Building professional learning communities with the aid of activity theory

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Introduction

In recent years, professional learning communities (PLCs) have been endorsed as social infrastructures that can effectively support mathematics teachers' collective and individual learning to bring about instructional reform in mathematics classrooms. Encouraged by success stories, PLC building initiatives have been integrated in school practises and professional development programmes. In spite of the many available instructive resources, however, fostering effective PLCs remain to be a challenging task because of its multifaceted nature. It is also a lengthy process that requires sustained commitment from various parties. It is therefore not unheard of for PLC building initiatives to fail or be abandoned along with the classroom reform initiatives they intended to achieve.

In this paper, I suggest that activity theory, particularly Engeström's (1993) activity system model, can be used to aid in fostering the multifaceted work of building PLCs. I explore this potential by demonstrating how a PLC initiative, along with the tensions that come with it, can be mapped into an activity system model. From the demonstration, I draw on affordances, considerations and possibilities for proceeding in utilising the activity system model in PLC building.

Professional learning communities

A PLC is essentially a group of teachers, possibly with other stakeholders, working together for a common goal over a sustained period of time, where this goal is often specified to be in line with increasing the individual and collective ability of teachers to improve student learning. Studies have generally supported the efficacy of PLCs in achieving this goal (e.g., Vescio, Ross, & Adams, 2008). Schools with strong PLCs have been associated with sustained innovative initiatives, and improved student achievement and teacher instruction. PLCs have, thus, become a catchphrase for reforming schools and classroom instruction. But forming PLCs is not always as simple as putting together a group of teachers to work on something. In view of this, knowledge of the workings of what are considered to be effective PLCs becomes instructive for PLC building initiatives.

The nature of the work that a PLC engages in can be quite varied. But regardless of the work, effective PLCs are differentiated according to certain characteristics they are found to possess (e.g., Hord, 2004; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Differences in characterisations exist, but the following four points provide a general overview.

First, the community must possess *shared values and vision for improving student learning*, that being the primary purpose that drives the work of the PLC. Second, there must be *reflective and professional collaborative learning norms and practices* in the community to efficiently advance the work of the PLC. That is, there is collective involvement in pursuing learning that will serve the work of the PLC. In addition, collaborative interactions should include sharing of each other's practice, and holding honest and productive conversations about them – including the unpleasant ones – marked by reflection, understanding, trust and mutual respect.

Third, there must be *adequate and conducive infrastructure and resources* to carry out the work the PLC intends. These may include school policies, classroom setups, meeting venues, and schedules. And finally, there must be *supportive and shared leadership* for matters related to shaping the shared values and vision, carrying out the collaborative learning activities, and providing the infrastructure and resources required for the PLC work.

Thus, for PLCs to effectively carry out their directive, we need to pay attention to the personal, interpersonal, and institutional orientations, relations, and resources involved in the work. It is a multifaceted effort involving multiple parties over a sustained period of time. This makes this potentially fruitful undertaking also fraught with difficulties.

Activity theory and the activity system model

Activity theory offers a framework for studying psychological and sociocultural phenomena using the activity system as the primary unit of analysis (Engeström, 1993). It is not a theory in the conventional sense of the word. Rather, activity theory "consists of a set of basic principles which constitute a general conceptual system that can be used as a foundation for more specific theories" (Kaptelinin, Kuutti, & Bannon, 1995, p. 191). The theory traces its roots to Russian scholars such as Vygotsky and Leontyev. But in this paper, we focus mainly on Engeström's (1993) contribution to the theory, particularly in his depiction of the activity system model.

The basic structure of the activity system model reflects the mediated and contextual nature of activity. It recognises that activity is oriented by an object, where action on the object may be mediated by certain tools. It also recognises that activity exists in context, which also influences how the object of the activity is acted on. Engeström characterises the activity's context as consisting of community, division of labor, and rules. The model's typical representation is given in Figure 1.

> In the model, the *subject* refers to the individual or subgroup whose agency is chosen as the point of view in the analysis. The *object* refers to the "raw material" or "problem space" at which the activity is directed and which is molded or transformed into *outcomes* with the help of physical and symbolic, external and internal *tools* (mediating instruments and signs). The *community* comprises multiple individuals and/or subgroups who share the same general object. The *division of labor* refers to both the horizontal division of tasks between the members of the community and the vertical division of power and status. Finally, the *rules* refer to the explicit and implicit regulations, norms and conventions that constrain actions and interactions within the activity system. (Engeström, 1993, p. 67, emphasis in the original)

The model is not meant to replace activity theory. Rather, it is meant to be a conceptual tool to aid in analysis that makes use of the activity theory lens.

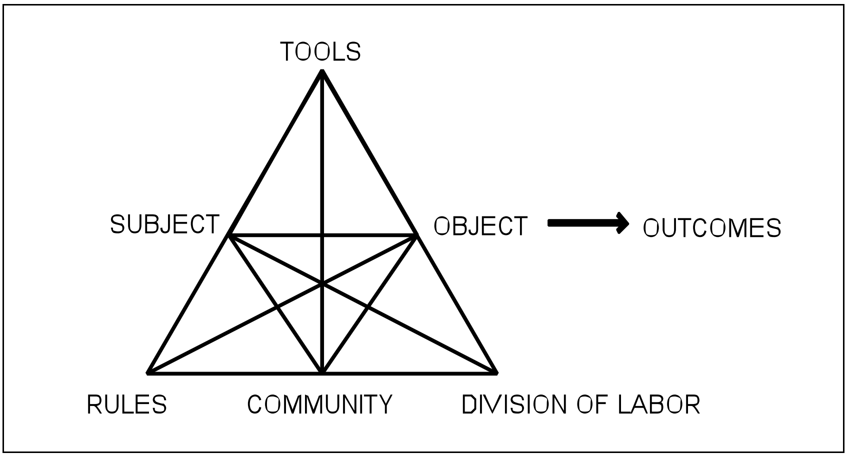

Figure 1. A typical representation of Engeström's (1993) activity system model.

A particularly useful principle for analysing activity systems that Engeström underscored was how *contradictions* naturally exist in activity systems. These contradictions are manifested by tensions in the system. For instance, a conflict between two different rules in the system may be observed, or the tools utilised may be found to be inappropriate for the subject to use. These contradictions and tensions shape how activity progresses since they initiate changes that can either move activity forward or possibly make it lose ground.

While the model presents the components and their interrelationships in a static form, it is important to recognise that the model offers a more functional heuristic to characterise activity dynamically. One can carry this out by describing and analysing the nodes and contradictions in the system historically or in relation to other activity systems.

Levine (2010) recognised the potential of activity theory as a lens to study the work of teacher community. In particular, citing the activity system model, Levine expressed how “activity theory has heuristic affordances for parsing activity into pieces and seeing how the pieces interrelate, even if in reality, all of these components are mutually constitutive” (p. 125). He adds that activity theory can bring into focus the state and change of the different aspects of collaboration including its outcomes. It thus presents itself as a promising and viable tool not only to study the multifaceted nature of PLC building but also to foster its development.

However, using Engeström’s activity system model is not straightforward; there is no standard method for operationalising an analysis based on it. How exactly can we use the activity system model to aid in fostering PLCs in schools? A reasonable starting point is to map the PLC initiative into an activity system model. In this paper, I will demonstrate that this mapping is possible using an actual proceeding of a PLC initiative. Some tensions arising from the work are also translated in the model. From this demonstration I draw out possible ways to proceed when using the model for PLC building.

Mapping a PLC initiative into an activity system model

The PLC initiative I utilise in this paper was directed towards implementing better mathematical problem solving (MPS) instruction in the classroom. It was composed mainly of me as facilitator and six mathematics teachers who were teaching Secondary 1 students in a private high school in the Philippines. The PLC was meant to be a supportive social infrastructure for the teachers as they taught MPS in their classrooms.

In mapping the initiative into an activity system model, I began with the conceived setup for the initiative. The previously identified characteristics of effective PLCs were taken into consideration as well as the other needs or requirements peculiar to the specific PLC work. I focused primarily on a main activity of the PLC involving a set of regular collaborative meetings.

These collaborative meetings were conducted to discuss the MPS task and the MPS lesson (i.e., the objects) that teachers will be implementing in the classroom. Principles (i.e., conceptual tools) expected to guide the work included Pólya's (1945/1973) problem solving model and Hiebert and Wearne's (2003) identified signposts for a problem solving classroom. Pólya's model essentially exhorts a solver to go through the steps of Understanding the Problem, Devising a Plan, Carrying Out the Plan, and Checking and Extending – not necessarily in a linear fashion – when solving a mathematical problem. On the other hand, Hiebert and Wearne note how a problem solving classroom is where (1) the mathematics is made problematic to students, (2) better solution methods are examined, and (3) appropriate information is provided to students at the right time. The PLC work also made use of the Practical Worksheet (Toh, Quek, Leong, Dindyal, & Tay, 2011) – essentially a worksheet (i.e., material tool) that incorporates guide questions based on Pólya's model – to facilitate teacher instruction and student learning of MPS.

As it was work intended for classroom implementation, the main stakeholders (i.e., community) of the activity were the classroom students. Adequate and conducive norms, practices, resources and infrastructure (i.e., rules) were required for the conduct of regular collaborative meetings and the conduct of the MPS classes where this lesson was to be implemented. In terms of roles and responsibilities (i.e., division of labor), there were necessary preparations required of the PLC members prior to coming to collaborative meetings. Active participation from all members during the meetings was also expected. Finally, the teachers were the ones who were tasked to carry out the MPS lesson in the classroom. The outcome of the activity was projected to be embodied by the successful implementation of MPS lessons.

Figure 2 illustrates the activity system model of this conceived setup of the PLC initiative. In the model, the effective PLC characteristic of shared vision and values for student learning were mainly reflected under tools which implied the PLC's regard for how MPS can facilitate the learning of mathematics. The required norms, practices, resources and infrastructures for collaborative learning can be found mainly in the rules, and partly in the division of labor. Finally, shared and supportive leadership is partly incorporated in the division of labor, but was mostly implied by the assumption that the setup reflected in the model received endorsement from all relevant parties.

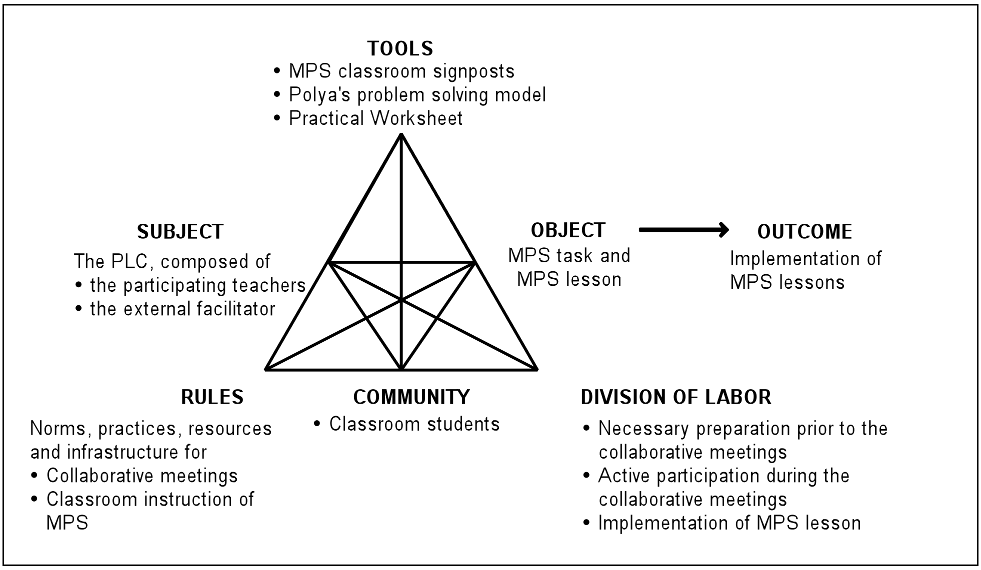

Figure 2. The activity system model of the conceived setup for the PLC work.

Representing tensions found in some episodes of the PLC initiative

The model provides a snapshot of a conceived PLC initiative setup. But as for any activity, the system is not stable and harmonious (Engeström, 1993). Tensions exist in activity and these are often manifested in episodes, which indicate possible obstacles to accomplishing the activity goals. In the PLC initiative modelled above, a number of such episodes did occur. For the purpose of this demonstration, I only describe three episodes during the collaborative meetings that indicated tensions. Their corresponding translations as inner contradictions in the activity system model are then given.

Episode 1: The bell rings signifying the end of the collaborative meeting but the extensions for the MPS task were not yet fully elaborated.

This episode signifies how the time allotted for collaborative meetings was not enough to carry out the planned agenda for the meeting. This can be represented by a contradiction between a rule (i.e., the agreed setup for the meeting) and the object of the activity.

Episode 2: A teacher came to a meeting unprepared in that she was not able to work on the task that the PLC was going to discuss because of other school-related matters she had to attend to.

This tension can primarily be represented by a contradiction between subject and division of labor. But this episode also points to the need to consider external factors that were also affecting the PLC's activity system. In particular, teachers were also part of the larger activity system of the school; it is within this system that the PLC's activity operates. Teacher roles and responsibilities in the school compete with the teachers' roles and responsibilities in the PLC.

Episode 3: A teacher was lobbying to modify a task such that information crucial to its solution would be pre-identified instead of letting students figure it out themselves. This was brought on by the teacher's consideration of the limited time in the classroom and more weightily by the fact that students' works were going to be marked.

This episode suggests a contradiction between the tools node and the rules node. In particular, the tension was manifested by how the problem solving classroom signpost of "providing the appropriate information at the right time" and "making the mathematics problematic" clashed with the existing MPS class protocol of assessing the students' works. This was compounded by the limited time allotted for the MPS class.

In the model, these contradictions can be represented by broken jagged lines. Figure 3 represents the PLC initiative's activity system model when the tensions manifested in the episode above are incorporated in it.

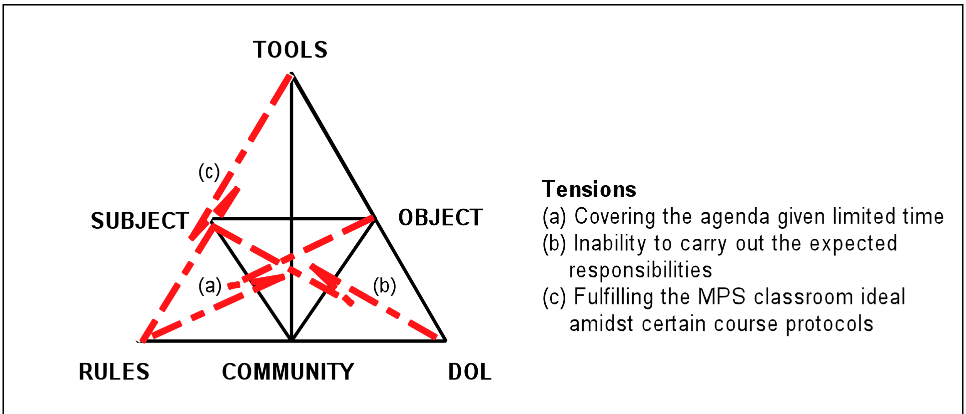

Figure 3. A representation of the contradictions and tensions that manifested in the PLC initiative's activity system.

Possible ways to go forward

In this paper, I demonstrated how a PLC initiative related to mathematics teacher development can be mapped into an activity system model, and how episodes from the initiative indicating tensions can also be mapped as contradictions in this system. It thus provides better confidence in the utility of using activity theory to foster PLCs.

At this point, I do not provide a specific way to go forward. Rather, I present some affordances, considerations, and possibilities in using the activity system model for PLC building. First, a potentially productive way to proceed is to zoom in on the tensions that were identified in the system. These can be individually analysed. Better decisions can then be made on whether additional action is necessary to address these tensions, and if so, what form they would take. For instance, to address tension (a) in Figure 3, depending on the perceived gravity of its effect on the activity's outcome, one can choose to (1) not do anything (i.e., just more quickly go through the agenda next time), (2) find a way to lengthen the meeting duration, (3) adjust the agenda, or (4) add other PLC activities that will not require contact time as a group to address the part of the agenda that will be missed out.

Second, the constructed model is in itself a heuristic tool for keeping track of the various elements involved in the PLC building initiative and their interrelationships. Thus, when changes are made in the PLC setup, say in response to certain identified tensions, the model can be updated and effects on the system can be monitored.

And finally, as indicated by the second episode described above, it must be recognised that there are other activity systems, which also influence how the PLC activity proceeds. These may be likewise constructed to provide better insight into the PLC initiative. Possible contradictions between systems may be mapped when necessary. The activity system alluded to in the second episode above refer to the larger activity system of the school community. Another potentially productive track is to consider the activity system of the teachers' individual classrooms. In doing this, the intended outcomes of the PLC work in the mathematics classroom can be monitored as well. Previous work that examined classroom instruction using the activity system model (e.g., Jaworski & Potari, 2009) can be consulted in this regard.

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