, and even the celebration of diversity is offered as a constructive alternative to research and policy predicated on the minimisation of diversity. It is argued that the distinction commonly drawn between teaching and learning as classroom activities denies the conjoint nature of their construction in practice. This argument is advanced through the identification of “lesson events” as a unit of comparative analysis and as representing evidence for the co-constructed nature of classroom practice on the basis of results from the 14-country Learner’s Perspective Study, and in particular by the analysis of classroom data from Melbourne, Hong Kong, San Diego, Tokyo, and Shanghai.

**Keywords:** Mathematics Education, Classroom Research, Culture, Cross-Cultural Research, International Comparative Research

## Section One: The Cultural Basis of Theory

### The Narratives of Nationhood

In December of 2000, the student achievement findings for Population 2 (Middle School) of the Third International Mathematics and Science Study (TIMSS) were released internationally. Newspapers around the world gave prominence to the report. Two years later, the results of the Programme for International Student Assessment (PISA) generated the same degree of international media interest, and national self-congratulations and recriminations. The political status of mathematics seems evident: as a discipline, as a body of knowledge, as a school subject, and as a measure of the success of a nation’s school system. The results of such studies contribute to what might be called *the narratives of nationhood* (Clarke, 2003a). For the United States, the prevailing narrative is one of a school system that continues to fail its constituents, while Singapore celebrates a continued tale of success. Rather than giving prominence to league tables of international student achievement, attention could focus more usefully upon the documentation of “good practice” in the various participating countries. But this would involve changing the dominant themes of the US national narrative from heroic/tragic comparisons of US and THEM to a more introspective tale of sharing within the family.

In contrast to the globalisation of mathematics education implicit in international testing programs such as TIMSS and PISA, it is possible to conceive of internationalist research that seeks to understand and learn from difference, rather than minimise its occurrence. No-one would question the legitimacy of distinguishing European and Asian art; in fact, the differences between the traditions and techniques of European and Asian art are both studied and celebrated. When the Belgian architect, Victor Horta, “learned from the Japanese to discard symmetry” (Gombrich, 1995, p. 536), he was drawing on the traditions and methods of Asian art to challenge and inform the Western tradition. One theme explored in this lecture is the possibility that perhaps we might learn to celebrate the differences (as well as the similarities) in mathematics education internationally and to learn from them. The resultant narratives might be less insular than the narratives currently derived from local political priorities and promulgated through the popular media. The construction of such narratives by the international research community requires a new sensitivity to the cultural groundedness of educational theory and the research from which such theory is developed, and a willingness to celebrate rather than minimise diversity.

## Reconceiving Classroom Practice

Recent re-readings of Vygotsky (1978 and others) have focused on his use of the term “obuchenie” to simultaneously signify both teaching and learning (Clarke, 2001). Speakers of Russian are not alone in their use of a term that combines both teaching and learning. The Japanese term “tagushushido” has the same inclusive duality. In Dutch there is one term that means both learning and teaching: “leren”. To distinguish between the practices of teaching and learning, the Dutch say “leren van” to signify “learning” and “leren aan” to signify “teaching”. A teacher is a “leraar” and a student is a “leerling”. In French, the term “didactique”, and particularly Brousseau’s use of that term (Brousseau, 1996), invokes a mutuality of responsibility and participation not always found in American or Australian interpretations of classroom practice.

The major thesis being developed in this section of the paper is that our theories are inevitably reflective of the language available to us for their articulation and that profound differences in terminology are reflective of corresponding differences in practice. These differences are culturally constituted in the most profound sense.

## Section Two: Methodology - Antecedents and Entailments

Our difficulties in characterizing social interactions for the purpose of theory building are compounded by the fluid and transient nature of the phenomena we seek to describe. Attempts to categorise social behaviour run the risk of sacrificing the dynamism, contextual-dependence and variation that constitute their essential attributes. This poses a challenge both for methodology and for theory. The ephemeral nature of social interactions is something that must be honoured in the methodology but transcended in the analysis.

### The Methodological Challenges of Classroom Research

It is imperative that educational research makes optimal use of available technology. International comparative classroom research, in particular, poses methodological and technical challenges that are only now being adequately addressed through advances in:

- techniques and equipment for the collection of audio-visual data in classrooms;
- tools for the compression, editing and storage of digitised video and other data;
- storage facilities that support networked access to large complex databases; and
- analytical tools capable of supporting sophisticated analyses of such complex databases.

Recent classroom research (Alton-Lee et al, 1993; Clarke, 2001; Sahlström, 1999; Sahlström & Lindblad, 1998), backed by more sophisticated ways of collecting and analysing data, has shown that some of the findings of the classroom research classics such as Bellack et al (1966), Sinclair and Coulthard (1975) and Mehan (1979) are seriously skewed because of technological issues in data collection. In particular, this has concerned the ability to simultaneously record both student and teacher interaction, and to adequately match the complexity of the resultant data with suitably sophisticated analytical tools.

Clarke (1998) has argued that since a classroom takes on different aspect according to how you are positioned within it or in relation to it, our research methodology must be sufficiently sophisticated to accommodate and represent the multiple perspectives of the many participants in complex social settings such as classrooms. Only by seeing classroom situations from the perspectives of all participants can we come to an understanding of the motivations and meanings that underlie their participation. Lindblad and Sahlström (1999, 2002) argue that if the early researchers had access to the same tools for data collection and analysis as are available today, the general view of classroom interaction would be quite different.

The most striking of these differences, and a very important one from an education point of view, concerns the role of students in classrooms. Single-camera and single-microphone approaches, with a focus on the teacher, embody a view of the passive, silent student at odds with contemporary learning theory and classroom experience. Research done with technologically more sophisticated approaches has described a quite different classroom, where different students are active in different ways, contributing significantly to their own learning (cf. Sahlström & Lindblad, 1998; Clarke, 2001).

Further, classroom researchers have until recently had limited opportunities for engaging in manageable comparative research, where materials from different countries and different periods of time can be accessed and analysed in feasible ways. At the International Centre for Classroom Research at the

University of Melbourne (<http://www.edfac.unimelb.edu.au/DSME/ICCR/>), contemporary technology makes it possible to carry out comparative analyses of an extensive database that includes three-camera classroom video records of lesson sequences, supplemented by post-lesson video-stimulated interviews with students and teachers, scanned samples of written work, and test and questionnaire data, drawn from mathematics classrooms as geographically distant as Sweden and Australia and as culturally distant as Germany and China.

### **The Learner's Perspective Study: Utilising Complementary Accounts**

Data collection in the Learner's Perspective Study involved a three-camera approach (Teacher camera, Student camera, Whole Class camera) that included the onsite mixing of the Teacher and Student camera images into a split-screen video record that was then used to stimulate participant reconstructive accounts of classroom events. So far, these data have been collected for sequences of at least ten consecutive lessons occurring in the "well-taught" eighth grade mathematics classrooms of teachers in twelve of the participating countries (Australia, China (Hong Kong, Macau, and Shanghai), the Czech Republic, Germany, Hong Kong and mainland China, Israel, Japan, Korea, The Philippines, Singapore, South Africa, Sweden and the USA). This combination of countries gives good representation to European and Asian educational traditions, affluent and less affluent school systems, and mono-cultural and multi-cultural societies.

Each participating country used the same research design to collect videotaped classroom data for at least ten consecutive math lessons and post-lesson video-stimulated interviews with at least twenty students in each of the participating 8<sup>th</sup> grade classrooms. The mathematics teachers in each country were identified for their locally-defined 'teaching competence' and for their situation in demographically diverse government schools in major urban settings. In a major component of the post-lesson student interviews, in which a split-screen video record was used as stimulus for student reconstructions of classroom events, students were given control of the video replay and asked to identify and comment upon classroom events of personal importance. Each teacher was interviewed at least three times using a similar protocol. Employing a theory of learning that accords significance both to individual subjectivities and to the constraints of setting and community practice, these multiple reconstructive accounts, together with the video record, must be viewed as complementary (rather than competing) and synthesised accordingly.

## **Section Three: The 'Lesson Event' as a Legitimate Unit of Comparative Analysis in International Classroom Research**

### **International Comparisons of Lesson Structure**

A research design predicated on a nationally representative sampling of individual lessons, as in the TIMSS Video Studies (1995 and 1999), inevitably reports a statistically-based characterization of the representative lesson (the first of the alternatives listed above). The analysis of video data collected in the first TIMSS video study (Stigler and Hiebert, 1999) centred on the teacher's adherence to a culturally-based "script." The use of such "teacher scripts" or "lesson patterns" has been discredited as an appropriate characterisation of national teaching practice or as a unit of international comparative analysis (Clarke, 2003b; Clarke & Mesiti, 2003; Jablonka, 2003; Mesiti, Clarke & Lobato, 2003; and Shimizu, 2003). Analysis of the LPS classroom data suggests, however, that the constituent elements or 'events' from which a lesson is constructed might serve both as a characterisation of aspects of national pedagogy and as a unit of comparative analysis in international studies of classroom practice.

### **Lesson Events**

The Lesson Event is conceived as an event type sharing certain features common across the classrooms of the different countries studied. Lesson Events identified in LPS data have included: Beginning the Lesson, Learning Tasks, Student at the Front, Guided Development, Setting the Task, Walking Between Desks, and Summing Up. Each individual Lesson Event had a fundamentally emergent character, suggested by the classroom data as having a *form* sufficiently common to be identifiable within the classroom data from each of the countries studied. In each classroom, both within a culture and between cultures, there were idiosyncratic features that distinguished each teacher's enactment of each Lesson Event, particularly with regard to the *function* of the particular event. At the same time, common features could be identified in the enactment of Lesson Events across the entire international data set and across the data set specific to a

country. For the purposes of the analyses reported here, a total of over 180 videotaped lessons was available (from classrooms in Berlin, Hong Kong, Melbourne, San Diego, Shanghai, and Tokyo), supplemented by over 20 teacher interviews, and almost 400 student interviews. The teacher and student interviews offer insight into both the teacher's intentions in the enactment of the particular lesson event and the significance and the meaning that the students associated with that event type. By examining classroom practice over sequences of ten lessons, the Learner's Perspective Study provided data on the teacher's and learners' participation in the co-construction of the possible forms of participation through which classroom practice was constituted (cf. Brousseau, 1986).

### **Kikan-Shido (Between Desks Instruction) as a Co-constructed Practice**

Japanese teachers possess an extensive vocabulary with which to describe their practice. Among the many terms available to them is the term 'Kikan-Shido,' which means 'between desks instruction,' in which, while the students are engaged in "practice", either individually or in groups, the teacher walks around the classroom, observing students at work, and may or may not speak or otherwise interact with the students. This activity is a familiar one to teachers in American and Australian classrooms, and to teachers in many other countries as well. As the translation (Between desks instruction) makes clear, the Japanese term for this activity focuses on describing the teacher's actions. If I were to use the English translation as the label for this pattern of participation, I would be maintaining the focus on the teacher's activity, whereas the whole purpose of my argument is to demonstrate the mutuality of teacher and student participation in this activity. So, for the purposes of this discussion, I will use the Japanese term, 'Kikan-Shido' as a signifier or cipher for a more general conception of the particular activity – one that takes into account the patterns of participation of both teacher and students in the activity designated by 'Kikan-Shido.'

### **Kikan-Shido in Australian Classrooms**

In analyzing the Australian LPS video data, it was clear that all three teachers made extensive use of "between desks instruction" in every lesson, and commonly for extended periods of many minutes. During this time, the Australian teachers monitored the students' current activities and, sometimes, whether or not homework had been completed. While walking around the classroom, the Australian teachers frequently conversed with the students: Questioning, prompting, and generally scaffolding the students' activity. For the Australian teachers, the activity of "between desks instruction" appeared to have at least three principal functions: (i) monitoring and encouraging current on-task activity, (ii) actively scaffolding this on-task activity, and, sometimes, (iii) monitoring the completion of homework. The Australian students made many references to 'Kikan-Shido' as a valued and anticipated lesson event. On many occasions teachers would kneel or sit beside a student (or students) and engage them in conversation about the task they were attempting.

In the lessons analysed in this study, the teacher's scaffolding activity was much more likely to involve questioning students than simply telling them an answer or a procedure to use. Despite this, Australian students consistently described the teacher's actions as "explaining." This discrepancy between student accounts and documented practice reflects the limitations of the students' vocabulary and even of their ability to recognise the sophistication of the teacher's actions. This is an important methodological point: The capacity to juxtapose the video record with the retrospective video-stimulated account of the student or teacher allows each to inform the researcher's interpretations in a way not possible with earlier data collection techniques. Research studies reliant solely on either data source run the risk of seriously misrepresenting actions, meanings and motivations.

*China* – The classrooms in Shanghai and Hong Kong appeared to appeal to different pedagogical principles related to agency and ownership of knowledge in the classroom. Specifically, in Shanghai, teachers appeared to assume a capacity in their students to develop new mathematical knowledge. In Hong Kong School 1, the teacher would walk between desks, observing student work in order to understand student difficulties. Instruction would then be given to the whole class, drawing on the insights gained from observations during Kikan-Shido. Similarly, in Hong Kong School 2, the teacher's guidance during Kikan-Shido was typically quite directive. In post-lesson interviews, the teacher from Shanghai School 2 made reference in all three interviews to an activity that was translated as *inspecting around*. "I *inspected around* and took a passing glance. You have to discover those good points from the students. If there are any mistakes, you have to sort them out" (SH2 – TI2). This echoed the statement by one student: "Because the teacher, when we were working on the exercises, he came and looked at what we wrote, that can tell us what's wrong, and then we have to avoid making the mistakes again" (SH2- L3 – Cathy 1). A superficial

similarity of action concealed a deeper difference in belief.

*The USA* – In the US data, only the teacher from School 3 made extensive use of “Between desks instruction.” In School 1, the teacher worked almost exclusively with the whole class. In School 2, the teacher sometimes circulated when students worked on small group activities, but her use of Kikan-Shido appeared to be purely for monitoring purposes, and she did not help students individually. In US School 3, in nearly every lesson the students worked on practice problems for the last 20 minutes of class, while the teacher circulated around the classroom. It appeared that Kikan-Shido was employed much more selectively in the US classrooms studied.

*Japan* – The teacher in Japanese School 1 affirmed the significance of Kikan-Shido as a Lesson Event in the post-lesson interview following Lesson 9, where she stressed the monitoring function of Kikan-Shido: “I was walking between desks (Kikan-Shido) and seeing how students were doing. I could see how most of the students are doing by looking from the front of the class. But I cannot see ALL the students, and it is hard to see how those who are most likely to be behind are doing.” This teacher also used the Kikan-Shido activity to give hints to students who had difficulties. The information gained by Japanese teachers during Kikan-Shido was then employed in the Matome (Summing Up) stage of the lesson. This summative use of information gained during Kikan-Shido appears to be idiosyncratic to Japanese classroom practice.

### Section Four: Finding Culture in the Classroom

In this paper, I have argued that any theory of classroom practice must conceive of the activities in the classroom as co-constructed to a significant extent. Acceptance of this point has implications for the research designs by which we study the activities occurring in classroom settings. The need has been identified for a single term to encompass the conjoint, co-constructed body of practice signified in Russian by *obuchenie*, in Dutch by *leren*, and in Japanese by *tagushushido*, and approximated in English by *teaching/learning* (Clarke, 2001).

But co-construction of *practice* and joint participation *in practice* do not connote commonality of purpose among the participants in that (classroom) practice. Even where all participants recognize and subscribe to a particular lesson event (the example used in this paper is *Kikan-Shido*), they may interpret its function differently.

If we conceive of institutionalised patterns of participation as taking on the status of bodies of practice in the form of characteristic ‘lesson events’, then their co-constructed nature has further significance. Rather than progressively increasing the competence of their participation in a culturally or socially pre-determined practice (cf Lave & Wenger, 1991), this conception of the origins of practice accords significant agency (however constrained by institutional or cultural norms) to the participants to shape their particular pattern of participation and thereby to influence the nature of that practice. Wenger’s more recent writing (Wenger, 1998) assigns significant agency to the participants in a practice. Analysis of the LPS data in a variety of cultural settings has demonstrated the various ways in which this agency is enacted.

One challenge highlighted in this paper is to connect the essentially empirical Lesson Events to their cultural antecedents and to their consequences for student learning. The extent to which the classroom enactment of Kikan-Shido is reflective of cultural values can be seen in the priority attached in Japanese classrooms to the collection of information subsequently used in the culturally-significant Matome lesson event, and the underlying ethos of “fairness” [colloquially a “fair go”] in Australian classrooms that prioritises equity of student access to the teacher.

In an international comparative study, any evaluative aspect is reflective of the cultural authorship of the study. If we are to make judgements of merit, whether they are about student achievement or classroom practice, we can only do so from the position of the authoring culture. The analyses reported in this paper offer the ‘lesson event’ as a potentially useful referent for the international comparative analysis of classroom practice by which to accommodate classroom diversity, and to honour the agency of the individual (both teacher and students) in public settings such as classrooms.

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