Documenting the Learning of Teacher Communities Across Changes in their Membership

Jana Visnovska
The University of Queensland
<j.visnovska@uq.edu.au>

Teacher mobility is often viewed as a limitation of longitudinal analyses of teacher learning in communities, in which membership changes. I introduce an analytical tool developed to address the continuation of the learning of such communities across changes in membership. In the case analysis, I examine whether changes in membership should be framed as induction of new members into a single community that evolves across the years, or instead as the emergence of a new community each time the membership changes.

Teacher mobility is typically construed as a challenge to building local instructional capacity and to sustainability of school- and district-based instructional improvement efforts. Yet, it is one of givens of school reality. It is therefore vital that the lenses that we develop for guiding research and design of instructional improvement in mathematics take this aspect of school reality into account. Among the most important of such lenses are our conceptualisations of teacher learning and how it can be supported over time.

Research on teachers' learning has been dominated by a cognitive paradigm that focuses squarely on teachers' knowledge and beliefs (cf. Ball, 2000; Borko, 2004). This conceptualisation of teacher learning suggests that fundamental change in teaching practice – and therefore in students' learning – might be initiated by changes in knowledge of individual teachers (Clark & Peterson, 1986; Fennema & Franke, 1992). For longitudinal interventionist studies conducted with groups of mathematics teachers within this paradigm, teacher mobility presents a challenge. This is because changes in teacher group membership produce disruptions in studied phenomena.

Efforts to support teachers' development of sophisticated instructional practices have brought to the fore the social contexts of teachers' work and, in particular, the opportunities for learning that these contexts afford. Ways of theorising teachers' learning that draw on situated theories of activity have become prominent in research on teacher professional development. The theoretical underpinnings of this perspective on teacher learning are derived primarily from the work of Rogoff, Lave, and Wenger (Lave, 1991; Lave & Wenger, 1991; Rogoff, 1997; Wenger, 1998). This orientation conceptualises learning as a process that is inherently related to the social and cultural contexts in which it occurs and attempts "to break down a distinction … between the individual reasoner and the world reasoned about" (Cobb, 2001, p. 14126). Focus is on

> the changes that occur in people's reasoning as they move from relatively peripheral participation to increasingly substantial participation in the practices of particular communities. In their overview of this type of research, Lave and Wenger (1991) clarify that the cultural tools used by community members are viewed as carrying a substantial portion of a practice's intellectual heritage. As Lave and Wenger note, this implies that novices' opportunities for learning depend crucially on their access to these tools as they are used by the community's old-timers. (Cobb, 2001, p. 14122)

By equating learning with increasingly substantial participation, this conceptualisation takes changes in community membership into account. In their influential work, Stein, Silver, and Smith (1998) appropriated the construct of legitimate peripheral participation to

understanding ways in which newcomers learned as they participated in increasingly central ways in activities of the school-based community of mathematics teachers.

In the professional development study that provides the case for this paper, the changes in membership in the professional development group reflected teacher mobility in the district and were at times substantial.[30] Yet the theoretical and methodological framing of the study made it possible to both guide the professional development design and analyse the learning of this group in terms of an emergence and subsequent development of a single professional teaching community. As we reported elsewhere, this learning across 5-year period was substantial (Dean, 2005; Visnovska, 2009). This observation affirms that ambitious goals for teacher professional learning in longitudinal school- or district-based collaborations can be viable in districts with relatively high teacher mobility.

To illustrate why teacher mobility does not become a conceptual limitation in studies conducted within situated paradigm, I first discuss the background and the theoretical framing of the study and then introduce the analytical tool for understanding learning of a community across changes in membership. I conclude by discussing the kinds of insights into teachers' learning that the analysis of continuation of a community makes available and its' contribution to robustness of the interpretive framework for analysing the learning of professional teaching communities.

Background of the Design Study

I draw on a professional development design study (Brown, 1992; Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003) that we[31] conducted with the group of middle-school mathematics teachers in a diverse urban school district with a high-stakes accountability program. We began working in the district to provide teacher development in statistical data analysis at the invitation of the district's mathematics coordinator. We conducted a two-day summer institute and three one-day work-sessions during the first year of the study, a three-day summer institute and six one-day sessions during each of the subsequent four years, and a concluding three-day summer institute. The broad study question concerned the process of supporting teachers' development of instructional practices centred in students' reasoning (Cobb & McClain, 2001). The membership of the group was stable for the first 2 years but changed during the last 3 years as teachers moved into administrative positions or left the district and new teachers were inducted into the group.

Methodological Background

In developing the analytical tool that is the focus of this paper I adopted a community of practice lens elaborated by Dean and colleagues (Cobb, McClain, Lamberg, & Dean, 2003; Dean, 2005). For these authors, the term professional teaching community is not synonymous to a "group of mathematics teachers who collaborate with each other in some way". Specifying the distinction between a group and a community is important given that not every group composed of mathematics teachers would provide them with the climate, the need, and the resources for a deep, systematic engagement in issues relevant to their

---

[30] Nine teachers participated during the first 2 years. Three of them left the group and 6 new teachers joined the 6 continuing members at the beginning of year 3. At the beginning of years 4 and 5, four and two leaving teachers were replaced by the same number of new recruits respectively.

[31] Presented study was a part of a larger research project. The research team included the author, Paul Cobb, Kay McClain, Chrystal Dean, Teruni Lamberg, Qing Zhao, Melissa Gresalfi, Lori Tyler, and Jose Cortina.

profession. Some groups, nevertheless, have been documented to develop such resources (Carpenter et al., 2004). Based on review of the literature (e.g., Gamoran et al., 2003; Wenger, 1998), Dean and colleagues articulated the salient characteristics of a professional teaching community of mathematics teachers: a shared purpose or enterprise, a shared repertoire of ways of reasoning with tools and artifacts, and norms of mutual engagement.

In order to trace the emergence of the community and how it was supported, Dean analysed the development of four interrelated types of norms of mutual engagement that became established in the group: norms for (a) general participation, (b) pedagogical reasoning, (c) mathematical reasoning, and (d) institutional reasoning. These norms were documented empirically by discerning patterns or regularities in the ongoing interactions of the members of the group. A norm is therefore not an individualistic notion but is instead a joint or collective accomplishment of the group members (Voigt, 1995).

Dean (2005) analysed the emergence and subsequent learning of the community that provides the case for this paper during first 2 years of the study. She documented that that 19 months into the collaboration, the group had become a genuine professional teaching community. The shared purpose of the community centred on ensuring that students come to understand central mathematical ideas while simultaneously performing more than adequately on high stakes assessments of mathematics achievement. The norms of general participation that were key to the teachers' effective collaboration included building on others' contributions to discussions, asking questions, challenging others' assertions, as well as openly sharing problems experienced during instruction. These were in a strong contrast to the initial teachers' participation when challenges and conflicts were considered a violation of the participation structure and the teachers held their instruction private.

Dean's interpretive framework does not explicitly address changes in a group membership introduced by teacher mobility, because the group was stable over the years when the framework was developed. Even though the normative practices and the enterprise of a community are always generated and re-generated in the participation of its members, the term professional teaching community does not primarily refer to group membership. Rather, it refers to the collection of practices that are established as normative through teachers' participation in communal activities as the community pursues its purpose. The question that is central to establishing the continuation of a community across changes in its membership therefore concerns whether the normative practices of the group were re-generated after new members joined the group.

Analysis of Continuation of a Community

The data that I analysed consist of video-recordings of all professional development sessions in years 3-5 together with a set of field notes, copies of all the teachers' individual and collective work, and 9 classroom video-recordings of their statistics instruction that were produced for use in professional development sessions during years 3 and 4.

The analysis is guided by a framework that coordinates individual teachers' learning with the development of collective practices of the teacher community as they are situated in the institutional setting of a school district (Cobb, McClain et al., 2003). Building on interpretive framework for analysing the learning of professional teaching communities (Dean, 2005), I analysed the patterns and regularities in the ongoing interactions of the group members to establish normative practices of the group. The specific approach used to analyse data is an adaptation of Glaser and Strauss' (1967) constant comparative method, tailored for analysing longitudinal data sets that are generated during design experiments (Cobb & Whitenack, 1996). The tentative conjectures are continually tested

and revised while working through the data chronologically, resulting in a formulation of claims that span the entire data set but yet remain empirically grounded.

To understand whether the group of teachers continued to function as the community of practice after inclusion of the newcomers, and the process that supported their inclusion, I looked for evidence that would suggest (a) whether norms of general participation were explicitly negotiated with the newcomers, (b) whether old-timers[32] participated in normative ways, thus modelling participation for the newcomers, (c) whether the newcomers participated in normative ways or breached the norms of the community, and (d) how what I identified as a breach of a norm was constituted in the group (i.e., whether it was constituted as a breach). It was my conjecture that if the group continued to function as a professional teaching community, the general norms of participation would be re-generated in the newcomers' interactions gradually, but in relatively short period of time. I looked for evidence of the newcomers voicing disagreement (rather than pseudo-agreement), actively making sense of discussions, and building on others' arguments in their contributions. Supporting deprivatisation of teachers' practices was a major challenge in the original group of 9 teachers in the first two years. I was therefore particularly interested in whether the newcomers made their practices available for group purposes, and, if so, how the old-timers and research team supported deprivatisation of the newcomers' practices.

Dean (2005) reported that the evolution of normative practices during the first two years differed at times with respect to the type of activity. For example, the teachers still interacted as a pseudo-community (e.g., never interrupted each other) when they were engaged in pedagogical activities (e.g., discussion of their students' work) during year 1. However, when they were engaged in statistics, they built on others' contributions and directed their comments to each other, not the researcher. I therefore conjectured that while the newcomers might have participated similarly to the old-timers in some professional development activities, their participation might have differed significantly in others. To identify activities in which the newcomers' participation was different from that of the old-timers, I first looked at the relative *frequency* of the newcomers' contributions to the group discussions. I generated exact participation counts for the group of the newcomers and the old-timers in those cases in which the newcomers' lack of participation was noticeable. Given that we designed the professional development activities with the intention of providing the newcomers with ways to actively participate and contribute from the very beginning, I conjectured that the relative frequency of newcomers' contributions should soon become proportionally similar to that of the old-timers.[33]

It is important to clarify that while some newcomers and old-timers were talkative, others contributed less frequently but often indicated their intellectual presence throughout the debate. For this reason, comparing counts of individuals' contributions would be a poor indicator of the extent of participation in this type of analysis. I instead used sum of the utterance counts across the group of newcomers relative to that of the group of old-timers to indicate the extent to which the newcomers as a group (a) had access to the task at hand and the means to address it, and (b) were positioned as a resource during the whole group

---

[32] Following Cobb (2001), I use the term *old-timers* to label the teachers who were not newcomers in the given year. This term does not indicate age or years in a teaching position of the member.

[33] I weighted the counts against the numbers of the newcomers and the old-timers who were *actually present* during an analysed activity. I report the counts for an activity as a ratio that signifies (number of old-timers' contributions per a participating old-timer : number of newcomers' contributions per a participating newcomer), for example (7.5 : 8.2).

discussions. Opportunities for the newcomers to make contributions and pose questions are critical to their participation becoming more central. This is because such opportunities facilitate newcomers' development of both community-specific competencies, and identities as valued members of the community (Stein et al., 1998). I used the relative participation counts as an indicator of the types of professional development activities in which the newcomers might not have had access to legitimate participation. I then further analysed these activities to understand the reasons for disparities in the newcomers' and old-timers' contributions and how the newcomers' participation could have been better supported.

To further understand differences in the newcomers' and the old-timers' participation, I identified episodes in which the newcomers' *ways of reasoning* about mathematical and pedagogical situations differed from those that were normative among the old-timers. In particular, I looked for situations in which the group members noticed differences in interpretations and engaged in negotiations of meaning. Such situations constitute a variation of the first type of evidence that a norm is being established, in which meanings that have previously been constituted as normative are challenged and must be re-negotiated in the whole group discussion.

I used this methodology to analyse continuity of the professional teaching community at the beginning of years three and four, when the ratios of newcomers to old-timers present were relatively high (6 : 6 and 4 : 8 respectively, when all teachers were present in the session). I conjectured that the lower proportion of newcomers in the group in year four might contribute to a more seamless re-constitution of the norms of the professional teaching community. To better understand the induction process, I looked for patterns that spanned these two years.

Case Analysis and Findings

Findings reported here are from year three analysis. Findings from years 4 and 5 corroborated the identified patterns (Visnovska, 2009). To understand the extent to which the norms for general participation and institutional reasoning were re-established after the newcomers joined the group, I first documented how the old-timers introduced the goals of the group and their valuations of these goals to the newcomers. The old-timers especially described and elaborated four themes: how the group (a) attempted to understand students' thinking, (b) attempted to use both curriculum and statistics instructional sequences used in professional development sessions as resources to plan instruction, and "redo" the textbook unit on statistics, (c) learned about Japanese lesson study and attempted to understand collaborative improvement of lessons over time, and (d) worked on issues related to institutional context, and especially on supporting principals' understanding of what high quality mathematics instruction involved.

The old-timers also shared their valuations of the collaborative nature of the group, its non-threatening culture, and highlighted the aspects that helped them to deprivatise, that is, open up their practices to others. This was crucial as the private nature of instruction was a major obstacle in the initial emergence of the professional teaching community (Dean, 2005). During the initial 3 sessions, each of the six old-timers indicated that they positively valued the sessions because they happened in an intellectually demanding and collegial environment of the professional teaching community. They communicated their views of instructional improvement as a collective responsibility of the group and shared their valuations of deprivatised collaboration as a means to understand and improve instruction. Most importantly, the old-timers also demonstrated the deprivatised nature of their

instructional practices by bringing their students' work and classroom video to sessions, and by talking openly about difficulties that they faced in their instruction.

From the beginning, the newcomers actively attempted to make sense during the discussions. Each of the 6 newcomers asked at least one question or contributed a comment in the whole group setting by the end of session one. For example, Erin, a newcomer, shared how the job of teaching mathematics in their district is perceived in ways that make it difficult for teachers to admit that they make mistakes and need to learn.

> Erin: I think there is a fear, even in study groups, to admit that you don't know something, that you do not understand something. You are the *teacher*, so we are the *experts*, so we should know it. … I think that's a big fear. And you are talking about the planning is so task oriented, we become task masters. … We've got these things we got to cover (Year 3)

To understand the newcomers' opportunities for participation, I traced the relative frequency of their contributions to discussions in each professional development activity (e.g., solving a statistical task, analysing student work). From session one, it was typical that the newcomers frequently contributed to the group discussions. For example, during an activity, where the teachers solved a statistical task (session one), 47 contributions came from the 6 present old-timers, and 53 contributions came from the 6 newcomers (7.8 : 8.8). During the pedagogical reflections on this activity, the participation ratio was 8.7 : 5.8.

I identified only two cases of the newcomers' limited participation in professional development activities in year 3. The first occurred in session 2, when the group analysed classroom video of two old-timers co-teaching a statistics lesson (participation ratio 3.3 : 0.3). The second activity occurred in session 3, when the group continued to work on supporting principals' learning about high quality mathematics instruction that was initiated in year 2 (participation rate 15 : 5.2). I examined these cases to identify the specific demands of the activities and conjecture how the newcomers' learning could have been better supported. Overall, the general norms of participation were stabilised across all types of professional development activities by session four.

Lastly, I examined the newcomers' and the old-timers' nature of participation. I identified episodes in which the newcomers' ways of reasoning about mathematical and pedagogical situations differed from those that were normative among the old-timers. In terms of the teachers' mathematical reasoning, I identified no systematic differences between the two groups. In contrast, several exchanges evidenced that during the first two years, the professional teaching community developed a professional pedagogical discourse that was not immediately transparent to the newcomers to the group. In other words, the newcomers and the old-timers initially constructed different meanings while they sometimes used the same words (e.g., joint planning, re-teaching) to talk about specific pedagogical situations. I documented two episodes in which differences of this kind became evident in year three (both occurred in session 3). I discuss the first one here.

We asked the teachers to share what their opportunities were to talk to other teachers about mathematics instruction in their schools. A significant majority of the teachers maintained that it was not easy or at all possible for them to coordinate their planning time with other teachers. However, three newcomers stated that they regularly jointly planned their lessons. It transpired that there were two different views of joint planning in the group. For the newcomers, joint planning included situations where they split an instructional unit with a colleague and only had to prepare materials for a half of the lessons. Doing this was not time demanding, in contrary, it saved some preparation time and made the job of teaching more manageable. Three old-timers noted that joint planning encompassed discussing and analysing students' prior learning, "the actual presentation of

the lessons, the points we want to cover, could we have done this better" (Amy), and "sitting down and actually talking about what worked or may not work" (Marci). They maintained that such joint planning is both time consuming and intellectually demanding. Negotiations of meaning afforded by episodes of this kind, supported the newcomers' increasingly central participation in the professional teaching community.

Discussion

The analysis provides insights that are relevant to both (a) documenting actual learning of the teacher group and to (b) making design modifications that might be beneficial for future efforts to support the learning of professional teaching communities. First, the findings make it reasonable to talk of the evolution of a single community where the changes in the group membership are conceptualised in terms of induction of new members, rather than in terms of an emergence of a new community at the beginning of every year. More importantly, this analysis justifies that subsequent shifts in the normative practices that occurred in different years of the collaboration should be interpreted as learning of the single professional teaching community.

Second, the analysis provides initial evidence of substantial communal learning. This was especially in the negotiations of meaning between the old-timers and the newcomers. These negotiations indicate that the old-timers' pedagogical reasoning differed from the reasoning that most of their colleagues had developed while working in the district.

Third, this analysis reveals cases in which the newcomers' participation was not sufficiently supported. For instance, in the initial activities in which the teachers analysed classroom videos in both year 3 and year 4, the newcomers in the group did not readily have a way in which to meaningfully contribute to the group discussions. This suggests an avenue for further improvement of the professional development design.

Last, the group benefited from initial professional development activities in which the resources on which old-timers' and the newcomers' could draw were balanced. Activities that did not draw heavily on the old-timers' history of participation in the community provided more opportunities for the newcomers' participation, and therefore also more opportunities for the newcomers to uphold and contest the general norms of participation.

Conclusions

In reporting analyses on longitudinal learning of a professional teaching community the reviewers tend to indicate that member changes in the teacher group should be discussed as one of the limitations of the study. I would like to suggest that analytical and methodological approaches in which teacher mobility has to be construed as a limitation address problems that do not exist in educational contexts, namely, how to support learning of teacher groups that are stable over extended periods of time. The analytical tool presented in this paper allows for gaining insights into learning of professional teaching communities in which membership changes. As a result, the framework for analysing learning of professional teaching communities over extended periods of time (Dean, 2005) remains meaningful in professional development settings where teacher mobility is a part of reality and induction of new members a desired (rather than limiting) phenomenon.

Acknowledgements

References

Ball, D. L. (2000). Bridging practices: Intertwining content and pedagogy in teaching and learning to teach. *Journal of Teacher Education, 51*, 241-247.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15.

Brown, A. L. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *Journal of the Learning Sciences, 2*, 141-178.

Carpenter, T. P., Blanton, M. L., Cobb, P., Franke, M., Kaput, J. J., & McClain, K. (2004). Scaling up innovative practices in mathematics and science. Retrieved 2006, from http://www.wcer.wisc.edu/NCISLA/publications/reports/NCISLAReport1.pdf

Clark, C. M., & Peterson, P. L. (1986). Teachers' thought processes. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 255-296). New York: Macmillan.

Cobb, P. (2001). Situated cognition: Origins. In N. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social and behavioral sciences* (Vol. 21, pp. 14126 – 14129). New York: Elsevier Science.

Cobb, P., Confrey, J., diSessa, A. A., Lehrer, R., & Schauble, L. (2003). Design experiments in education research. *Educational Researcher, 32*(1), 9-13.

Cobb, P., & McClain, K. (2001). An approach for supporting teachers' learning in social context. In F. L. Lin & T. Cooney (Eds.), *Making sense of mathematics teacher education* (pp. 207-232). Dordrecht, The Netherlands: Kluwer.

Cobb, P., McClain, K., Lamberg, T., & Dean, C. (2003). Situating teachers' instructional practices in the institutional setting of the school and school district. *Educational Researcher, 32*(6), 13-24.

Cobb, P., & Whitenack, J. (1996). A method for conducting longitudinal analyses of classroom videorecordings and transcript. *Educational Studies in Mathematics, 30*, 213-228.

Dean, C. (2005). *An analysis of the emergence and concurrent learning of a professional teaching community.* Unpublished Dissertation, Vanderbilt University, Nashville, TN.

Fennema, E., & Franke, M. (1992). Teacher's knowledge and its impact. In D. A. Grouws (Ed.), *Handbook on research on mathematics teaching and learning* (pp. 147-164). New York: Macmillan.

Gamoran, A., Anderson, C. W., Quiroz, P. A., Secada, W. G., Williams, T., & Ashman, S. (2003). *Transforming teaching in math and science.* New York: Teachers College.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* New York: Aldine.

Lave, J. (1991). Situating learning in communities of practice. In L. B. Resnick, J. M. Levine & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 63-82). Washington, DC: American Psychological Association.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Rogoff, B. (1997). Evaluating development in the process of participation: Theory, methods, and practice building on each other. In E. Amsel & A. Renninger (Eds.), *Change and development: Issues of theory, application, and method* (pp. 265-285). Hillsdale, NJ: Erlbaum.

Stein, M. K., Silver, E. A., & Smith, M. S. (1998). Mathematics reform and teacher development: A community of practice perspective. In J. G. Greeno & S. V. Goldman (Eds.), *Thinking practices in mathematics and science learning* (pp. 17-52). Mahwah, NJ: Lawrence Erlbaum.

Visnovska, J. (2009). *Supporting mathematics teachers' learning: Building on current instructional practices to achieve a professional development agenda.* Unpublished Dissertation, Vanderbilt University, Nashville, TN.

Voigt, J. (1995). Thematic patterns of interaction and sociomathematical norms. In P. Cobb & H. Bauersfeld (Eds.), *Emergence of mathematical meaning: Interaction in classroom cultures* (pp. 163-201). Hillsdale, NJ: Erlbaum.

Wenger, E. (1998). *Communities of practice*. Cambridge: Cambridge University.