Lesson Patterns in Superficially Similar Cultures: The USA and Australia

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- Jablonka, E. “The Structure of Mathematics Lessons in German Classrooms: Variations on a Theme.”
- Shimizu, Y. “Capturing the Structure of Japanese Mathematics Lessons as Embedded in the Teaching Unit.”

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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. The Lesson Pattern reported by Stigler and Hiebert (1999) was not in evidence in the 25 US lessons analysed in the Learner's Perspective Study, and the US teachers frequently engaged in practice that was not identified as typical by Stigler and Hiebert (1999). Similarly, despite the hypothesised cultural similarity, the components of the US Lesson Pattern were in poor correspondence with the practices of Australian classrooms. There do appear to be differences between the thirty Australian and twenty-five US lessons analysed and, by implication, similarities across each national set of lessons. The challenge for researchers conducting such international comparative studies is to find a framework and a unit of analysis conducive to fruitful comparison. 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.

Lesson Patterns

In the writings of Stigler, Hiebert and their co-workers, we find an interesting shift from discussion (and advocacy) of "lesson scripts" (Stigler & Hiebert, 1998) to "lesson patterns" (Stigler & Hiebert, 1999) and via "hypothesised country models" to "lesson signatures" (Hiebert et al., 2003) as the means by which the classroom practices of countries might be usefully compared. This trend signifies an increasing recognition that meaningful comparison of teaching practice across an international sample requires a multi-dimensional framework and a greater sensitivity to variation than is possible within the confines of a 'lesson script.' Nonetheless, given the visibility of such conjectured lesson patterns in various discussions of international comparative research (see Clarke, 2003a, for a more complete discussion), we felt it warranted to examine the postulated lesson patterns empirically.

Certainly, based on the analyses reported by Clarke and Mesiti (2003) and those reported in this paper, it seems likely that, 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 facilitated meaningful comparison and informed practice.

To summarise: Despite the demonstrable variation in the structure of lessons taught by an individual teacher or by several teachers from the same country, there do appear to be recognisable structural differences in practice between mathematics classrooms in different countries; even when

these countries are as superficially similar in culture as Australia and the U.S.A. These differences were evident when the analysis of the Australian lessons (Clarke, 2003b) was compared with the American lessons analysed by Mesiti, Clarke and Lobato (2003). By implication, this suggests that there must be similarities across each national set of lessons. Perhaps these similarities in the lessons of a particular country are only evident (or, at least, most 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.

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 (LPS) 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. This is done in relation to our analysis of Australian and American classroom data. We were encouraged in making this comparison by the analyses conducted by Lampert and his co-workers (Lampert, Yu, Stigler, & Gallimore, 2003). Lampert and his colleagues used a method of automated classification of lessons to carry out 'blind assignment' of lessons collected in the TIMSS 1999 Video Study into countries using the TIMSS-R Video Codes. The highest misassignment of US lessons (8 lessons) was to Australia, and 10 Australian lessons were misassigned to the USA. The comparatively high level of misassignment between Australia and the USA suggests that assumptions of cultural similarity may have some basis, at least at the level of lesson structure.

We will also make use of our analyses to address the question, "How best might the comparative 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

a) could not capture the essence and variety of lesson structure within an individual teacher's classroom practice;
b) 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:

a) reviewing previous material;
b) demonstrating how to solve problems for the day;
c) practicing; and
d) 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.

	Reviewing previous material
	Demonstrating how to solve problems for the day
	Practicing
	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

The following figures represent the combined efforts of the researchers in their attempts to code the videotape footage from the LPS of U.S. Schools 1, 2 and 3 with the classroom activities as described in the U.S. lesson pattern.

i. U.S. School 1

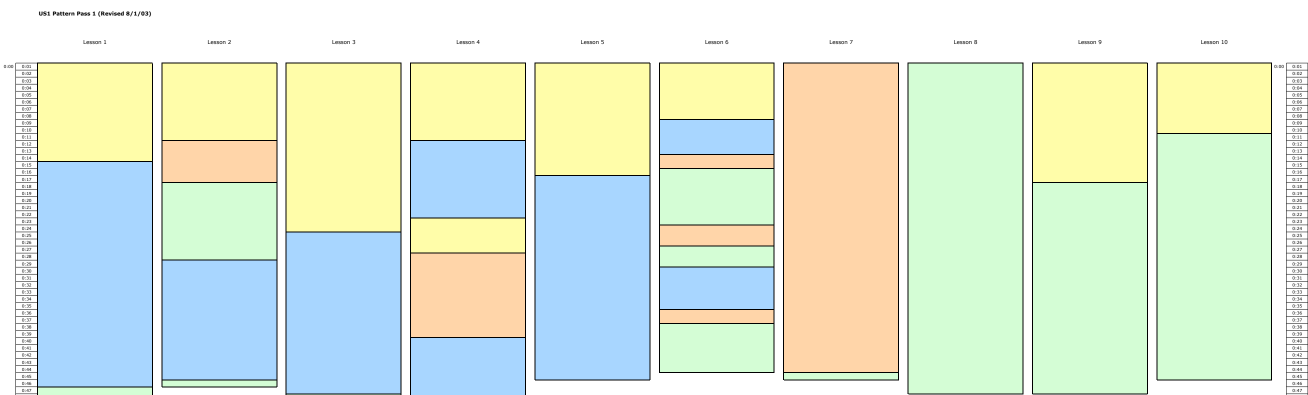


Figure 2. Stigler & Hiebert (1999) U.S. lesson pattern as applied to LPS U.S. School 1

The lesson pattern reported in the TIMSS Classroom Videotape Study, namely that a lesson begins with *a) reviewing previous material* followed by *b) demonstrating how to solve problems for the day* then followed by *c) practicing* and finally ends with *d) correcting seatwork and assigning homework* does not appear as the complete lesson structure in any lesson in U.S School 1. In addition not all activities are present in every lesson, lessons one to five appear radically different in structure from lessons seven to ten while the structure of lesson six appears to be cyclic in nature.

Most lessons began with a warm-up activity or by checking homework and this rarely appeared to happen at any other time in the lesson. This particular teacher spent a significant portion of the lesson demonstrating how to solve problems and correcting seatwork problems and there appeared little time devoted to student individual practice. The teacher administered an ungraded, 'conceptual' test in lesson seven and the three lessons following this test were spent explaining and correcting the tasks from the test in order to expand on and develop the students' understanding of the related concepts.

ii. U.S. School 2

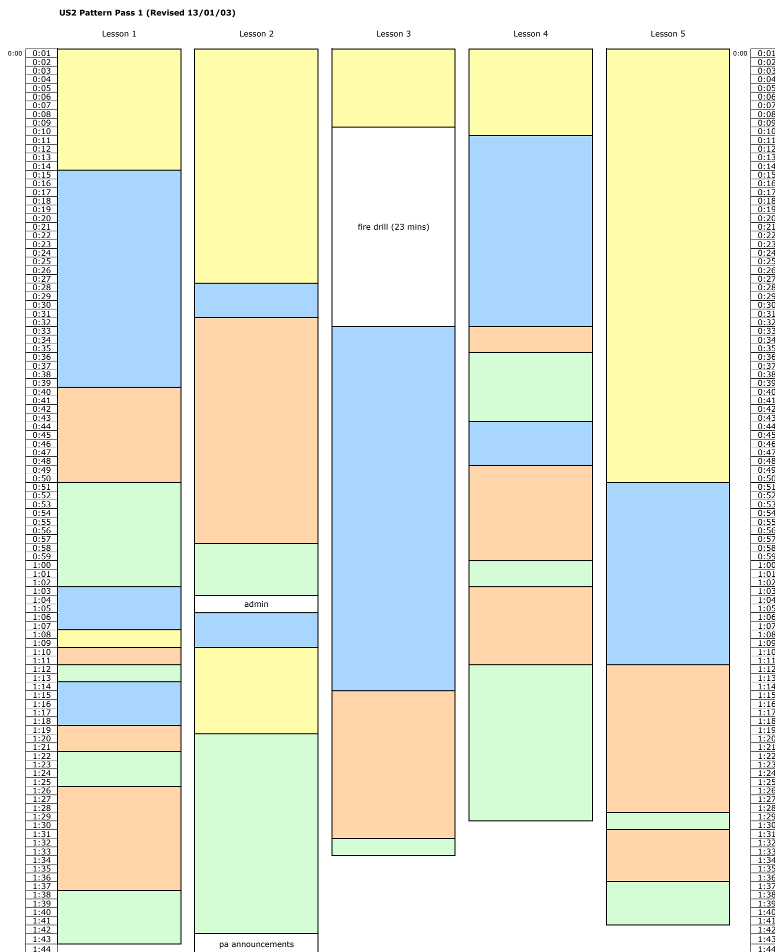
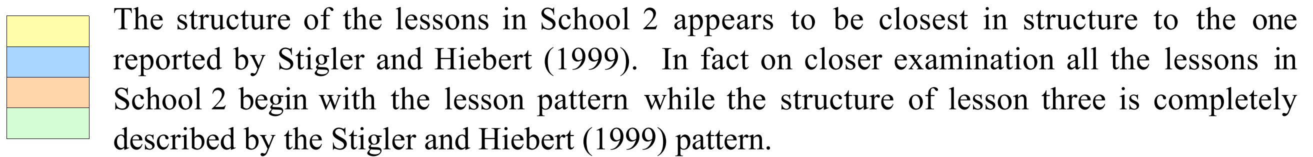


Figure 3. Stigler & Hiebert (1999) U.S. lesson pattern as applied to LPS U.S. School 2



The structure of the lessons in School 2 appears to be closest in structure to the one reported by Stigler and Hiebert (1999). In fact on closer examination all the lessons in School 2 begin with the lesson pattern while the structure of lesson three is completely described by the Stigler and Hiebert (1999) pattern.
Of the three schools, School 2 *appears* the closest in structure to the aforementioned pattern, also each activity appears in every lesson and the time allocated to each activity is more evenly distributed. This apparent correspondence between the School 2 lessons and the Stigler/Hiebert pattern provided one focus for the more detailed analysis undertaken in Stage 2.

iii. U.S. School 3

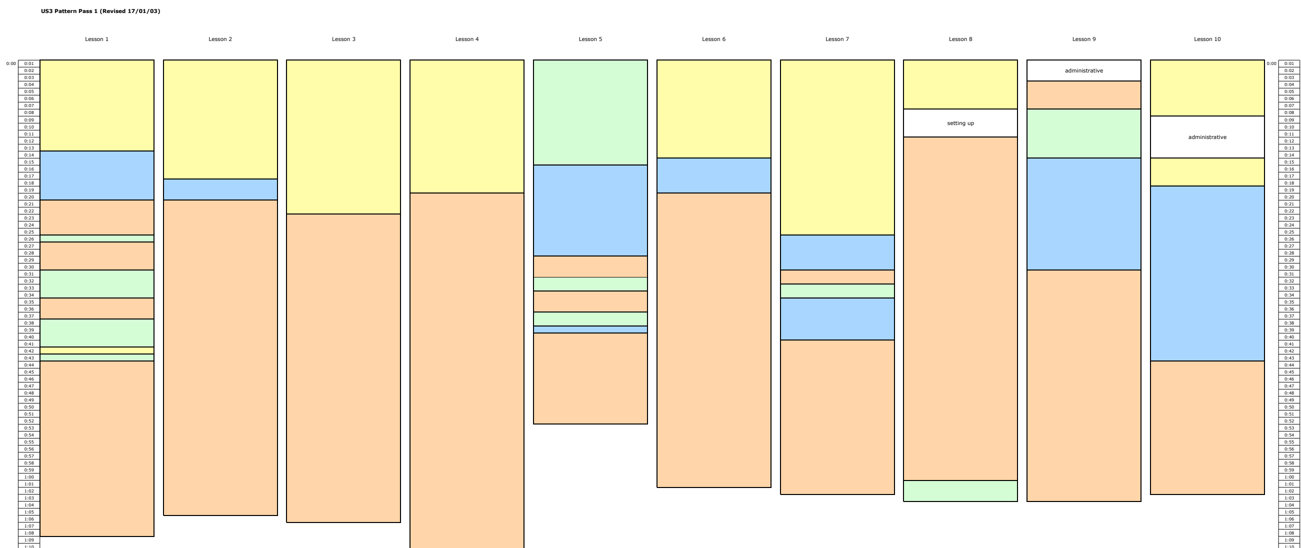
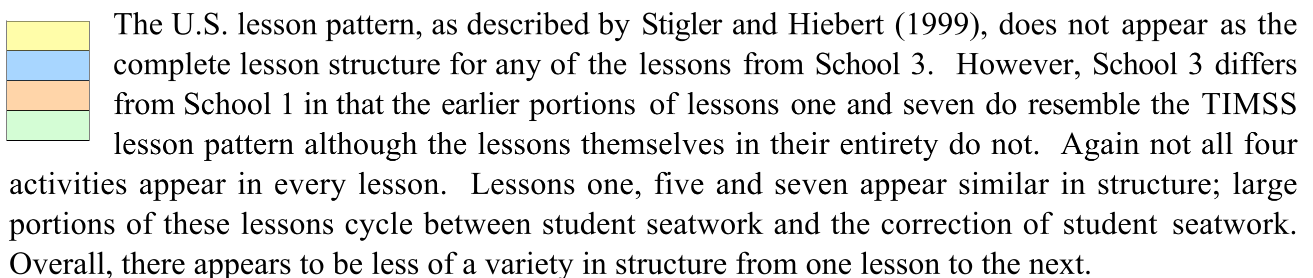


Figure 4. Stigler & Hiebert (1999) U.S. lesson pattern as applied to LPS U.S. School 3



The U.S. lesson pattern, as described by Stigler and Hiebert (1999), does not appear as the complete lesson structure for any of the lessons from School 3. However, School 3 differs from School 1 in that the earlier portions of lessons one and seven do resemble the TIMSS lesson pattern although the lessons themselves in their entirety do not. Again not all four activities appear in every lesson. Lessons one, five and seven appear similar in structure; large portions of these lessons cycle between student seatwork and the correction of student seatwork. Overall, there appears to be less of a variety in structure from one lesson to the next.

Almost all the lessons began with students correcting their homework from a transparency the teacher placed on the overhead projector. Any student concerns about the homework were then addressed at this time. Little time was devoted to teacher demonstration while large portions of the lesson were devoted to student practice.

Discussion

The most striking result is that the three classrooms each have a unique structural signature or blueprint. We are reluctant to attribute any observed structural features solely to the teacher (although the teacher may well be the major contributor), since these may also be a consequence of

characteristics of the students or the particular school setting and its traditions of practice. Designation as Classroom 1, 2 or 3 would obscure the deliberate location of each classroom in a different school. For this reason, we refer to the three cases as School 1, School 2 and School 3 – rather than implicitly attributing the observed variation to the teacher alone.

School 1 appears to have the greatest variety in structure from one lesson to the next. The lessons are generally structured around no more than two or three main activities.

If we restrict ourselves to the four U.S. codes from Stigler and Hiebert (1999) as we have done in the Stage 1 analysis, then School 2 *appears* to have the most uniformity in structure and it *appears* closest to Stigler and Hiebert's (1999) U.S. lesson pattern. However, in the Stage 2 analysis that follows, we will show that the enactment of the lesson pattern for School 2 is in fact *very* different from the Stigler and Hiebert's U.S. "most common" practice, but the differences are not revealed by application of the four general and simplistic codes. Also the lesson is more likely to be broken up into six or more activities, however, this may be a product of the particular length of lesson as each lesson lasts more than twice that of a lesson from School 1.

Another striking feature of Schools 1 and 2 is that the structure of some of the lessons in these schools could be interchanged; for example, the more frequent swapping of lesson activity as seen in lesson 6 of School 1 appears an uncommon characteristic of School 1 but a distinguishing characteristic of School 2; and certainly lesson 3 of School 2 would sit comfortably alongside the first five lessons of School 1.

School 3 appears quite unique in terms of lesson structure. It distinguishes itself from the other two schools by the proportion of lesson time devoted to the activity of student *'practicing'*.

In addition, the liberal nature with which the Stigler/Hiebert activity categories were interpreted and applied to the data helped to conceal the differences between classrooms and in fact made less perceptible the unique characteristics of the classrooms. For example, although Schools 1 and 2 appeared to have some lessons that are almost interchangeable at the level of structure, what the teacher and students were actually undertaking and accomplishing within the activities that were coded identically, was very different. In order to better represent the nature of the activities in the classroom, further analysis was undertaken.

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. Figures 3, 4 and 5 set out the structure of a selection of the lessons from the three Australian schools.

Lessons from each of Australian Schools 2 and 3 were selected for coding on the basis that they encompassed the range of practice evident within those classrooms. Two researchers then independently analyzed these lessons, applying the American pattern as liberally as had been done in the initial coding of the US lesson data. After this independent analysis, the resultant coded lessons were compared, the few differences discussed and resolved, and the coded lessons adjusted accordingly. These few discrepancies related mainly to timing and occurred at the end or the beginning of an activity and were resolved by a joint viewing of the video data. The consensus coding principles were then applied by one of the researchers (Nash) to six lessons from Australian

School 1. The results of this coding process are displayed in Figures 3, 4, and 5.

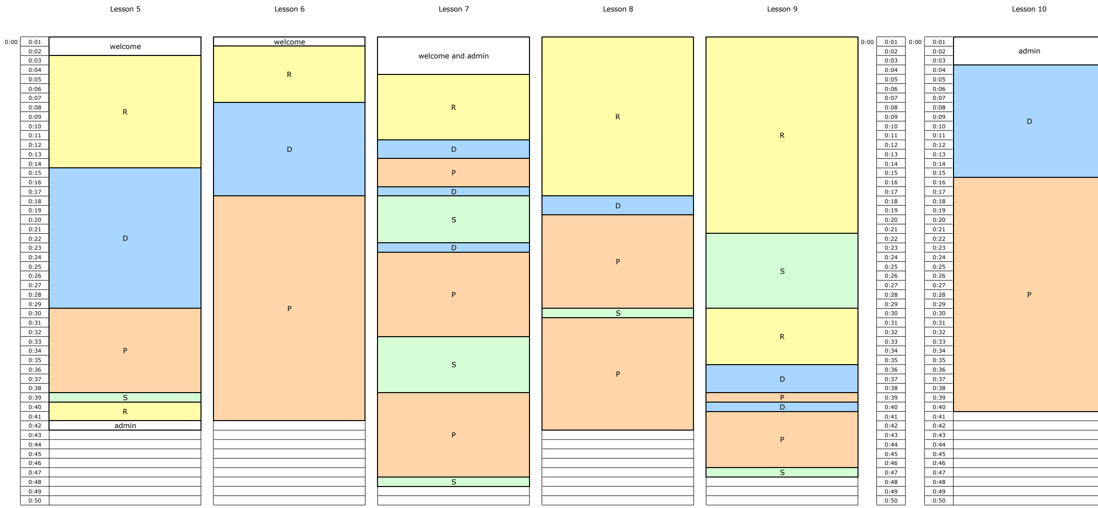


Figure 3. U.S. lesson pattern categories as applied to six lessons from Australian School 1.

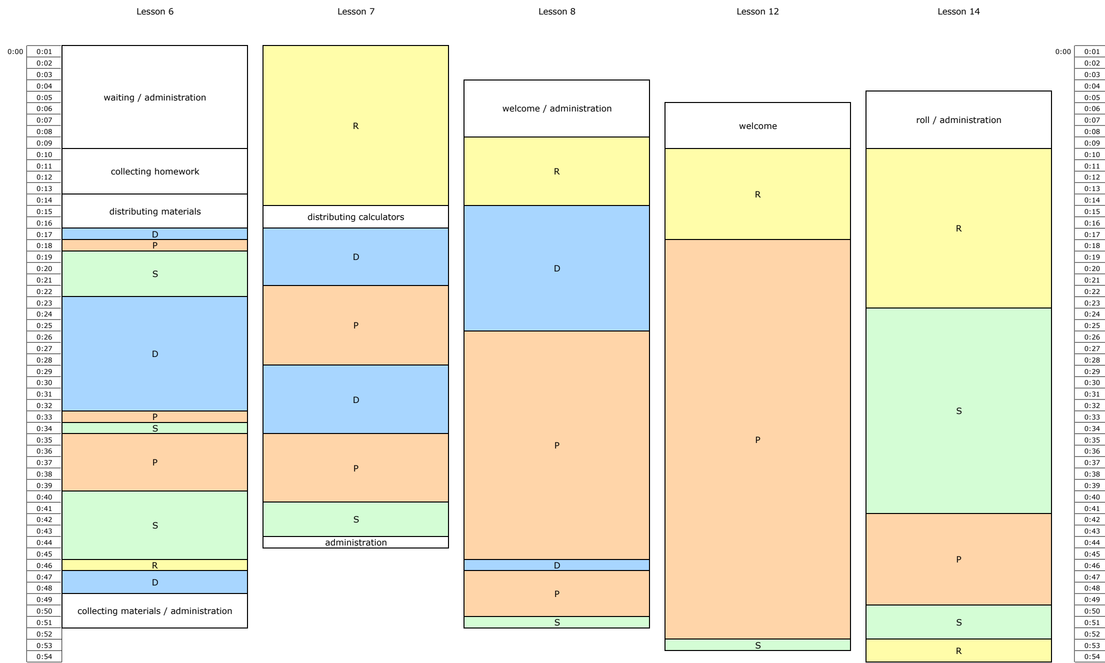


Figure 4. U.S. lesson pattern categories as applied to five lessons from Australian School 2.

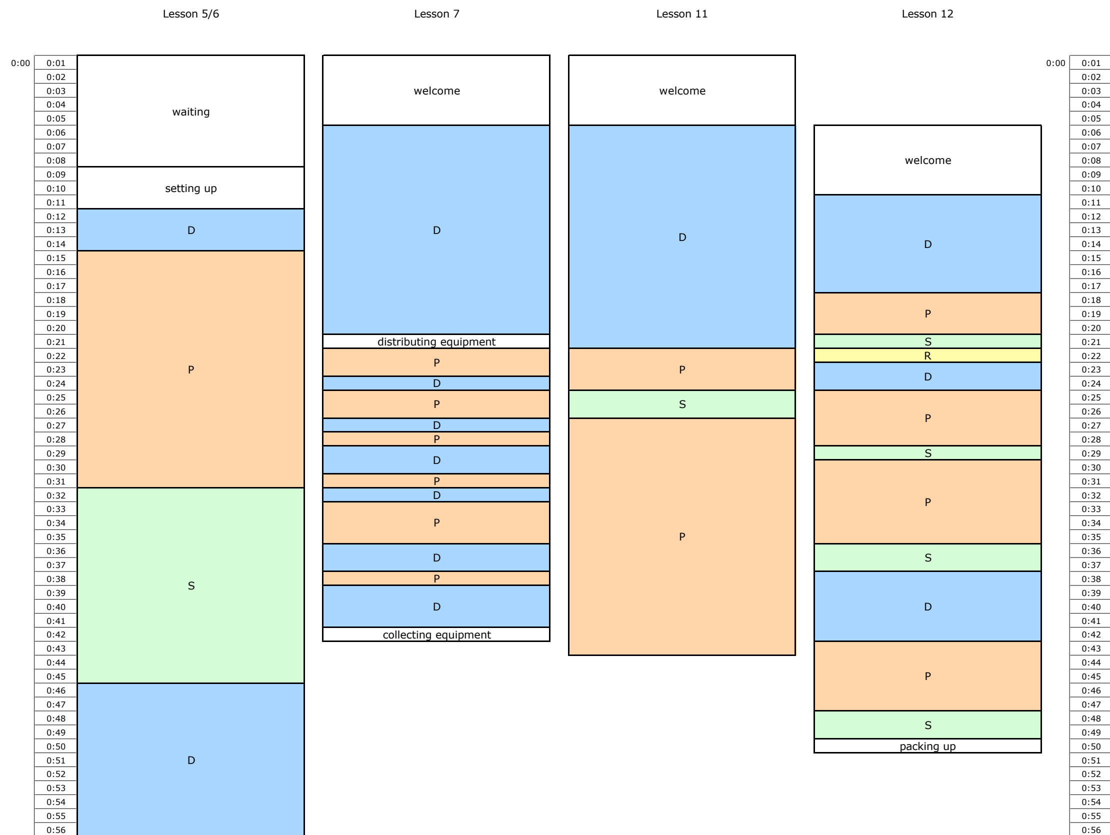


Figure 5. U.S. lesson pattern categories as applied to four lessons from Australian School 3.

Figures 3, 4 and 5 suggest that:

(i) The individual US lesson pattern constituent categories were only an imprecise fit to the Australian data and, in several instances did not correspond to Australian classroom practice, even with extremely liberal interpretation,

(ii) The US lesson pattern itself did not appear to match any of the Australian lessons, and

(iii) Nonetheless, there did appear to be significant structural differences between the US and Australian lessons analysed.

The occurrence of rapid alternation of activity types evident in the Australian classrooms was one of the most visible structural differences between the Australian and U.S. lessons. Australian School 3, Lesson 7, provides a good example of this, in which the teacher alternates short ‘bursts’ of demonstration and practice. This alternating activity, although apparently composed of two of the U.S. activity types, is probably better characterised as a specific ‘lesson event’ in its own right. The point we are making is that even the liberal application of the U.S. activity ‘codes’ to Australian lessons failed to capture important structurally-distinctive features of those lessons. This raises the question as to what more useful analytical unit might be employed other than the individual lesson, if we are to gain insight into the differences between the practices of U.S. and Australian teachers that our data suggest exist.

Revisiting the U.S. data: Typicality at the level of practice

The activities that characterized US lessons in Stigler and Hiebert's account were accompanied by a description of what was considered the typical classroom practice. Stigler and Hiebert (1999) provided these descriptions to illustrate the conventional implementation of each of the activities as seen in the 80 single lessons of US teachers.

	Reviewing previous material *The lesson begins by checking homework or engaging in a warm-up activity. Mr Jones conducted a warm-up activity and then checked homework, an opening that is quite common.*
	Demonstrating how to solve problems for the day *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.*
	Practicing *Seatwork is assigned, and students are asked to complete problems similar to those for which the solution method was demonstrated. Seatwork usually is done individually, although sometimes students work in small groups to compare answers and help one another.*
	Correcting seatwork and assigning homework *Near the end of the lesson, some of the seatwork problems are checked and, occasionally, some additional problems are worked out together. Homework, with more practice problems, is then assigned. Usually, some time is allowed during the lesson for students to begin the homework.*

Figure 6. The classroom descriptions of each of the activities found in the U.S. lesson pattern (Stigler & Hiebert, 1999, p. 80)

The lesson components identified in Figure 6 are vague in one sense and prescriptive in another. In attempting to apply the categorisation of Figure 6 to the LPS data, it was necessary to distinguish between the title of an activity (which we 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 a point of reference in relation to which our data could be located). While stage one of the analysis involved a more flexible interpretation in coding of the activities in the national lesson pattern, the second stage of the analysis involved a more careful scrutiny of the descriptions that typified the 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 7 shows the result of applying this revised categorization procedure to the data from U.S. School 2. While this analysis was carried out on the full set of LPS American data, this one example provides an adequate illustration of the extent to which categorization in terms of 'typical practice' revealed further

inconsistencies between the Sigler /Hiebert national lesson pattern and the LPS data.

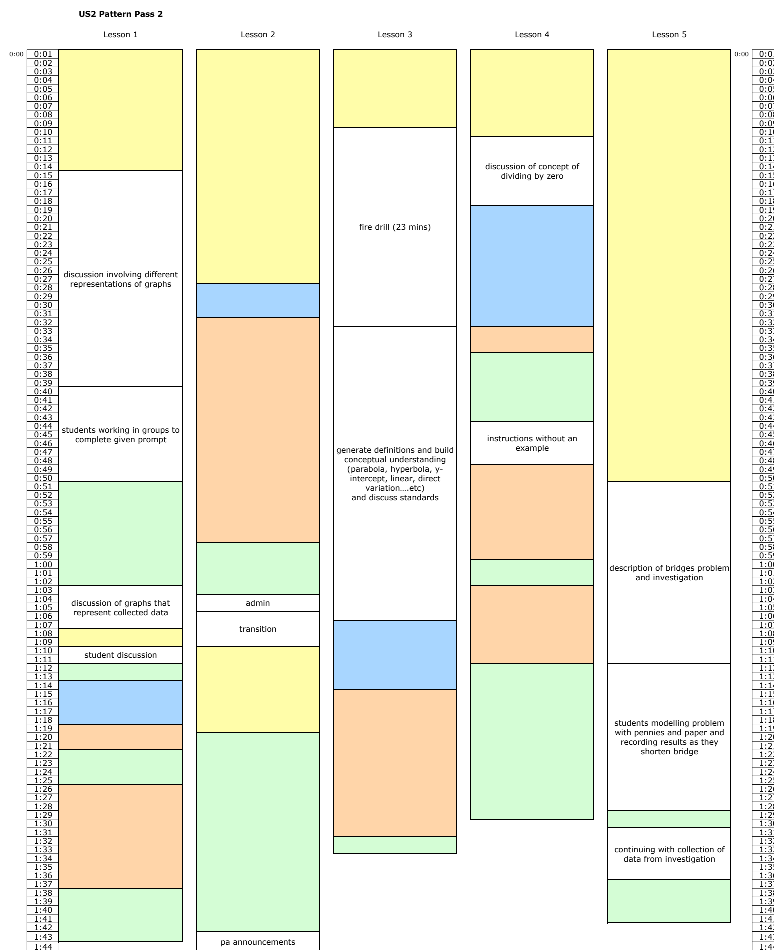


Figure 7. Descriptions of U.S. typical practice applied to LPS U.S. School 2

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

(i) The lesson structure in all three schools differed significantly from the U.S. pattern and

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

It must be noted that the teachers selected for study in the LPS project were endorsed as competent by their local communities and by the U.S. research team. The LPS lessons should not be viewed as a nationally representative sample. It is striking, however, that the reported U.S. national norms of lesson structure should be so absent, both at the level of whole lesson pattern and at the level of typical practice.

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) and engage them in conversation about the task they were attempting.

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 (see Clarke (2003c) for more detail). 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. Researchers participating in the LPS Project are undertaking extensive analyses with respect to the characterisation of Lesson Events and their varied enactment across the full LPS data set.

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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References

Anderson, L. W., Ryan, D., & Shapiro, B. (1989). *The IEA classroom environment study*. NY: Pergamon.

Anderson-Levitt, K. M. (2002). Teaching Culture as National and Transnational: A Response to Teachers' Work. *Educational Researcher 31*(3), 19-21.

Clarke, D.J. (2003a). International Comparative Studies in Mathematics Education. Chapter 5 in A.J. Bishop, M.A. Clements, C. Keitel, J. Kilpatrick, and F.K.S. Leung (Eds.) *Second International Handbook of Mathematics Education*, Dordrecht: Kluwer, 145-186.

Clarke, D. (2003b). The Structure of Mathematics Lessons in Australia. Paper presented as part of the symposium "Mathematics Lessons in Germany, Japan, the USA and Australia: Structure in Diversity and Diversity in Structure" at the Annual Meeting of the American Educational Research Association, Chicago, April 21-25, 2003.

Clarke, D. (2003c). Practice, Role and Position: Whole Class Patterns of Participation. Paper presented as part of the symposium "Patterns of Participation in the Classroom" at the Annual Meeting of the American Educational Research Association, Chicago, April 21-25, 2003.

Clarke, D.J. & Mesiti, C. (2003). Addressing the Challenge of Legitimate International Comparisons: Lesson Structure in Australia and the USA. In L. Bragg, C. Campbell, G. Herbert, & J. Mousley (Eds), *Mathematics Education Research: Innovation, Networking, Opportunity*, Proceedings of the 26th Annual Conference of the Mathematics Education Research Group of Australasia, *Vol. 1*, 230-237.

Lambert, B.L., Yu, C., Stigler, J., & Gallimore, R. (2003). Automated Classification of Lessons into Countries using TIMSS-R Video Codes. Paper presented at the 84th Annual Meeting of the American Educational Research Association, Chicago, USA, April 21, 2003.

LeTendre, G., Baker, D., Akiba, M., Goesling, B., & Wiseman, A. (2001). Teachers' Work: Institutional Isomorphism and Cultural Variation in the US, Germany, and Japan. *Educational Researcher 30*(6), 3-15.

Mesiti, C., Clarke, D.J., & Lobato, J. (2003). The Structure of Mathematics Lessons in the United States. Presented as part of the symposium "Mathematics Lessons in Germany, Japan, the USA and Australia: Structure in Diversity and Diversity in Structure" at the AERA Annual Meeting, Chicago, April, 2003.

Stigler, J. & Hiebert, J. (1999). *The Teaching Gap*. New York: Simon & Schuster.

Thorsten, M. (2000). Once upon a TIMSS: American and Japanese Narrations of the Third International Mathematics and Science Study. *Education and Society 18*(3), 45-76.