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Jonas Emanuelsson[1] · **Fritjof Sahlström**[2]

Abstract

Beginning in the 1960s and early seventies, classroom research contributed to understandings and insights concerning the complexities and diversities of teaching. In the late 1990s, classroom research began to also include student voices in the classroom. Socio-cultural theory turned the empirical focus toward student interaction, and methodological development made new insights possible. The impact of this paradigmatic change is still in progress. At the same time, a rapid growth in international comparative classroom studies emerged, where the two most recognized comparative classroom research initiatives have been the TIMSS Video Studies, the first one initiated in 1995 at the University of California, Los Angeles, and the Learner's Perspective Study (LPS), initiated in 1999, at the University of Melbourne's International Center for Classroom Research (ICCR). In this paper, we ask what it takes to carry out successful international classroom research, using the LPS as an example. The analysis shows that the LPS project design made it possible for research groups from different countries and cultures to participate in building a sustainable community of research practice specialized in working with the complexities in the study of teaching and learning in classrooms. Of particular importance was the intense and sustained collaborative work on data, where researchers of varying seniority and experience met and carried out scholarly work in relation to a shared dataset. While also having disadvantages, the heavy emphasis on data was crucial for creating and sustaining a reflexive international research community.

Keywords International comparative classroom research · Research collaboration · Black box · Integrated data sets

1 Introduction

In the 2018 World Yearbook of Education, Martin Lawn described the development of international comparative educational research, from its beginning in the 1950's, to the multitude of international large-scale assessment programs present today. The basis for this development was the notion that the "the whole world should be seen as a single educational laboratory", as formulated by the Swedish researcher Torsten Husén and colleagues (Heyneman, 2004, p. 346). At about the same time as the beginning of the highly successful standardized quantitative testing programs, classroom interaction research was also beginning to find its feet. In the early beginning, classroom research was mainly about

measuring the performance of students on tests before and after classroom activities to draw inferential conclusions. Often those tests were complemented with background characteristics of the students, the teachers and their schools with surrounding areas. A common research interest was to identify patterns of co-variance that could contribute to explanations of why outcomes from some classrooms were seemingly better than from others. This did not succeed as expected. One of the reasons for this was the lack of an empirically based understanding of the complexities of the everyday life in classrooms, for teachers and students.

2 Aim

Over the years, classroom researchers have continued trying to get closer to the actual practices of teaching and learning. The aim of this paper is to problematize and discuss what it takes to facilitate scholarly understandings about teaching and learning across classrooms in different countries.

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Here we especially scrutinize the collaborative aspects of research.

3 Background

In a comprehensive review, Mattessich, Murray-Close and Monsey (2001) examined 281 collaborative studies and identified 20 factors that make research collaboration successful. Among other characteristics, they argued for the need of a skilled conveyor who has organising and interpersonal skills, and that there be established and frequent both formal and informal communications between the collaborating partners. For successful collaboration, members of the collaborating group should also share an understanding and respect for each other and their respective cultural norms, values, limitations and expectations (pp. 7–10). In a more recent and interesting large analysis in *Science Advances*, Hsiehchen, Espinoza, and Hsieh (2015) carried out a study of multinational teams and diseconomies of scale in collaborative research. Analysing the relationship between team size, international composition, and publications and citations, based on a dataset of 24 million articles, they concluded that to a certain point, size matters, but that there is a tipping point when the number of researchers grows too high; that successful collaborations require a core committed team (Hsiehchen et al., 2015, p. 5), and that international collaboration adds to the quality and quantity of project publications. These findings seem to resonate with our experiences of the LPS project (cf. Bennich-Björkman, 1997, for an older but comprehensive review of innovative research environments).

From a perspective quite different from that of Hsiehchen et al. in 2015, a research group called the *Matsutake Worlds Research Group* have addressed international research collaboration from an anthropological point of view. In an *American Ethnologist* article, they reflected insightfully on their experiences of understanding the biological, social and psychological contexts of the Matsutake mushroom. They described their work as being experimental, in conducting joint fieldwork, joint analyses and being involved in collaborative writing. All these experiments required group members to be specialised in the different areas required in the project. They described these as follows.

> These experiments push us beyond our training, requiring bravery—and opening new possibilities for the discipline of cultural anthropology. We call our process "strong collaboration," that is, a form of collaboration in which explicit attention to the process is part of the project. (2009, p. 381)

While classroom interaction is not a mushroom, and cultures of teaching are different than the cultures studied in the Matsutake project, classroom teaching seems to be at least as varied, context-dependent and culturally situated as the Matsutake mushroom. In many ways, the LPS project in focus here, adhered to the same characteristics. In another, related study, Scott, Woolcott, Keast and Chamberlain (2018) argued for new measures that shed light on how and why (or why not) collaborative project networks achieve sustainability, removing the current reliance on conventional, linear management and evaluation approaches. Scott et al. (2018) found nine features characterizing the collaborative project they analysed. The project was found to consist of a large number of elements, which interact dynamically, in non-linear ways. Feedback, self-organization and co-evolution are salient features of a holistic system, with history both at actor and system level, enabling functioning under non-balanced conditions (Scott et al., 20,198, pp. 1080–1081). Before we return to the LPS in more detail we give an overview on the development of classroom research.

3.1 Teacher focus in classroom research in the 1960 to 1980 s

In the 1960s, classroom researchers became interested in peeking inside the black box of education and began developing methods for observing and recording teaching, and especially the acts of teachers in the classroom. What turned out to become classical studies by Bellack et al., (1966), Sinclair & Coulthard (1975) and Mehan (1979) were published, contributing substantially to a growing empirically based understanding of classroom processes, and establishing fundamental concepts such as the Initiation-Response-Evaluation structure for teaching.

The term black box might initially bring to mind the crash investigation method, where technical log data from the black box of an airplane or some other mode of transport is investigated in order to understand how an accident was caused. This was not the case for the early classroom research. On the contrary, the interest was in finding out how classrooms work. Understanding how things work is much more difficult than understanding why they fail. And despite doing their best with what was available and succeeding well in doing so, the early classroom research did not fully deliver on its promise, and the matter of how inputs are converted into outputs within the 'black box' of the classroom continues to be unknown (Cuban, 2016).

Following the early work, teaching has been massively investigated by means of different research approaches (e.g., Wittrock, 1986; Cochran Smith, 2007; Biddle, Good & Goodson, 1998). These studies have contributed to understandings and insights concerning the complexities and

diversities of teaching in a multidisciplinary way, establishing different kinds of expertise on teaching within different frameworks. For a long time now, teaching has been regarded as having specific characteristics such as the "persistence of recitation", that is, interaction based on students' recitation of the book used in teaching (Hoetker & Ahlbrandt, 1969, p. 163).

In his seminal work Mehan (1979) analysed interaction in teaching and put forward a specific characteristic pattern in terms of the Interrogation-Response-Evaluation sequence: the teacher asks a question with a student reply which then is evaluated by the teacher in a typical IREsequence. The almost omni-presence of the IREpattern is one of the most stable findings in relation to classroom interaction, and has been shown to be persistently present in classroom interaction. Further, classroom research has demonstrated that student interaction in classrooms is constrained by several factors internal to the organization of classroom communication. In particular, this constraint concerns limits in the number of speakers in the public classroom discussion (Alton-Lee et al., 1993; Sahlström, 1999, 2002). These factors cause pressure for students to become involved in side-talk, talking to their peers when they should not, causing teachers to address disciplinary issues much more often than wished for (Tainio, 2011).

3.2 Bringing the international learner into focus in the 1990s

Beginning in earnest in the 1990s, to classroom research was added an interest in understanding student voices in the classroom (Alton-Lee et al., 1993; Hicks, 1995; Bloome & Theodorou, 1988; Sahlström, 1999, 2002). The methods of analysis presented were a further development of previous work in the field, in particular in terms of pursuing local sequential relationships between co-occurring interactions, but also in terms of facilitating a context-sensitive analysis of different student actions in the same classroom. Methods utilised also put further emphasis, among teachers and students, of the co-production of teaching. Parallel recording and transcription made it possible to see not just that students and teachers do and orient to different things at the same time, but that they do these different things recognizably in relation to other co-occurring interactions.

TheXXXnclusionn of students in classroom research occurred as a consequence of simultaneous developments in theory and practice. Socio-cultural theory, as advanced by researchers such as Jean Lave and Etienne Wenger (1991), Rogoff (2003) and Sfard (2008), turned the empirical focus toward student interaction. The impact of this paradigmatic change is still in progress, and has led to an ever-increasing number of books, dissertations and articles focusing on the actions and interactions of learners, within a varied and growing body of research.

3.3 International comparative classroom studies

At the same time as the socio-cultural shift within classroom research, a rapid growth in international comparative classroom studies emerged, as part of the ever-growing interest in international comparisons. From being almost non-existent, international comparative classroom research has seen a significant increase in both interest and volume. The two most recognized international research programs for comparative classroom research have been the TIMSS Video Study, initiated in 1995 at the University of California, Los Angeles, and the Learner's Perspective Study, initiated in 1999, at the University of Melbourne's International Center for Classroom Research (ICCR). (For an overview of the design of these and several other international comparative classroom studies see Niss et al., 2013).

The TIMSS Video Study was the first large-scale international video study, looking at nationally representative samples of teaching in the US, Germany and Japan. Its main results were reported by Stigler & Hiebert (1999), in a report in which the authors described what they called "cultural scripts" for teaching, with significant differences found between Germany, the US and Japan. The TIMSS Video Study had the aim of representing *the average or typical* teaching going on in classrooms in the participating countries. The TIMSS-R Video Study (Hiebert et al., 2003) expanded the scope of the original TIMSS Video Study in three very important ways, as follows: (i) The number of participating countries was increased to six; (ii) The focus was explicitly on the classroom practices of countries that performed significantly better than the USA on TIMSS student achievement measures; and (iii) A much more rigorous and systematic approach was adopted, including the development of suitable codes by which to characterise classroom practice.

One immediate result of these changes was the relinquishing of the idea of 'teaching scripts" in favour of allowing for more flexible characterisations of patterns in classroom practice. The TIMSS Video Studies (particularly TIMSS-R Video) provided the research community and policy makers with valuable insights. Perhaps most importantly, the potential value of large-scale international comparative video studies was demonstrated. However, the TIMSS video studies did not explain the differences in student achievement in terms of differences in teaching. Neither did TIMSS video studies document or analyse the learner's perspective on classroom interaction, hence failing to recognise the importance of studying both teachers and learners in the production of teaching.

3.4 The learner's perspective study

Motivated by the design and results of the first TIMSS Video Study, the Learner's Perspective Study was initiated in 1999 (Clarke, 2011). Its aim was to expand and in part challenge the 'cultural script' theory of Stigler & Hiebert (1999), by studying in detail what goes on in classrooms around the world. One of the ambitions was to situate Australian mathematics teaching in relation to results from the first TIMSS video survey study (Stigler & Hiebert, 1999). Another significant ambition was also to document student desk-work and hence give possibilities of analysing how public classroom interaction relates to the more private work of students at their desks. In interviews both teachers and students were invited to comment on the recorded lessons. To begin with, the LPS involved four countries, namely, Australia, Germany, Japan and the United States.

The LPS project gradually grew and research groups from additional countries were invited to join. Eventually the collaborations involved 16 countries. In each country, a sequence of at least ten consecutive lessons in mathematics was studied at three different schools. Both the teacher and the students were recorded, and both teachers and students were interviewed immediately after the lessons with the actual recordings as stimulated recall. The elaborate technical design has since become a virtual standard, with worldwide adoption within the field of classroom research. Clarke et al., (2006a) put forward a set of seven overarching questions ranging from addressing issues concerning the presence of coherent and culturally specific student and teacher practices, over relationships between these practices, to variability within classrooms and countries as well as amongst classrooms and countries. In contrast to other large-scale international studies, the LPS stood out by not being anchored in an international organisation such as IEA, OECD, or ICMI. Instead, it originated from researcher driven interests and was conducted by research teams from the participating countries (Niss et al., 2013).

Researchers involved in the LPS examined the patterns of participation in eighth grade mathematics classrooms. The scope of the research was to document not just the obvious social events that might be recorded on a videotape, but also the participants' construal of those events, including their memories, feelings, and the mathematical and social meanings and practices which arose as a consequence of those events. Because of the highly selective nature of the classrooms studied in each country, no claims can be made about national typification of practice, however any regularities of practices sustained across thirty lessons demand some consideration of the possible causes of such consistency. Whether or not such identifiable learner characteristics exist as cultural traits, the LPS project was predicated on a belief that international comparative studies are likely to reveal patterns of practice that are less evident in studies limited to a single country or community (Clarke et al., 2006a, p 3).

A significant characteristic of the Learner's Perspective Study was the documentation of the teaching of sequences of lessons, rather than just single lessons. The data related to each lesson comprised classroom videos, teacher questionnaires, video-stimulated student and teacher interviews, field notes from classroom observation, students' productions, and resources used by the teacher. For classroom videotaping, three cameras were used (teacher camera, student camera, whole class camera), including the onsite mixing of the teacher and student camera images into a split-screen video record, which was then used in the student and teacher interviews to stimulate reconstructive accounts of classroom events. In each of the participating countries, three 8th grade classrooms in government schools in major urban settings were chosen according to the common criteria of teacher competence (as defined by the local community), demographic diversity, and the avoidance of atypicality in the student group.

The project was originally designed to complement emergent national norms of student achievement and teaching practices with an in-depth analysis of mathematics classrooms in Australia, Germany, Japan, and the USA. Since its inception, research teams from other countries have joined the Learners' Perspective Study. The research teams participating in the Learners' Perspective study were based in universities in Australia, China (both mainland and Hong Kong SAR), the Czech Republic, Germany, Israel, Japan, Korea, New Zealand, Norway, The Philippines, Portugal, Singapore, South Africa, Sweden, the United Kingdom and the USA. This combination of countries gave good representation to European and Asian educational traditions, affluent and less affluent school systems, and mono-cultural and multicultural societies. The results of the Learner's Perspective Study have been reported in many papers and chapters. For an overview, please refer to the five volumes of the LPS book series (Clarke et al., 2006b; Clarke et al., 2006c; Shimizu et al., 2010; Leung et al., 2014; and Kaur, et al., 2013), published by Sense Publishers.

In sum, the most distinctive differences between the design, scope and organisation of the LPS and the smaller project-based classroom studies of the 1960s lies in the LPS ambition to capture the complexities in the classroom rather than focussing on the organisation of interaction. In the 1990s students were given clearer voices, and technology used to generate data became more sophisticated and included video documentation. Beginning with the first TIMMS video study the international comparative interest grew (cf. Niss et al., 2013). Extensive efforts were made to typify the classroom nationally in terms of 'teaching

scripts'. The LPS represents a different type of study both in its acknowledgement of complexity and in its multi video and audio set-up to capture the voices of both teachers and students. However, the most significant and distinctive difference between the LPS and prior classroom research is in how the study was set up to allow for and cater for collaborative work between different research groups, representing local expertise in relation to the mathematics classroom in each setting. The LPS also facilitated additional development of such collaboration. In the next section we develop these distinctive features further.

4 Research questions

Our approach takes its outset in the quite ambitious effort of the Learner's Perspective Study, or LPS. In this paper we concentrate on the following two questions:

1. What were the substantial contributions of the LPS for the development of international collaborative classroom research?
2. What are the distinctive project features required for collaborative understanding of teaching and learning in classrooms across cultures?

5 Method

In answering these two questions, we develop an argument on why the Learners' Perspective Study (LPS) afforded distinct possibilities for co-operating research groups to get closer in understanding the situated complexities of classroom teaching and learning. We begin by identifying and describing major contributions and insights from the LPS. Subsequently, and drawing upon the literature review, we offer brief accounts of qualities that make research collaboration successful, by doing a comparison of findings from the literature review and how collaboration within the LPS took place. We also comment shortly on how technological developments, especially when it comes to documenting classroom activities with recordings, is in a symbiotic relationship with fieldwork design.

In the report on the above-mentioned study by Mattesich et al. (2011), they grouped the 20 factors they argue are indicators for successful research collaboration in six broader categories, namely, Environment, Membership characteristics, Process and structure, Communication, Purposes and Resources. Scott, Woolcott, Keast, and Chamberlain (2018) arrived at nine core aspects, as follows: large numbers of elements, dynamic interaction, non-linearity, feedback, self-organization, co-evolution, holism, system, history both at

actor and system levels, and functioning under non-balanced conditions (Scott et al., 20,198, pp. 1080–1081). Hsiehchen et al. (2015) and the *Matsutake Worlds Research Group* present similar, and in part additional, features. For the analysis relating to our second research question, on distinctive project features, we condensed and combined the categories from the research literature into five inter-related and partly overlapping conceptual aspects, presented in Table 1 below. The aspects are used to scrutinize and describe distinctive features required for collaborative classroom research within the LPS-project.

6 Results

6.1 The two major contributions and insights from the Learner's perspective study

Before we describe our analysis, it is of use to point out the two major LPS project research contributions, which were as follows: firstly, the need for understanding of separate lessons as part of a teaching sequence, and secondly the need for understanding that the relationship between learning and teaching is deeply culturally embedded.

In a 2006 publication, Clarke argued for the need for understanding lessons as part of a teaching sequence, where the so-called teaching scripts presented in prior research were not the core aspect they had been claimed to be, as follows.

> The analyses reported in this chapter reveal significant structural variation in the different lessons in any

Table 1 Conceptual framework for analysis of distinctive project features, adapted from Mattesich et al., 2001, Hsiehchen et al., 2015, and Matsutake Worlds Research Group, 2009

Concept	Source
Environment, membership and community	Mattessich, Murray-Close and Monsey (2001) Hsiehchen, Espinoza, and Hsieh (2015) Matsutake Worlds Research Group (2009) Scott, Woolcott, Keast & Chamberlain (2018)
Processes, structures and communication	Mattesich et al. (ibid.), Matsutake Worlds Research Group (ibid.) Scott et al. (ibid.)
Purposes	Mattesich et al. (ibid.) Scott et al. (ibid.)
Resources	Mattesich et al. (ibid.), Matsutake Worlds Research Group (ibid.)
Complementary perspectives	Matsutake Worlds Research Group (ibid.) Scott et al. (ibid.)

one teacher's lesson sequence. This degree of structural variation suggests that a single lesson pattern is unlikely to be an accurate or a useful representation of either an individual teacher's lessons or of any nationally-representative sample of lessons. (Clarke et al., 2006d, p. 2)

Clarke's argument underscores the complexities of typifying cultural differences, and contests the idea that teaching scripts is a valid way to describe teaching characteristics.

The second major contribution of the LPS, and of Clarke and his colleagues' subsequent work, concerns the need for understanding classroom teaching and learning as embedded in multi-layered national contexts, where the shared lesson contents turned out to be embedded in quite different educational cultures. Swedish students and teachers were shown to be working in ways which prioritised student contributions, leading to dynamic interaction. However, when contrasted to classrooms from other cultures, the price for the Swedish participation was shown to be a certain loss of teacher control over mathematical content, increasing the risk of watered-down content understanding (Emanuelsson & Sahlström, 2008). In a follow-up project to the LPS, namely, the Lexicon project (Mesiti et al., 2021), Clark and his colleagues assembled a 'lexicon' for the teaching of mathematics, identifying, comparing and contrasting national naming and description practices. The project was initially inspired by the specific Japanese naming practices, such as *kikanshido* for teaching between desks while walking around the class and *matome* as a term for the conclusion or 'big idea' within a lesson. The particular strength of Clarke's approach was not to turn his interest into a normative exercise, but to try to find out how teachers in other countries named and described teaching practices. This analysis resulted in uncovering previously unknown deeply culturally embedded ways of naming and describing mathematics teaching, and hence made it possible to discuss them among teachers and researchers.

6.2 Distinctive project features for collaborative understanding of teaching and learning in classrooms across cultures

Within the LPS, the point of departure was that to understand the complexities of international comparison of teaching and learning in classrooms, it is necessary to have a well-developed and thoroughly elaborated understanding of classroom interaction, and to understand the different perspectives teachers and students bring to classroom teaching and learning. A solid understanding of the problems and pitfalls of international comparing and contrasting is required. Further, one needs sophisticated technology and

robust procedures for organising, handling and analysing data. As we have argued above, the Learner's Perspective Study checked all of these requirements. In this, it is not alone. Several other projects, such as the TIMMS and PISA video studies, reached the same fulfilment of requirements (Niss et al., 2013).

6.2.1 Environment, membership and community

What makes LPS stand out from the other projects is the researcher driven interest and long-standing and dynamic community of the project. Within the frame of the overarching LPS agenda, collaborating research groups formulated different research questions departing from different theoretical positions. "This theoretical eclecticism is an immediate and pragmatic consequence of the manner in which the various analytical approaches reflect the different research foci of the international researchers that make up the research community of the Learner's Perspective Study", (Clarke, et al., 2006c, p. 18) wrote when developing an argument for why research must construct its methodologies accordingly and draw from available technologies in ways that afford rather than constrain the methodological and theoretical ambitions of the researcher.

It is clear that Clarke and his team at the University of Melbourne managed to set up a researcher-driven international team, in which the community-of-practice features of working together, facilitating entry for newcomers, facilitating both informal and formal communication within the project, and sustaining long-term commitment, resulted in the rather unique breakthrough of culturally contrastive classroom research. This breakthrough had an actual impact within both research and policy that was very much in line with the factors identified by Mattessich et al., (2001).

Both authors of this paper were involved in the LPS from quite early stages. Besides the above more formal ways of collaborating we also remember more informal ways of building trust and an understanding of each other's culture. We remember Melbourne workshops, national park writing retreats, sightseeing, picnics, conference dinners, conference concerts, cooking competitions, food market shopping, hikes. We remember talk, walks and sunburnt colleagues, fishing and monkey chasing in Durban, fire alarms in shared international housing. There were children, husbands and wives, parents and siblings. Personal, private and off-task, it may seem. However, it is apparent that intertwined with and in part facilitated by the seemingly private were scholarly aspects, such as scrutinizing and discussing each other's' manuscripts and challenging emergent patterns in a joint effort to reach a deeper understanding of classrooms in our own country and the countries of others.

6.2.2 Processes, structures and communication

Within LPS, many discussions were held in relation to the immense work involved in generating the data required for participation. The check-list for entry was both expansive and expensive, leaving many of the project researchers with an impression of empiricism, where data somehow were assumed to generate results in themselves. Which they did not do.

What the data did, though, was generate commitment and mutual respect (Mattessich et al., 1992). When seated at the LPS table, you could be sure of all others having put in the same effort as you in order to get there. And once at the table, the data provided for endless opportunities for getting to know the collaborators, because there was much to discuss and seek agreement on. These items included school selection, teacher selection, student selection, camera angles, microphone choices, transcription protocols, translation issues, data storage, compression standards, to mention a few. The expectations on data to be provided for each of the participating schools that were the ticket of entry to the LPS project were substantive. Besides digitised answers on international benchmark-tests, questionnaires and consent forms from teachers and students, materials for each of the 30 lessons, the materials that should be delivered to the data-base at ICCR included digitised copies of three camera angles, time coded transcripts (for teachers' and students' microphones and interviews) in the original language and in translation to English. Each lesson should be summarised in the form of a lesson plan that can be described as a meta-characterization of the lesson, in terms of a time-coded index with descriptions of how interactional patterns and content focus changed during the flow of the lesson. Also scanned copies of students' work with attached translations to English, photographs, etc., should be attached to the other materials. Documents describing rationales for sampling of schools, teachers and classrooms should accompany each data set. The list was longer; for more detail see the technical guidelines for LPS data processing (The Learners' Perspective Study, undated).

6.2.3 Resources

In LPS, the massive data to be generated, organised, compiled and shared facilitated what Herbert Clark in a 2006 chapter described and analysed as *participatory commitment.* Clark's chapter is an analysis of the constitutive features of human sociality. He argued that joint commitments are at the core. In the LPS project, the shared commitment to data generation made the participating teams wary of the mutual dependencies, both in intellectual, practical and monetary terms. The seemingly naive faith in the power of shared data facilitated mutual trust, respect and commitment, and a process for continuous learning both for established teams and for individual members. However, as with any choices, there was also a price to pay, with recognizable trade-offs to be made with respect to the balance between time spent on shared theoretical contextualization and time spent on shared materials. Below, we try to unpack some of these matters.

"Sociality is not a mere abstraction. It is a feature of life that gets played out in concrete social actions." Herbert Clark wrote (2006, p. 147). Within the LPS, there were no doubts about the concrete character of the work to be carried out. Compiling an integrated data set with three schools of 10 lessons, each with complementary data, as sketched above, was sure to weed out any possible illusions of working with abstractions. There is no exact measure of the proportion of funding that the participating countries spent on data generation, management and preparation, but for the Swedish team, this was approximately 75% of the available funding.

Dealing with data does not immediately convert itself into published articles. As with many other data-heavy projects, LPS was off to a quite slow start in terms of publishing. Most publications originated from the individual research groups and a substantial number of joint presentations at international conferences (cf. Emanuelsson & Clarke 2004; Clarke et al., 2010). LPS also published five volumes that were the result of joint editorial work and peer-review among the collaborating researchers (Clarke et al., 2006b; Clarke et al., 2006c; Shimizu et al., 2010; Leung et al., 2014; and Kaur et al., 2013).

6.2.4 Purposes

The shared hard work of data production and management within the LPS, and the intense interaction required in order to resolve the coordination of the data process, provided a rich substrate for the kind of learning that takes place as a consequence of changing participation and contrasting one's perspective on teaching and learning with others equally engaged in very much the same fieldwork and analyses. In designing, revising and working with data, learning trajectories from legitimate peripheral participation to experts with agency and with successively more elaborated and more complex understandings of the classroom were accomplished, both within and across the participating teams. Toward the end, the LPS project had generated a large number of internationally oriented researchers not only with surprisingly specific knowledge of video compression rates and ethical approval procedures, but also with emerging and deeper understanding of the complexities of classroom interaction.

In 1994, Silvia Caravita and Ola Halldén published an often-cited article on learning and conceptual change in *Learning and Instruction*. In arguing for the need of understanding the social context of learning in the analysis of conceptual change, Caravita and Halldén wrote that "change involves a set of ways of thinking about a conceptual domain, which are elicited in specific contexts of action and discourse". They went on to cite the Italian author Italo Calvino:

> "But which is the stone that supports the bridge?," Kublai Khan asks. "The bridge is not supported by one stone or another," Marco answers, "but by the line of the arch they form." Kublai Khan remains silent, reflecting. Then he adds: "Why do you speak to me of the stones? It is the arch that matters to me." Polo answers: "Without stones there is no arch." (Calvino, 1974, p. 82).

When considering the arches of the LPS—its insights into individual lessons as part of teaching sequences, and its insights into the cultural embeddedness of teaching and learning—it is highly valuable also to recognize the character of its stones, and the way that the particular features of this international collaborative classroom project provided particular contexts of action and discourse.

Some of the specifics that were learned within the LPS would never get used again, and changes in technology quickly made some of the insights obsolete, as in any technology-intense research project. But knowing how to compress, convert and securely store video files, or how to turn the knobs of vPrism and Studiocode, was not the point. The point was that the work built a respectful community, where a major obstacle to international comparative qualitative research was dealt with, namely, implicit researcher nationalistic normativity, in both patriotic and exoticizing variants.

6.2.5 Complementary perspectives

When viewing international empirical classroom materials with colleagues, implicit normativity is commonplace. It takes hard work to realize how culturally bound one's own perceptions of classroom teaching and learning are (see Nuthall, 2005 for a very insightful argument). When seeing Swedish eighth-graders sitting without any materials in front of them in a class on linearity a few minutes after having seen US children use a rich variety of materials for learning the same thing, it is hard not to move into talking about what is good and bad. When listening to a Japanese colleague (Minoru Ohtani) explain the bio-psychological and embodied non-linear underpinnings of the Japanese

approach to teaching linearity, it's hard not to think German or Swedish teachers could benefit from some of that attitude. We also sensitized our own eyes and saw characteristics of classrooms in our own countries not easily seen before. One example of this is when Japanese colleagues saw that group work is surprisingly often used as a teaching resource in Japan when seeing pairs or triplets of students repeatedly seeking each other's assistance without being orchestrated by the teacher, despite earlier arguing it seldom or almost never happens. It also became evident that Japanese teachers in some classrooms often instructed students to talk to their desk-mates about questions and problems posed, thus forming a group working together.

Discussions such as these take place all the time when international academics meet. Most of the time, the evidence provided for arguments that are sometimes also heated is anecdotal. Sometimes it is based on having viewed a short clip or seen something in a newspaper article. With the risk of being too sweeping, the ensuing discussions are often more focused on either using the observations as support for the argument that the teaching carried out in one's own country indeed is superior, or on using the observations for exotifying praising of the teaching carried out in some other, presumably superior (often Asian) country.

In LPS, this was not the case. Because of the marathon labour with data, we actually knew what happened in the classrooms, and we also knew that others knew. This shared common knowledge (cf. Edwards & Mercer, 1987), created through a culture of mutual respect and trust, made it possible for us from Sweden to remind our Japanese colleagues of all the off-task student chatter also taking place in lessons where linearity is physio-psychologically grounded. Further if these seemingly 'off-task' activities of students are scrutinized in detail they might not turn out to be off-task at all (Emanuelsson & Sahlström, 2006). Or it could happen for our Japanese colleagues to realise that some of the practices thought to be somewhat unique to their classrooms also occurred frequently in other countries. And when having these discussions, we were able to refer to sequences and instances, and to pull up these materials and actually have a look. There was, we argue, a unique community of international research practice, built on hours and hours of video data, and all that ensued from making them happen.

7 Discussion

As with all projects, also the LPS came with a price. In 2008, the authors of this paper published the article referred to above, *The price of participation*, where we addressed the balancing between the quality of the content taught and the need for allowing for student input and initiatives.

Simplified, our basic argument was that when setting up for, inviting to, and allowing for student participation, there was a price to pay in terms of teacher control, where one of the costs turned out to be the mathematical coherence in the teaching of linearity. You can get students to talk, but it will cost you some consistency in the handling of mathematics. Through various presentations and other interactions with teachers and classroom researchers, we found that these results are in alignment with their experiences, generating fruitful discussions, and perceived as 'true' in terms of trustworthiness.

In the LPS, as argued above, the ticket of entry was data, and what we in the project mostly talked about was data, sometimes from analytic points of view, but quite often with more practical research and pedagogical concerns. The advantages of this approach are numerous, as argued above. However, there was also a cost. Much in the same way as with linearity in the Swedish classroom studied by Emanuelsson & Sahlström (2008), this cost concerned the short-term level of project analytic coherence. In addition to data, trust and commitment, a shared, or at least a clearly expressed, view of theoretical points of departure adds to the feasibility cross-cultural comparison. In LPS, there was not a shared specific theoretical framework, besides a generous social constructionist framework. This made some of the work difficult, slower and less analytically sharp than what could have been the case. The price of participation in LPS was comparatively higher, if measured in the ratio of time spent versus pages of published analyses, than for less ambitious studies. However, in the broader context of building long-term communities of research practice it was a price that seems to have been well worth the payment.

The LPS design was aimed at capturing the complex and often sophisticated processes emerging in classroom practices from several and complementary positions. It was set up as it viewed the classroom, with complementarity, complexity, several voices and perspectives in mind, working with differences and similarities rather than striving to find essence. The large group of researchers that took part in LPS had unique opportunities to experience and appreciate the reflexivity that data-based knowledge of classroom cultures around the world provides for. In a research and policy environment where specific conclusions have a tendency to get made from sometimes quite a distance from the classroom (Hattie 2008), the long-term benefit of having a large group of researchers who share extensive knowledge of what goes on in practice in classrooms is of tremendous value. And the work carried out within the LPS reminds us of why educational research indeed is a hard science (Berliner, 2002). In line with Nuthall's (2005) argument for the truth lying in the details, there is a need for resources to scrutinise these details. The LPS afforded support for handling the complexities of educational research, and ample resources, including ample time for highly specific and detailed scholarly discussions in an international environment.

While writing this paper, we came across the previously mentioned Matsutake research project article. At the time of publication in 2009, it was a theoretically radical project, with an early argumentation for the kind of rhizomatic thinking that today is common in the humanities and the social sciences. The text argued well for a reconceptualization of collaboration in anthropology, with insightful observations of the landscape between big science and individual science. LPS was not at all defined as postmodern. On the contrary, the project relied on conventional mainstream conceptualizations of theory, method and data.

Despite this, the Matsutake project seemed to share many aspects with LPS. The character of collaboration, both within the project and with students, schools and teachers, the insistence on "looking several ways" (Clifford, 2004), and the interest in classrooms as situated and complex phenomena, are similar both for the education researchers in LPS and the mushroom anthropologists. In similarity to the *Matsutake Worlds Research Group*, the LPS did not aim at synthesising separate analyses into a whole. Further, the LPS did focus connections across different geographical sites rather than complementarity across different research specialities (Matsutake Worlds Research Group, 2009, p. 399). The LPS classroom was the Matsutake project's mushroom, and in both projects, the research subject informed the research design, aspiring to mimic the mushroom's and the classroom's "rhizomic sociality" (Matsutake Research Group, 2009, p. 399).

8 Conclusions

Looking back at the history of classroom research, it is clear that an impressive amount of new knowledge has been generated. But despite high ambitions, deep competence. and long-term commitment, few classroom research projects have been successful in crossing borders, both between cultures, and between research and practice. Returning to Berliner (2002), we believe that one of the more significant reasons for the relative success of LPS was precisely the diversity of scholarship for which Berliner argued:

> We should never lose sight of the fact that children and teachers in classrooms are conscious, sentient, and purposive human beings, so no scientific explanation of human behavior could ever be complete. In fact, no unpoetic description of the human condition can ever be complete. When stated this way, we have an argument for heterogeneity in educational scholarship

and for convening panels of diverse scholars to help decide what findings are and are not worthy of promoting in our schools. (p. 20)

To facilitate learning across cultures concerning the classroom, one needs not just theory, method and materials, but scholars, with opportunities to argue and listen with mutual respect on the basis of shared high-quality data, over extensive periods of time. We are thankful for having had a chance to be part of such a collaboration, provided through the academic leadership of Professor David Clarke.

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