

PATTERNS OF PARTICIPATION IN THE MATHEMATICS CLASSROOM

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This paper first postulates the existence of co-constructed patterns of participation in the classroom and then documents one such pattern of participation: Kikan-shido (instruction between desks), both as it is enacted and as it is perceived by the classroom participants. In the course of detailing the use of kikan-shido in three Australian classrooms, this paper addresses the relationship between practice, participation and learning, as exemplified by kikan-shido as a locally-enacted pattern of participation to which teacher and students subscribe and which teacher and student have agency to exploit and to shape, and in which teacher and students, are complicit (co-conspirators). Acceptance of this point has implications for the research designs by which we study the activities occurring in classroom settings.

INTRODUCTION

Eugene Ionescu is reputed to have said, “Only the ephemeral is of lasting value.” Social interactions are nothing if not ephemeral and, since it is through social interaction that we experience the world, the understanding of social interactions must underlie any attempts to improve the human condition. 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 juxtaposition, in this paper, of participation, position, role and practice reflects a perceived gradation in the constructs that might be used to model the fluidity of social interaction. Where *role* is taken to have an institutionalised status and to constitute a more lasting categorization (eg teacher or pupil), while *position* is a social artefact constructed through the interactions of a social group smaller than an institution and less enduring in its membership (eg leader or expert). *Participation* is the social mechanism whereby both positions and roles are enacted and the patterns of participation that provide the focus for this paper are the regularities of *practice* engaged in by a social conglomerate – in this case, a teacher and her/his pupils.

Practice also requires explication. Greeno observed that “Methods of instruction are not only instruments for acquiring skills; they also are practices in which students learn to participate” (Greeno, 1997, p. 9). With regard to the learning of mathematics, some

classroom practices will resemble those of other communities who habitually make use of skills specific to mathematics (the mathematical activities of accountants or surveyors, for example), and some practices will be classroom-specific in the sense of relating to the process of learning (providing particular forms of explanation, asking particular types of questions when in doubt, seeking and offering assistance, and so on). Greeno also made reference to “patterns of participation” developed by students (Greeno, 1997, p. 9). This is a particularly apt phrase, combining the fluidity of participation in a social setting with the implicit regularity of a pattern. If we are to understand what occurs in social settings, it is the patterns of participation that are likely to offer insight. As will be argued, in considering social interactions in the classroom, the teacher must be considered co-participant with the students in any practices of the classroom community.

In this paper, the notion is posited of an individual having constructed a body of practice in which s/he engages regularly and with some consistency, but which is subject to refinement, modification, rejection, and replacement over time. The practice of individuals (a teacher’s practice or a learner’s practice) is distinguished from ‘professional practice’ in the sense of established ‘legal practice’ or ‘medical practice.’ Such individual practice will be a subset of the practices of the various communities of which each individual has membership and will conform to the affordances and constraints of the settings and situations in which those individuals find themselves.

Like Wenger (1998), this analysis of patterns of participation in classroom settings stresses the multiplicity and overlapping character of communities of practice and the role of the individual in contributing to the practice of a community (the class). Clarke (2001) has discussed the acts of interpretive affiliation, whereby the learners align themselves with various communities of practice and construct their participation and ultimately *their* practice through a customizing process in which their inclinations and capabilities are expressed within the constraints and affordances of the social situation and the overlapping communities that compete for the learner’s allegiance and participation. By examining classroom practice over sequences of ten lessons, the Learner’s Perspective Study (website: <http://www.edfac.unimelb.edu.au/DSME/lps/> and outlined below) provides data on the teacher’s and learners’ participation in the co-construction of the possible forms of participation through which classroom practice is constituted (cf. Brousseau, 1986).

But co-construction *of practice* and joint participation *in practice* do not connote commonality of purpose among the participants in that (classroom) practice. To some extent both teacher and student share a common interest in advancing the student’s learning, but they are not positioned identically within that purpose (cf. Davies & Harré, 1991), and their classroom participation will both confirm these positionings and co-construct them.

METHODOLOGY

This paper reports the analysis of data from sequences of lessons, supplemented by post-lesson video-stimulated interviews, and uses one particular whole class pattern of participation (*kikan-shido* or instruction-between-desks) to illustrate differences between the function of practice, role and position in the context of eighth-grade mathematics classrooms. Data collection was undertaken consistent with the ‘complementary accounts’ approach discussed in detail elsewhere (Clarke, 1998 and 2001). In the Learner’s Perspective Study (LPS), three video cameras documented teacher and learner actions for sequences of at least ten consecutive lessons and this video record is supplemented by post-lesson reconstructive video-stimulated interviews with teacher and students, together with test and questionnaire data and copies of written material produced in class and interview.

We need to acknowledge the multiple potential meanings of the situations we are studying by deliberately giving voice to many of these meanings through accounts both from participants and from a variety of “readers” of those situations. The implementation of this approach requires the rejection of consensus and convergence as options for the synthesis of these accounts, and instead accords the accounts “complementary” status, subject to the requirement that they be consistent with the data from which they are derived, but not necessarily consistent with each other, since no object or situation, when viewed from different perspectives, necessarily appears the same (Clarke, 2001, p. 1).

Our goal in the analysis of the classroom events documented in the Learner’s Perspective Study is the identification of pattern within the complex, interconnected database. As will be argued, the analysis undertaken in this paper must not only identify a ‘pattern of participation’ within the data, but also demonstrate that the participants themselves gave tacit (or explicit) recognition to that pattern, by verbal reference in interview or classroom utterance, or through their active participation in conforming to the pattern or even contributing to its construction.

THEORETICAL POSITIONING

Previous research, and much of our theorising, has tended to dichotomise teaching and learning as discrete activities sharing a common context. It has been argued that this dichotomisation is a particularly insidious consequence of the constraints that language (and the English language, in particular) imposes on our theorizing (Clarke, 2001). It is a major premise of this paper (and the project of which it is one product) that such dichotomisation misrepresents both teaching and learning and the classroom settings in which these most frequently occur.

The theory of learning on which this paper is grounded is one that starts from the social situation of the individual in interaction with others, but which accords a significant role to the individual’s interpretive activity. Particular significance is attached to social interaction, and learning proceeds by the iterative refinement of intersubjective understandings that include social and content-specific (in this instance, mathematical)

meanings, as well as values and modes of collaborative practice. These understandings are enacted as the progressive increase in valued practice, including the appropriate utilisation of technical language. This account of learning invokes a negotiative process that presumes interaction with others. These interactions are predicated on an interpretive affiliation that situates the learner with respect to the values and goals of others in the learning environment (the classroom) and an interpretive characterisation of the other, by which the capabilities, motivations, values and actions of other participants in the classroom are inferred and this characterisation is then iteratively refined through on-going social interaction. Context is also a matter of interpretation and internalization (see Clarke & Helme, 1998). Essential to an understanding of the nature of social activity in classrooms is the co-constructed nature of the practices of these classrooms, and the role of negotiation not as a subordinate activity *through* which classroom practice is constructed but as an essential activity *from* which classroom practice is constituted.

This paper provides evidence of the mutuality of teaching and learning and supports their interpretation as components of a single body of communally constituted practice. We are assisted in this argument by Harré's work on social positioning (Davies & Harré, 1991) as this gives recognition to the mutuality of social practice, where the positioning of an individual carries both rights and responsibilities and is only sustained by mutual compliance. Of course, a position can be contested and negotiation is a constitutive element of classroom practice (see Clarke, 2001).

Lave and Wenger provide a plausible connection between practice and learning, in which the learning is constituted as participation in practice and the mediating mechanism is the situated negotiation of meaning: "Participation is always based on situated negotiation and renegotiation of meaning in the world" (Lave & Wenger, 1991, p. 52). In this view, participation is not the medium by which learning is afforded, it is the thing itself. As such, patterns of participation take on a heightened significance as established forms of practice. Legitimate participation in institutionalised practice is taken to signify learning or the acquisition of knowledge. My focus in this paper is on those patterns of participation that stand in the same regard to the practices of the disciplines of science or economics as the classroom does to the research laboratory or the stock exchange.

KIKAN-SHIDO (INSTRUCTION BETWEEN DESKS)

Japanese teachers possess an extensive vocabulary with which to describe their practice. Among the myriad terms available to them is the term 'kikan-shido,' which means 'instruction-between-desks' 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 (Instruction Between Desks) 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.'

In this analysis, I examined kikan-shido from several perspectives: Its form as observed on the video record of class activity; its meaning as reconstructed by teacher and students in post-lesson video-stimulated interviews; and its function (intention, action, and interpretation). My intention in describing and discussing this pattern of participation is to examine the legitimacy of the characterisation of kikan-shido as a whole class pattern of participation, and to situate the actions of teacher and learners in relation to this pattern of participation. It will be argued that while engaging in kikan-shido, the teacher and the students participate in actions that are mutually constraining and affording, and that the resultant pattern of participation can only be understood through consideration of the actions of all participants.

In the Australian LPS video data, it is clear that all three teachers made extensive use of "instruction-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. In the lessons analysed in this study, the scaffolding activity was more likely to involve questioning students than simply telling them an answer or a procedure to use.

For the Australian teachers, the activity of "instruction 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.

In presenting this analysis, three examples have been chosen to illustrate the diversity of practice evident within the Australian data (constraints of space prevent the complete reproduction of the data here).

Example 1: A1-L8 (0:33:47 to 0:36:26) Guided Questioning by Teacher – Non-Routine Task

Example 2: A3-L8 (0:27:59 to 0:31:52) Guided Questioning by Teacher – Routine Task

Example 3: A4-L12 (0:31:18 to 0:33:27) Explicit Teacher Demonstration

In relation to these examples, it is useful to consider some related interview data (attenuated for reasons of space):

Interview with Teacher 1 (T1)

T1 like I get down on my knees a lot and try not to be . . . I don't want my presence to be *overpowering*. I don't want them to think, "Oh she's *over* me just telling me what to do." I don't want to come down on them

T1 Oh . . . this was *terrible* [slow] . . . I-I ar as soon as I started going around oh I felt bad about this . . .

 It just sort of . . . was made *very obvious* that I hadn't . . . but that that's also another thing that I do, I do go to see them straight away so they can tell me . . . what they don't understand – that that gives me a much better . . . understanding of whether . . . what I have done up the front is of is of any value at all.

Interview with Student from School 1

S1 It's really good when Mrs T1 comes around to everyone individually . . . it's so if you are not sure about anything . . . you just like . . . she'll come around.

There are four key aspects to Teacher 1's participation in kikan-shido that emerge from the data illustrated by the brief examples above:

- The students' perception of the teacher's commitment to be "there" for "everyone"
- The teacher's deliberate use of physical positioning to minimise any intimidation of the students and, implicitly, to reduce the prominence of the inevitable power difference between teacher and student
- The inadequacy of the student's use of the term "explain" to encompass the teacher's instructional action. Video evidence suggests that the teacher's actions were commonly much less directive or transmissive than is suggested by the term "explain" as used in student interviews.
- The teacher's utilisation of kikan-shido as the means by which to gauge the success of her whole class presentation.

THE CO-CONSTRUCTION OF WHOLE CLASS PATTERNS OF PARTICIPATION

Of major interest for the purposes of this paper is the evidence that kikan-shido was a pattern of participation to which both teacher and students subscribed and which was co-constructed by them. In designating kikan-shido as an example of a "whole class pattern of participation" I need to demonstrate that it had a recurrent form, recognisable to those participating in it. This is not to say that the meanings attributed to the activity by those participating in it were correspondent. The point has already been made that individuals can participate in a practice whilst being positioned differently within it,

and whilst attributing different characteristics to the activity. That is, without being identical, the participants' descriptions of the activity make it clear that they are talking about essentially the same form, but they may attribute quite different functions to that form. The other essential element is the need to demonstrate that all participants can shape the particular body of practice signified by kikan-shido. That is, that the pattern of participation is co-constructed.

Evidence that students contribute to the form taken by a pattern of participation such as kikan-shido can be found in a statement from a seventh-grade student in an earlier study.

Davy Oh we do muck around (both laugh). When me and Darren we just talk. When we've got our hands up we just talk during so she comes. Then when she comes we get back to work. Or maybe some hot day we're just talking or mucking around, or pushing people around. Something like that . . . 'Cause sometimes I might have me hand up for five minutes. She's right next to me and she goes over the other side of the room. And that's why I start mucking around . . . so I get her attention.

This provides explicit acknowledgement by the student that the teacher's participation in kikan-shido can be manipulated.

The extent to which kikan-shido, as practised in the Australian classrooms analysed in this study, has distinctive cultural or national features is immediately suggested when classrooms in other countries are investigated for evidence of the same practice. From the comparison of sequences of ten lessons, taught by three competent Australian teachers, with matching data sets from countries such as the USA, Hong Kong, Mainland China, The Philippines, and Germany, it appears that, in general, the Australian teachers commit more time to kikan-shido than do the teachers in the other countries.

CONCLUDING REMARKS

In this paper, I have attempted to frame the argument that any theory of classroom practice must conceive of the activities in the classroom as co-constructed. Kikan-shido as it has been reported here is clearly a dance done by teachers and students, where the steps are improvised according to need. The participants in the classroom, teacher and students, are complicit (co-conspirators) in this improvisation. Acceptance of this point has implications for the research designs by which we study the activities occurring in classroom settings.

A corollary of this point is the problematisation of learning and teaching as distinct processes and as disjoint bodies of practice - at least to the extent that this disjunction is applied to classroom settings. The need has been identified elsewhere (Clarke, 2001) for a single term to encompass the conjoint, co-constructed body of practice signified in Russian by *obuchenie*.

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 pattern of participation (the example used in this paper is *kikan-shido*), they may interpret its function differently. Nonetheless, the study of patterns of participation offers one approach to capturing both the fluidity of social interaction and its regularities.

If we conceive of institutionalised patterns of participation as taking on the status of bodies of practice, 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 (eg 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 significantly greater agency to the participants in a practice. This analysis has provided some examples of how that agency is enacted.

Acknowledgement: The author would like to acknowledge and thank Melanie Nash for her meticulous work in searching the interview record for teacher and student accounts of *kikan-shido*.

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