

Guest Editorial...

Researching Classroom Learning and Learning Classroom Research

David Clarke

One of the central goals of the mathematics education research community is the identification of classroom practice likely to facilitate student learning of mathematics. In the paper by Clarke, Breed and Fraser in this issue of *The Mathematics Educator*, the results of an investigation into the outcomes of the Interactive Mathematics Program (IMP) undertaken back in the early 1990s are reported. Why is this important? Because the focus of the analysis was an expanded conception of the outcomes of classroom practice that included both the cognitive and the affective consequences of introducing a problem-based mathematics program. The findings demonstrate that the consequences of a particular curriculum and its associated classroom practices cannot be adequately characterized solely by the mathematical performance of the students. Most importantly, the IMP classrooms studied were most clearly distinguished from conventional classrooms by affective rather than cognitive outcomes. At the time, this was an attempt to embrace a broader vision of valued classroom practice and significant learning outcomes than could be documented in an achievement test. The message of this research has contemporary significance, but in the time since that study was conducted our capacity to investigate classroom practice and to connect it to learning outcomes has increased considerably.

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The Participant's Voice

I have argued consistently and persistently (Clarke, 1998, 2001, 2003) that since a classroom takes on different aspects 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. Our capacity to improve classroom learning depends on such understanding. The methodological challenge is how to document and analyze the fundamental differences in how each participant experiences any particular social (classroom) situation. My colleagues, Sverker Lindblad and Fritjof Sahlström (2002), argue that if early researchers had access to the tools for data collection and analysis that 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. Thorsten (2000) has made this point very clearly in relation to the Third International Mathematics and Science Study (TIMSS).

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. (Thorsten, 2000, p. 71)

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).

International Comparative Research

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 analyzed 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.

Watanabe (2001) quotes White (1987) as writing “we should hold Japan up as a mirror, not as a blueprint.” This powerful and appealing metaphor can serve as a general characterization of one of the major uses of international comparative studies of classroom practice. The agency for the interpretation and adaptation of any documented practice resides with the person looking in the mirror. There is no invocation of absolute best practice – the judgement is a relativist one, and an instructional activity with a high degree of efficacy in Hong Kong may retain little effectiveness when employed in a Swedish classroom, where different cultural values inform and frame the actions of all classroom participants. Most importantly, we are encouraged to study Japanese (or South African or German) classrooms not solely for the purposes of mimicking their practices but for their capacity to support us in our reflection on our own practice. The mutuality of the potential benefit provides further motivation for such research.

There is a small but growing body of research that works at developing techniques of documenting classroom interaction in ways that will facilitate high-quality analysis of children’s learning. The transfer from single-microphone audio (as in the early studies), via single-camera video (as in many recent studies) to multi-camera and multi-audio (as in the studies at the technological forefront) is not primarily technology-driven, but rather motivated by the recent shifts in education theories on learning, from a view of learning as transfer to a view of learning as constructed in action (see Sfard, 1998, for a discussion). Thus, technological sophistication is a requirement of recent

theory, rather than a matter of sophisticated equipment for technologically-minded project coordinators. This is an essential point: Educational research, like research in the physical and biological sciences, must make optimal use of available technologies in addressing the major problems of the field. But the prime motivation must be “What are the big questions and what tools do we need to address these questions?” rather than “What questions can be addressed with available tools?” Our research must be fuelled by a need to answer important questions, not by a need to use new tools. In addition, it is the first question that will lead to recognition of the need for new tools and provide the motivation for their development.

The Learner’s Perspective Study: Complementary Accounts

Data collection in the Learner’s Perspective Study (<http://www.edfac.unimelb.edu.au/DSME/lps/>) involves a three-camera approach (Teacher camera, Student camera, Whole Class camera) that includes the onsite mixing of the Teacher and Student camera images into a split-screen video record that is 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 three teachers in each of ten participating countries (Australia, Germany, Hong Kong and mainland China, Israel, Japan, Korea, The Philippines, 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. Data collection will commence next year in the Czech Republic, England and Singapore.

Each participating country uses 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 three participating 8th grade classrooms. The three mathematics teachers in each country are 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 is used as stimulus for student reconstructions of classroom events, students are given control of the video replay and asked to identify and comment upon classroom events of personal importance. Each teacher is

interviewed at least three times using a similar protocol.

Goffman's conception of a working consensus as a transient convergence on a locally viable interpretation (Goffman, 1959) is a particularly apt characterization of the goal of the consensus process operating in many interpretive research teams (e.g., Cobb & Bauersfeld, 1995; Stigler & Hiebert, 1999). The research in which I have been involved (e.g., Clarke, 2001) problematizes such consensus and attempts to synthesize portrayals of practice from 'complementary accounts' provided by researchers and the participants in the research setting relating to a common body of data (rationale provided in Clarke, 1998).

I would like to assert the inevitable existence of multiple reflexivities between theory, research into practice, and the practice of research. The argument is predicated on three basic premises:

1. The discourse of the classroom (for example) acts to position participants in ways that afford and constrain certain practices.
2. The discourse of educational research acts to position participants in ways that afford and constrain certain interpretations.
3. The adoption of a theory of learning in social situations will inevitably find its reflection in the manner in which those situations are researched.

These fundamental reflexivities are seldom acknowledged. Since research activity constitutes a form of learning or knowledge construction, the processes by which a research project is conducted should be in harmony with whatever theory of learning structures the researcher's analysis of data. Consistency between methodology and theory should be a matter of purposeful and deliberate design. Lorrie Shepherd turns this argument delightfully on its head in her paper "Psychometricians' Beliefs About Learning" (Shepard, 1991), where she contends that the disputes of the testing community can be explained in terms of differences in the beliefs about learning held by the various educational measurement specialists. In particular, Shepard argues that the beliefs of many psychometricians derive from an implicit behaviorist learning theory in flagrant contradiction with evidence from cognitive psychology. What Shepard does to good effect in her paper is reverse engineer psychometricians' learning theories on the basis of their test instruments. The fruitfulness of this approach is fully evident in

Shepard's provocative question, "But what if learning is not linear and is not acquired by assembling bits of simpler learning" (Shepard, 1991, p. 7).

In the case of the Learner's Perspective Study: Research guided by a theory of learning that accords significance to both individual subjectivities and to the constraints of setting and community practice must construct and frame its conclusions (and collect its data) accordingly. Such a theory must accommodate complementarity rather than require convergence and accord both subjectivity and agency to individuals not just to participate in social practice but to shape that practice. Research that aims to apply such theories must construct its methodologies accordingly and draw from available technologies in ways that afford rather than constrain the methodological ambitions of the researcher.

A Layered Vision

International comparative classroom research need not appeal to a separate and distinct research paradigm from that enacted in conventional classroom research, although the methodological and theoretical considerations are more complex than research within a single culture. Part of the power of international comparative research lies in its capacity to offer us the opportunity to juxtapose, compare and contrast documented practices drawn from settings that simply would not pertain in our local culture. What form does teaching competence take when confronted with a class of 60 or more students (as is the case in the Philippines)? How must we reconceive our notions of effective instructional practice to accommodate apparently successful classrooms in which students seldom if ever speak to each other (as pertains in some Asian classrooms)? How much more compelling must our theories of learning become if they can be demonstrated to accommodate and explain learning in such disparate settings?

As new theories of learning and social interaction develop, research techniques must have the capacity to accommodate these new theories. All too often it is forgotten that any use of technology in a research setting implies the existence of an underlying theory on which the type of data, the means of data collection, and the anticipated method of analysis are all predicated. Of all data sources currently available to researchers in education, videotape data seems most amenable to secondary analysis. Further, the potential of videotape data to sustain secondary analysis carries an associative potential for the synthesis of those analyses.

Multi-site international research projects offer access to a layered vision of practice, outcome and theory development. It may help to illustrate this stratification with examples from the Learner's Perspective Study.

Classroom Practice – Lesson Events

At the level of classroom practice, the challenge has been to find a suitable instructional unit to provide the basis for comparative analysis. Demonstration of the inadequacy of “the lesson” to serve this role (at least in the form of nationally characteristic lesson “scripts” or “patterns”) has led to analyses focusing on the “lesson events” from which each lesson is constituted. Lesson events such as “Beginning the Lesson,” “Learning Tasks,” “Guided Development” (Whole class discussion), “Between Desks Instruction,” and “Summing Up” have emerged as internationally recognizable activities, differently and distinctively employed and enacted in classrooms around the world.

Patterns of Participation

In participating in each of the lesson events identified above, teacher and students position themselves and are positioned within the constraints and affordances offered by the classroom setting and its peculiar practices (*peculiar* here is used in all possible senses). The consequences of this process of social positioning are characteristic *patterns of participation* accessible to classroom participants (and co-constructed by them) in ways that reflect each individual's unique interaction with the classroom setting and community.

The Distribution of Responsibility for Knowledge Generation

Each classroom affords and constrains access to various patterns of participation. Within the patterns of participation characteristic of a classroom can be found the “distribution of responsibility for knowledge generation” – a much more useful characterization of the classroom than a simplistic dichotomization into teacher-centered and student-centered, and much more revealing of the sociocultural nature of learning.

The use of video material supported by post-lesson video-stimulated interviews provides a complex database amenable to analysis at any and all of the three levels indicated above. Complex databases, configured in anticipation of multiple and complementary analyses, offer our best chance to match the complexity of social phenomena with an

appropriate sophistication of approach. Advances in technology bring us ever closer to the realization of this vision. The developmental pathway that has led us from early attempts at classroom observation and process-product studies to our present level of sophistication represents an on-going attempt to accommodate the complexity of social situations.

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 in education are compounded by the fluid and transient nature of the phenomena we seek to describe. Attempts to categorize social behavior 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 honored in the methodology but transcended in the analysis. Those of us who have accepted the challenge of researching classroom learning continue to learn how better to undertake classroom research.

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