Addressing the Challenge of Legitimate International Comparisons: Lesson Structure in Australia and the USA

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This paper reports a multi-stage analysis of 55 lessons taught as five ten-lesson sequences and one five-lesson sequence by three Australian and three American teachers. Despite the assumption of cultural similarity, there were significant structural differences between the Australian lessons analysed and the U.S. lessons. It is our contention that the comparison of lesson components ('lesson events') is more helpful than a (national) lesson pattern or script as a guide to the differences between the practices of teachers or nations.

Focusing on Classroom Practice

It seems reasonable to focus attention on the practices of classrooms as the most evident institutionalised means by which the policies of a nation's educational system are put into effect. Specifically, the classroom seems a sensible place to look for explanations and consequences of the differences and similarities identified in international comparative studies of curriculum, teaching practice, and student achievement. Within the specific focus of Classroom Practice, the central problem of international comparative research translates into:

Are there nationally-specific characteristics of classroom practice?

How best might the practices of classrooms be compared internationally if our purpose is to inform those practices?

NB. The second question remains both valid and important, whether the answer to the first question is "Yes" or "No."

The curriculum is the embodiment of the aspirations of the school system. To a significant extent, the teacher is the agent of the system by whose actions the curriculum is put into effect. Teachers, however, interpret the curriculum in idiosyncratic fashion, within the constraints and affordances of both system and culture. Both the curriculum and the teacher have been the focus of recent international comparative study. Among the studies of curriculum and teaching practice, we can lose sight of the student. Thorsten makes this point beautifully.

> What is absent from nearly all the rhetoric and variables of TIMSS pointing to the future needs of the global economy is indeed this human side: the notion that students themselves are agents. TIMSS makes students from 41 countries into passive objects of 41 bureaucratic gazes, all linked to the seduction of one global economic curriculum (Thorsten, 2000, p. 71).

Educational research has increasingly drawn our attention to the importance of the social processes whereby competence is constructed and in which competence is constituted (for both teaching and learning). The agency of the student, the nature of learner practice, and the cultural specificity of that agency and that practice must be accommodated within our research designs.

The Learner's Perspective Study

The analysis of video data collected in the video component of TIMSS (Stigler and Hiebert, 1999) centred on the teacher's adherence to a culturally-based "script." Central to the identification of these cultural scripts for teaching were the "lesson patterns" reported by Stigler and Hiebert for Germany, Japan and the USA, and the contention that teaching in each of the three countries could be described by a "simple, common pattern" (Stigler & Hiebert, 1999, p. 82). The Learner's Perspective Study analysed sequences of ten lessons, documented using three video cameras, and supplemented by the reconstructive accounts of classroom participants obtained in post-lesson video-stimulated interviews. Test, questionnaire, and student written material were also collected.

This methodological approach offers an informative complement to the survey-style approach of the TIMSS video study. A research design predicated on a nationally representative sampling of individual lessons, as in TIMSS, inevitably reports a statistically-based characterization of the 'typical lesson'. A more fine-grained study of sequences of ten lessons, informed by the reconstructive accounts of the participants, has the potential to address:

- Consistency of lesson structure over a ten lesson sequence
- Degree of variation in lesson structure in the practices of competent teachers
- The extent to which any such variation is linked to the location of the lesson in the instructional sequence and to the teacher's instructional intentions
- Student awareness of the structure of the lesson and how this is related to their perception of significant educational moments in the lesson and to their subsequent learning.

In this paper, we will primarily address the first two of these points. We will also make use of our analyses to address the question, "How best might the analysis of international classroom data be undertaken?"

The Classroom Data

The Learner's Perspective Study (LPS) (www.edfac.unimelb.edu.au/DSME/lps) required the videotaping of a considerable number of consecutive lessons in each school. Ten consecutive lessons, each ranging in length from between 50 and 70 minutes, were videotaped in two schools in the United States. A classroom in a third school was videotaped for five consecutive lessons; however, these lessons were each more than an hour and a half in length ('double lessons'). The schools were in demographically different regions of the same major U.S. city. Similarly, lesson sequences were videotaped in three Australian schools in demographically different regions of the same major Australian city.

Design of the LPS anticipated the comparison of the LPS analyses of videos of lesson sequences supplemented by the post-lesson reconstructive accounts of teachers and students with Stigler and Hiebert's analyses of the videotapes of single lessons (Stigler & Hiebert, 1999). The multi-stage analysis of the LPS data, presented in this paper, suggests that a more complex view of the structure of mathematics lessons than the lesson pattern identified by Stigler and Hiebert's (1999) analysis of single lessons might facilitate comparative analyses more effectively.

Stage One of the analysis of the U.S. lessons found that typically, for all three American teachers, the structure of a lesson differed from one lesson to the next. U.S. School 1 appeared the most variable in structure while U.S. School 3 appeared the most uniform in structure. There is evidence that the structure of a single lesson

- could not capture the essence and variety of lesson structure within an individual teacher's classroom practice;
- nor describe the typical lesson structure of all three U.S. classrooms in a satisfactory manner.

Stage Two of the analysis addressed the issue of 'typical practice.' This analysis identified the events in the lessons that corresponded to the same activity types but were enacted differently by the three teachers.

The Analytical Approach

Based on the analysis of 80 single lessons, Stigler and Hiebert (1999) reported that U.S. lessons could be characterized by four distinct classroom activities and that these activities, when placed in a particular sequence, formed the basis of a national lesson pattern. The lesson pattern for the United States was reported as:

- reviewing previous material;
- demonstrating how to solve problems for the day;
- practicing; and
- correcting seatwork and assigning homework (Stigler & Hiebert, 1999, p. 80)

Critical to any reading of Stigler and Hiebert's lesson patterns is the distinction between the activity titles (such as 'Demonstrating how to solve the problems for the day') and the brief descriptions of the most common or typical enactment of that activity.

> After homework is checked, the teacher introduces new material, or reviews previous material, by presenting a few sample problems and demonstrating how to solve them. Often the teacher engages the students in a step-by-step demonstration by asking short-answer questions along the way (Stigler & Hiebert, 1999, p. 80)

These descriptions of typicality do not constitute definitions of the relevant activity, although they did provide useful examples of the type of actions from which the activity category might be constituted. Without strict definitions that distinguished the finer characteristics of one activity from another, the researchers interpreted the four activity categories as liberally as possible. This proved quite challenging. For example, the description of the activity *'Demonstrating how to solve problems for the day'* (above) includes the phrase *'. . reviews previous material'* which is itself the title of one of the original four activities identified as classifying the structure of U.S. lessons, yet it also appears subsumed within another activity.

It was then determined which of the four activities best described the classroom behaviour for each minute of every lesson. Two researchers (Mesiti and Nash) completed this task independently and the results were compared and discussed. The results reported in this paper combine the efforts of both researchers.

To simplify the process of coding and to compare individual lesson structures more easily, a coding system was devised whereby each activity was allocated a particular color/shade.

(yellow)	Reviewing previous material
(blue)	Demonstrating how to solve problems for the day
(orange)	Practicing
(green)	Correcting seatwork and assigning homework

Figure 1. Allocation of color for coding purposes to each of the classroom activities found in Stigler & Hiebert's (1999) U.S. lesson pattern.

Applying the U.S. Lesson Pattern to the LPS U.S. data

Mesiti, Clarke and Lobato (2003) have applied these categories to 25 U.S. lessons studied as part of the LPS project. Figure 2 shows the results for U.S. School 2.

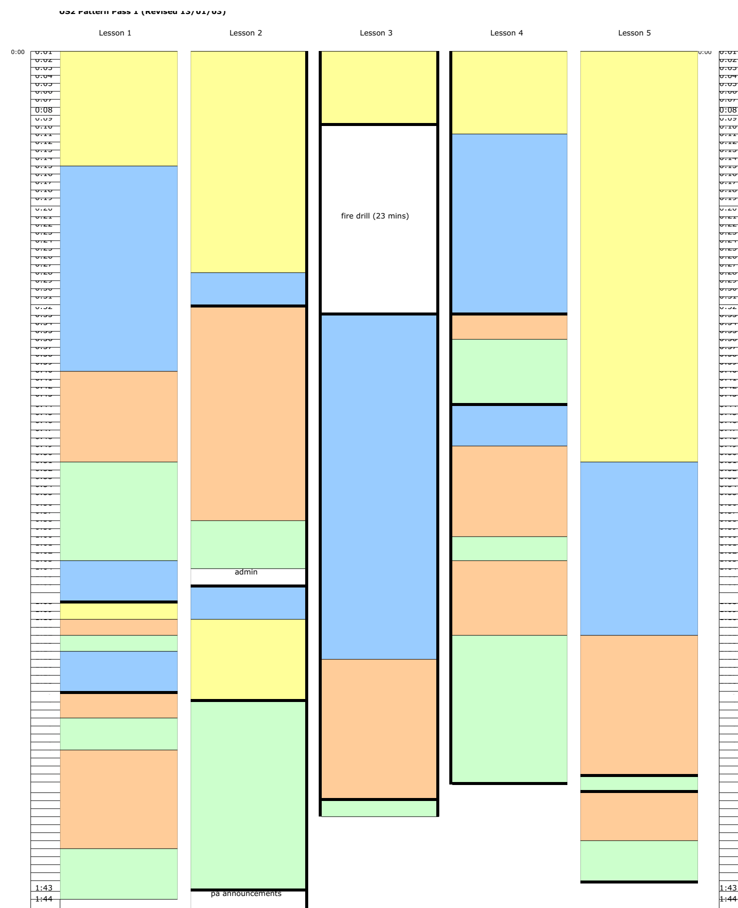

Figure 2. Stigler & Hiebert (1999) U.S. lesson pattern as applied to LPS U.S. School 2.

This visual representation of lesson structure allows the reader to gauge not only the sequence of activities in a lesson but also the duration of each activity and compare this information with other lessons within the school, or other schools, more easily. No indication of what proportion of the lesson would be usually allocated to each particular activity was given by Stigler and Hiebert (1999) for the U.S. lesson pattern.

When the task began of attributing the most appropriate of Stigler and Hiebert's (1999) four classroom activity categories to various parts of the lesson in order to describe the structure of the lesson with more detail, the researchers had to assume that the intention of Stigler and Hiebert (1999) in identifying a lesson pattern was to identify general 'coverage' (rather than simply 'occurrence') event categories. That is, it had to be assumed that the events being categorised were mutually exclusive and exhaustive. Certainly, the advocacy of a national lesson pattern implies that these four activities could not occur at the same time.

Of the three U.S. schools, School 2 appeared the closest in structure to the aforementioned pattern. Also, each activity appeared in every lesson. Of the other two schools, there was no single lesson that reproduced the lesson pattern and many lessons did not contain all four 'typical' lesson components.

Comparing Australian and U.S. lessons

The questions addressed by the second stage of this analysis concerned whether or not the lesson pattern and its constituent elements could be applied to the LPS Australian classroom data and whether or not the use of this coding scheme suggested either significant similarities or differences in the way the U.S. and Australian lessons were structured. Figure 3 sets out the structure of three of the Australian lessons from a single school.

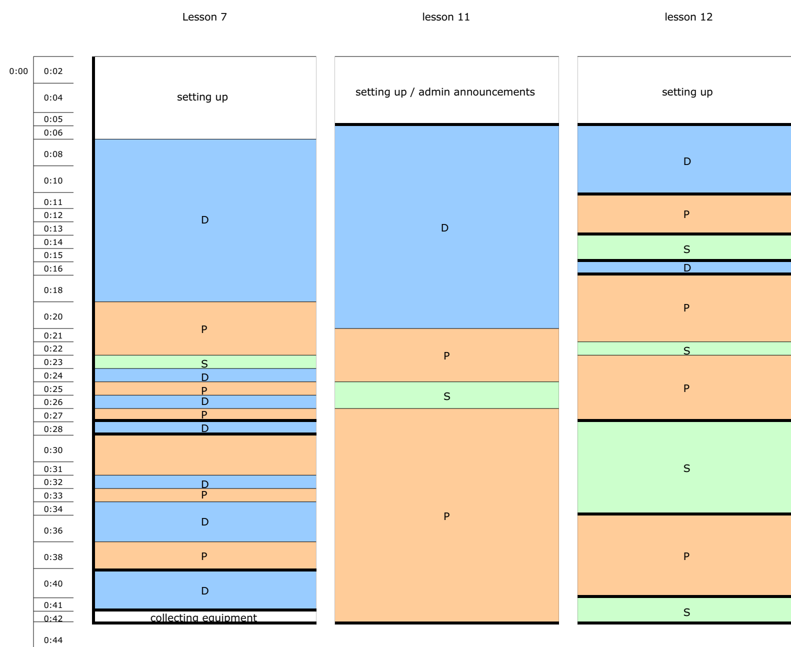

Figure 3. U.S. lesson pattern categories as applied to three Australian lessons.

Figure 3 (and the other Australian lessons analysed) suggests that the answers to the two preceding questions are: (i) The U.S. lesson pattern categories are only an imprecise fit to the Australian data, and (ii) nonetheless, there did appear to be significant structural differences between the U.S. and Australian lessons analysed. The rapid alternation of

activity type evident in the Australian classrooms was one of the most visible structural differences between the Australian and U.S. lessons.

Revisiting the U.S. Data: Typicality at the Level of Practice

In attempting to apply the Stigler and Hiebert categorisation to the LPS data, it was necessary to distinguish between the title of an activity (which we had applied as a form of code) and the description of the typical or usual enactment of that activity (which, while too prescriptive to be used as a code definition, could be used as a point of reference in relation to which our data could be located). While stage one of the analysis involved the use, for coding purposes, of a liberal interpretation of the activities in the national lesson pattern, the second stage of the analysis looked for correspondence with the descriptions of 'typical' U.S. practice for that activity. When the classroom behaviour did not resemble the description given by Stigler and Hiebert (1999) of typical practice, this particular part of the lesson was left blank and summarised with a short phrase.

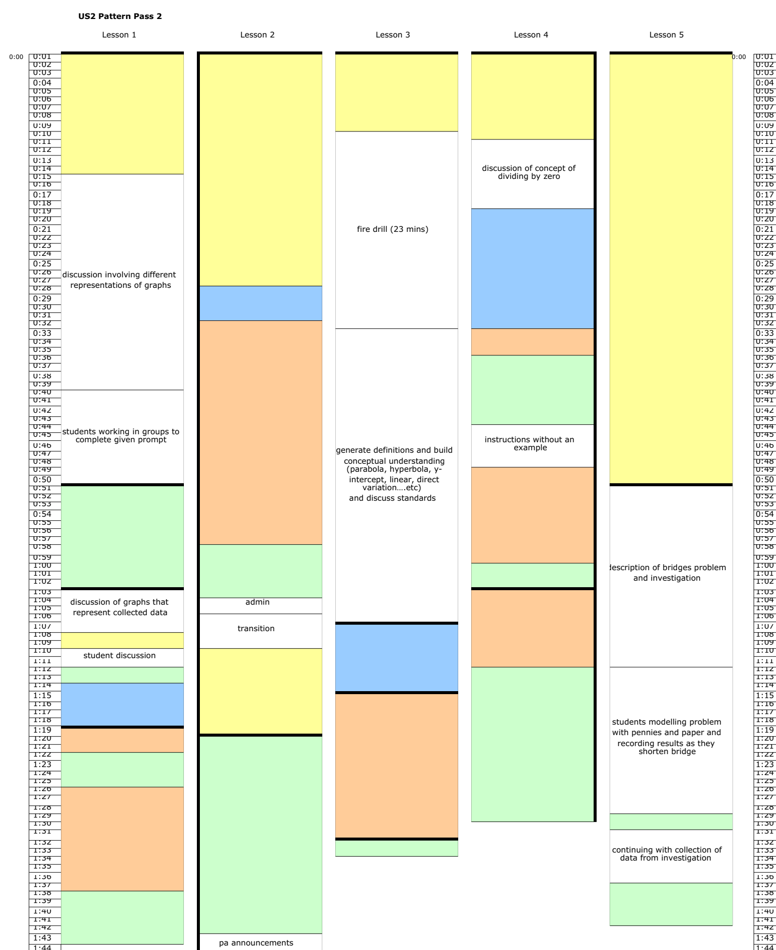

Figure 4. Descriptions of U.S. typical practice applied to LPS U.S. School 2.

Two prominent results arise from the revised analysis of the U.S. data:

- the lesson structure in all three schools differed significantly from the U.S. pattern and

- the teachers frequently engaged in practice, particularly in Schools 1 and 2, that was not identified as typical by Stigler and Hiebert (1999).

An Alternative Approach – Distinguishing Form and Function

Anderson-Levitt (2002, p. 20) juxtaposed the statement by LeTendre et al. (2001) that "Japanese, German and U.S. teachers all appear to be working from a very similar 'cultural script'" (2001, p. 9) with the conclusions of Stigler and Hiebert (1999) that U.S. and Japanese teachers use different cultural scripts for running lessons. The apparent conflict is usefully (if partially) resolved by noting with Anderson, Ryan and Shapiro (1989) that both U.S. and Japanese teachers draw on the same small repertoire of "whole-class, lecture-recitation and seatwork lessons conducted by one teacher with a group of children isolated in a classroom" (Anderson-Levitt, 2002, p.21), but they utilise their options within this repertoire differently. This suggests an analysis of enactment rather than activity type.

An alternative approach to the characterisation of practice by a lesson pattern or script is the identification of a specific classroom event type and the practices through which it is constituted, such that, while not necessarily a consistent element of every or even most of the lessons being analysed, the particular type of lesson event is frequent in occurrence, takes a consistent general form, but may be enacted with some variation at the level of actual classroom practices. In the case of the LPS Australian data, one such lesson event type was what the Japanese call "Kikan-Shido" or "Walking Between Desks."

> "Walking between desks (Kikan-Shido)"
>
> Form: 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.
>
> Function (specific to Australian data): In the Australian LPS data, all three teachers made extensive use of "walking-between-desks" 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. The scaffolding activity was much more likely to involve questioning students than simply telling them an answer or a procedure to use.
>
> For the Australian teachers, the activity of "walking-between-desks" 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. On many occasions teachers would kneel or sit beside a student (or students)

Teacher use of the practice of 'Walking Between Desks' was much less evident in the U.S. classroom data and, when present, was not used to the same extent for the explicit tutoring of students.

One aspect of this event type that varied even within the Australian data is what the other students were doing during this activity, particularly while the teacher was 'tutoring' a particular student. Student activity during 'Walking Between Desks' may be one of the more useful characteristics that distinguishes one teacher's implementation of Kikan-Shido from another's. The value of international comparative research in this context lies in the heightened diversity of practice afforded by an international sample. This diversity of practice both demonstrates the degree of variation possible with regard to a particular practice and highlights the significance of any similarities that might emerge.

Concluding Remarks

There was significant variation in structure and practice within the Australian and American lessons analysed, both for each national set of lessons and for each teacher. Given this variation, it seems neither productive nor correct to characterise an entire nation's mathematics lessons with a single lesson pattern or script. In attempting to accommodate the variation evident in a national sample of lessons, the resultant lesson structure and its constituent codes must be so inclusive as to sacrifice the details that might otherwise have informed practice.

However, there do appear to be differences between the thirty Australian and twenty-five U.S. lessons analysed and, by implication, similarities across each national set of lessons. Perhaps these similarities in the lessons of a particular country are only evident through comparison with the lessons of another country. The challenge for researchers conducting such international comparative studies is to find a framework and a unit of analysis conducive to fruitful comparison. Significant and potentially useful differences do seem to exist in the practices by which teachers in Australia and the U.S. implement particular lesson components ('lesson events').

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