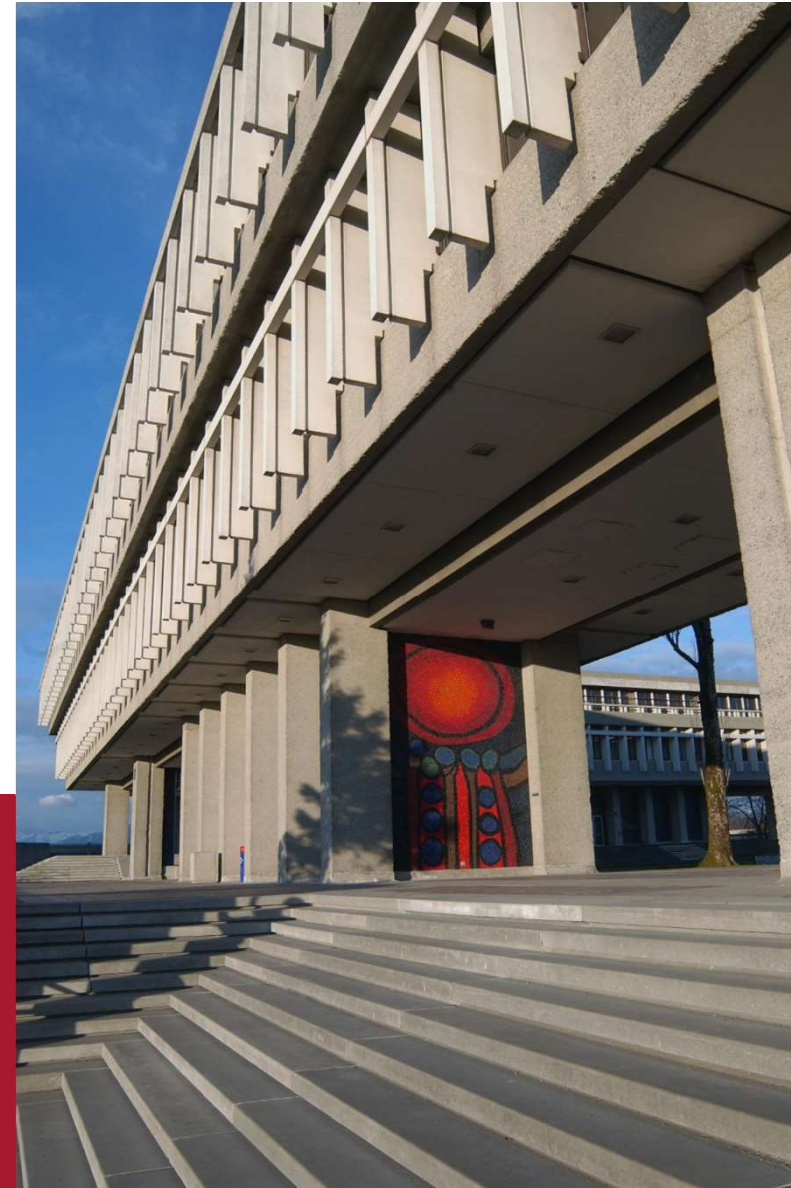


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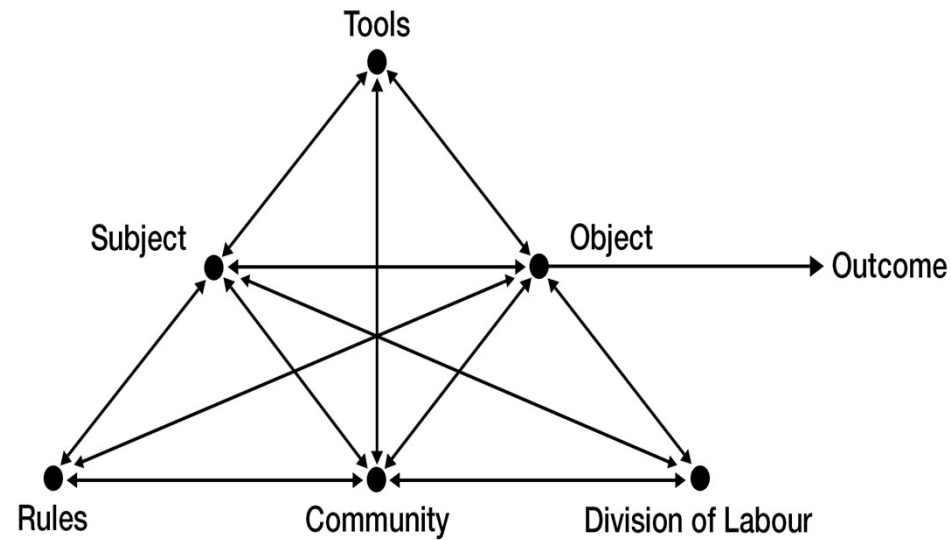
# Tensions in Implementing Mathematics Journaling

Annette Rouleau – PME 42 - 2018



# Tensions in Implementing Mathematics Journaling

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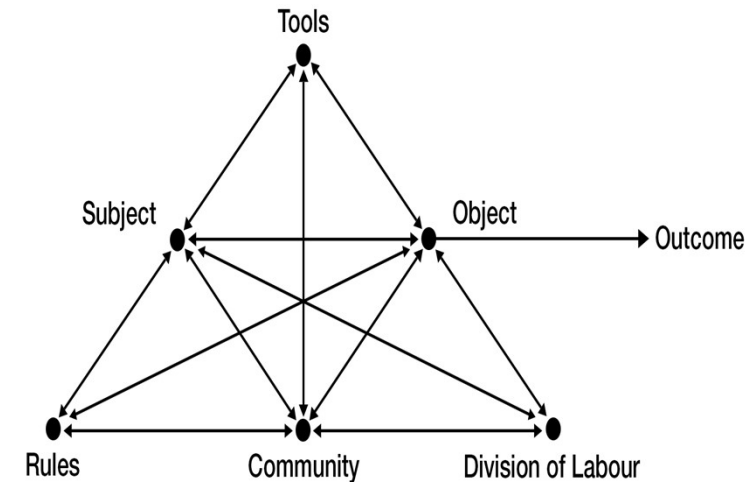
Activity System (Cole & Engeström, 1993)

The usefulness of activity theory lies in its ability to “capture complexity in the wholeness described, as well as to examine specific elements and their contribution to the whole” (Jaworski, 2013, p. 11).

## Activity Theory

(Cole & Engeström, 1993)

Premise: all intentional human actions are goal-directed and tool-mediated



Activity systems are:

- communities engaged in activities which share common goals.
- “natural units of analysis for the study of human behaviour” (p. 9).
- “best viewed as complex formations in which equilibrium is an exception and tensions, disturbances, and local innovation are the rule and the engine of change” (p. 9).

## Contradictions:

- “fundamental tensions and misalignments in the structure that typically manifest themselves as problems, ruptures, and breakdowns in the functioning of the activity system” (Virkkunen & Kuutti, 2000, p 302).
- essential for understanding the motivation for particular actions and for understanding the overall evolution of a system more generally (Engeström, 2009).
- “The challenge is not to eliminate the systemic tensions or contradictions but to balance the interplay so that it enriches system dynamics and facilitates motivation and learning” (Barab, Barnett, Yamagata-Lynch, Squire, & Keating, 2002, p. 102).

Research Question:

What were the tensions that affected the implementation of the activity of journaling in a high school mathematics class?

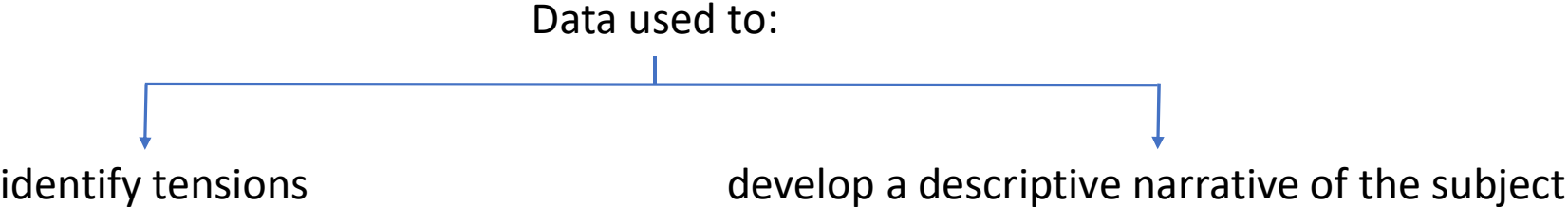
Methodological considerations:

Activity theory's focus on changes in specific activities overlooks the subjects' experiences of change (Venkat & Adler, 2008).

These reflections on their experiences within an activity system can provide a richer understanding of the tensions in change.

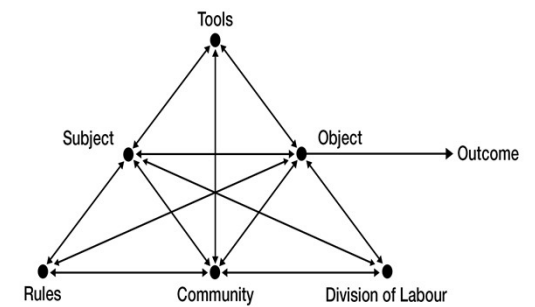
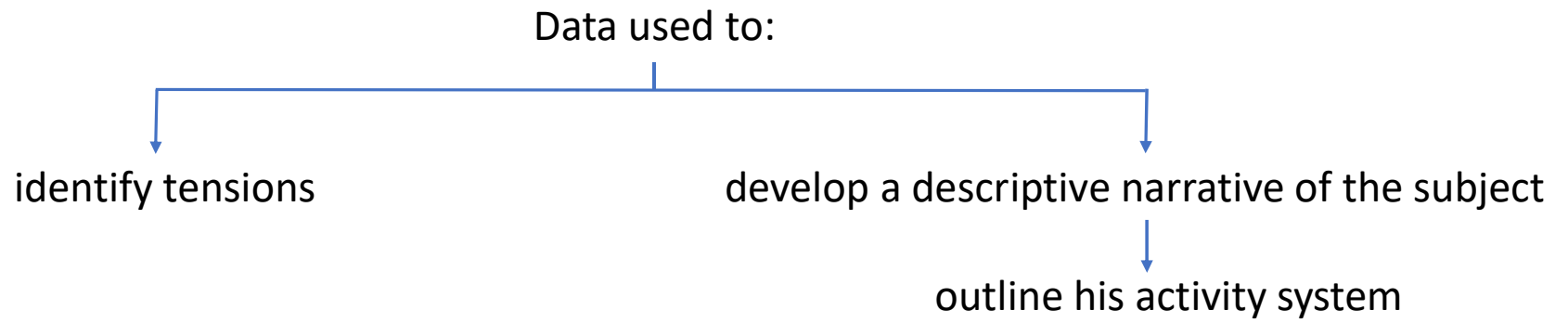
This study utilizes data from the subject's reflection of the activity rather than the researcher's direct observation of the activity itself.

Methodology:

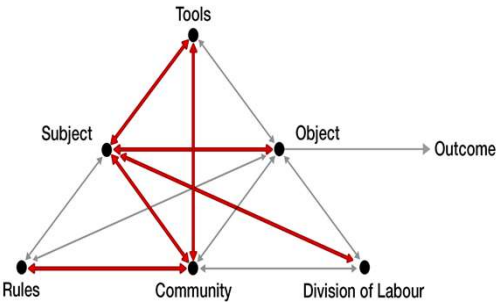
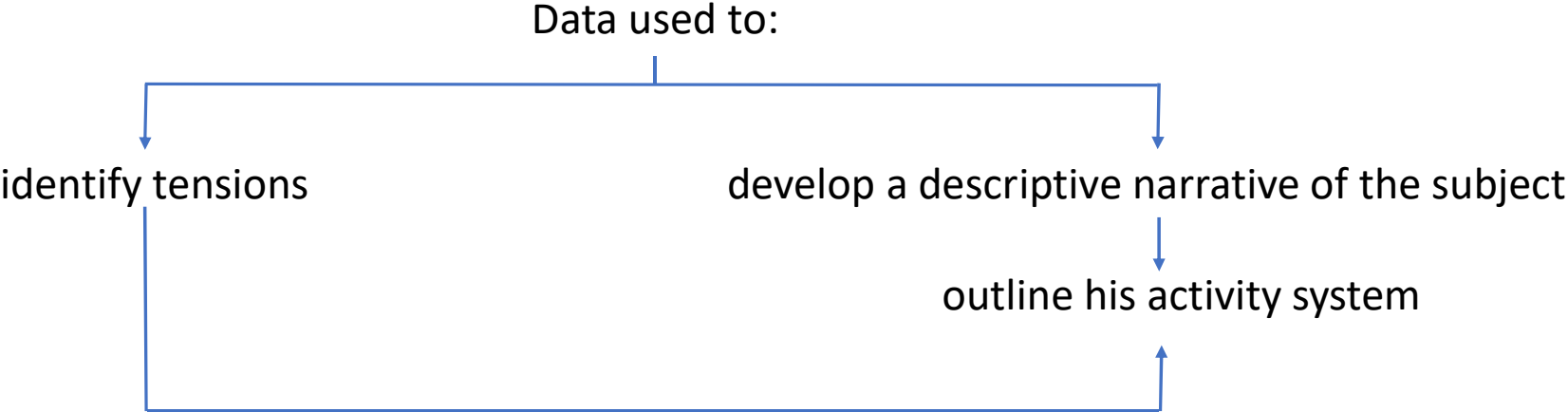




## Methodology:



Methodology:



## Context of the Study:

### The Teacher

*“If I go in this way, maybe I can kind of go in the backdoor and get into secondary math”.*

*“I hated it. I hated secondary teaching; I did not fit in that culture”.*

*“philosophically misaligned”*

*“elementary teachers teach kids, secondary teachers teach content”*

*“I can't do anything if I don't have a relationship”.*

*“kind of an outlier, typically out in front of things”*

## Context of the Study:

### Journaling

#### Benefits:

- strong connection to mathematical learning (Lim & Pugalee, 2004).
- synthesize new ideas and make meaning between old and new concepts (Hamdan, 2005).
- foster positive mathematical beliefs (Sanders, 2009).
- give the teacher insights into areas of confusion or misunderstanding (Sanders, 2009).

Context of the Study:

Journaling

Challenges:

- Students tend to perceive journal writing about mathematics as something outside the norm (Williams & Wynne, 2000).
- Difficulty for students in expressing mathematical ideas in writing (Morgan, 1998).

## Analysis and Discussion:

### Dan's Activity System

#### *Object:*

develop meaningful relationships with his students and for his students to develop meaningful relationships with mathematics

#### *Tools:*

whole group, small group, partner, and individual  
journaling and collaborative problem solving  
homework, note-taking, and flexible assessments

#### *Rules:*

provincial curriculum, school-wide assessment practices, and school-wide norms in general

## Analysis and Discussion:

### Dan's Activity System

#### *Community:*

students, parents, teachers, and administration  
educational, professional, and social communities

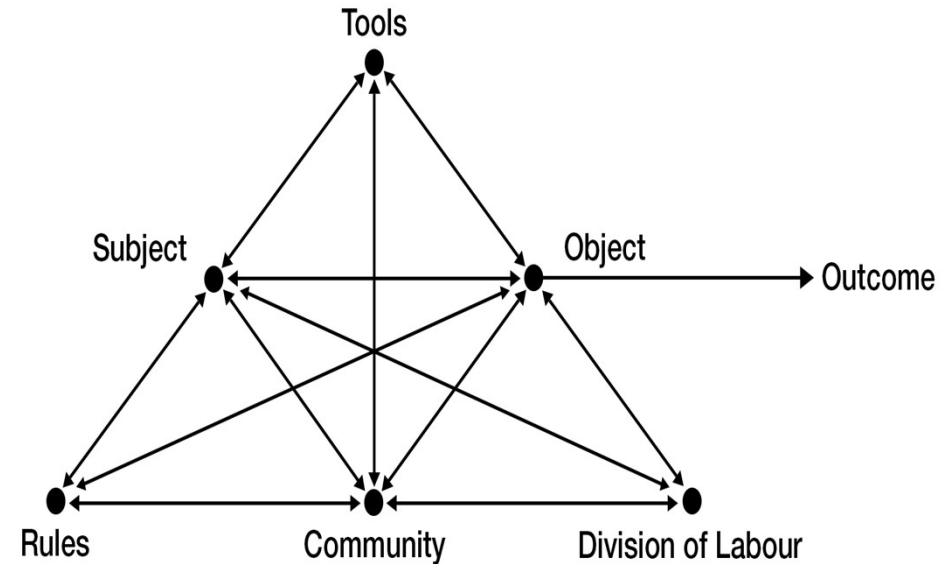
#### *Division of Labour:*

The *division of labour* for each establishes expectations of the roles for the community, essentially who is to do what. For example, as the teacher, Dan has the authority to choose and assign homework; his students are expected to do the homework and hand it in.

## Analysis and Discussion:

### Tensions in Dan's Activity System

1. Tensions between the subject and the division of labour.
2. Tensions between community and tool.
3. Tensions between subject and tool.
4. Tensions between the rules and the community.
5. Tensions between subject and community.
6. Tensions between subject and object.

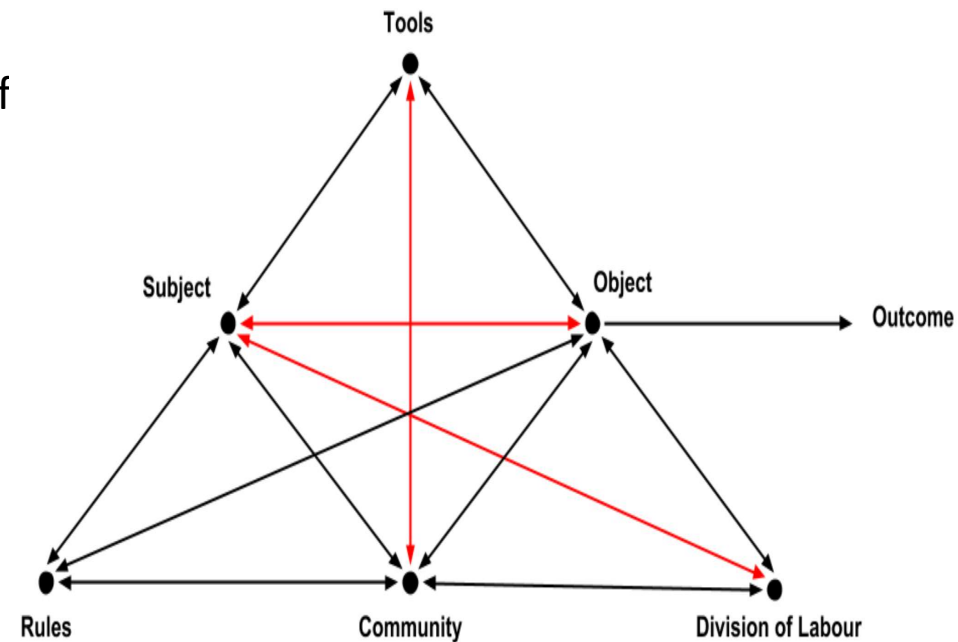




## Analysis and Discussion:

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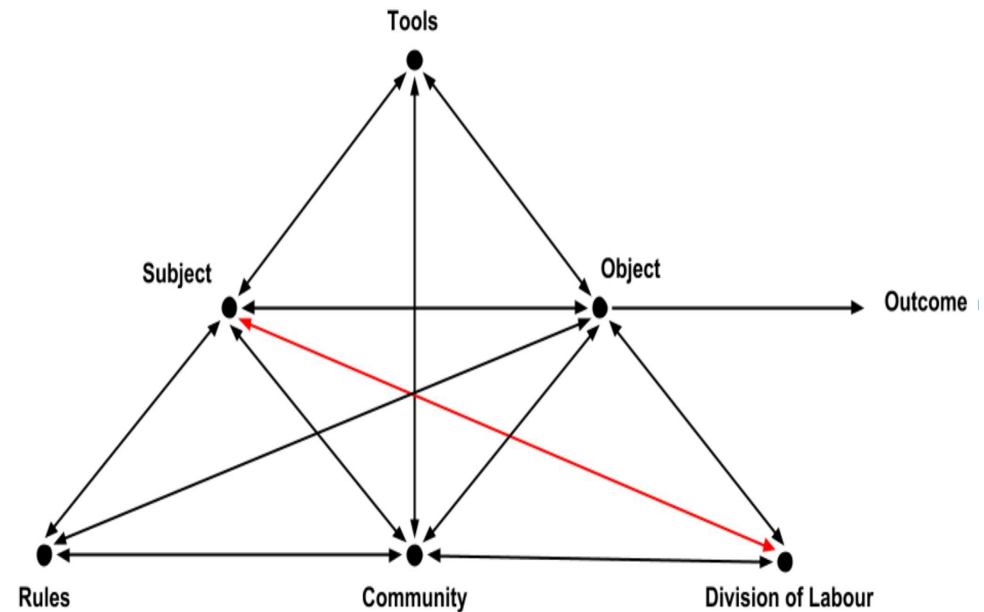
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# 1. Tensions between the subject and the division of labour.

*“super compliant”*

*“because kids used to do whatever I got them to do, they'll hand in really whatever I ask them to, they will sit and listen if I want to talk all class”*

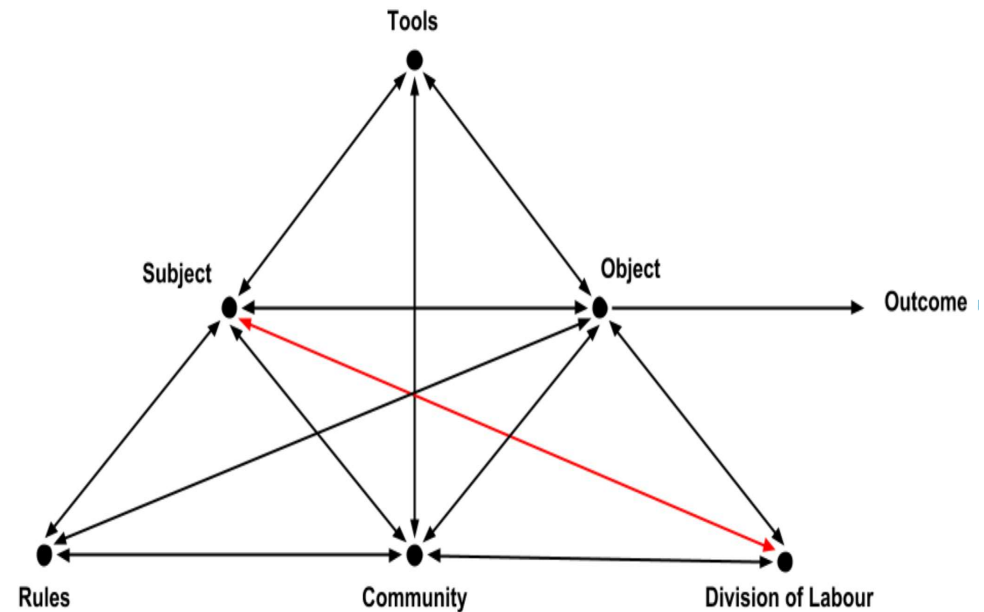


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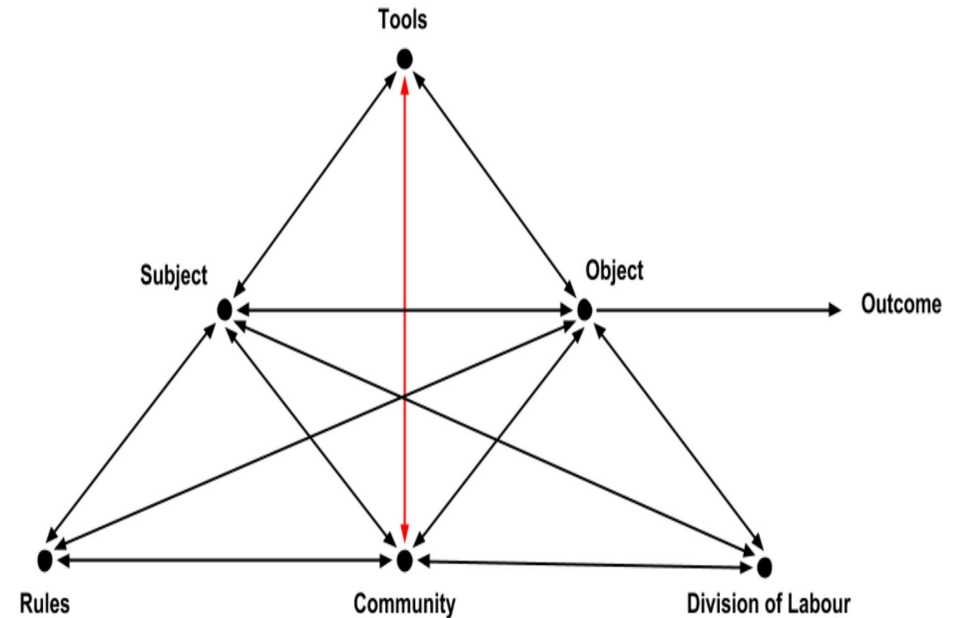
*“because kids used to do whatever I got them to do, they'll hand in really whatever I ask them to, they will sit and listen if I want to talk all class”*

*“There’s a tension around, you know, wanting to move forward”, he says, adding, “that’s what I’m trying to do, but it seems like it can only go so far as students are willing to let it go.”*



## 2. Tensions between community and tool.

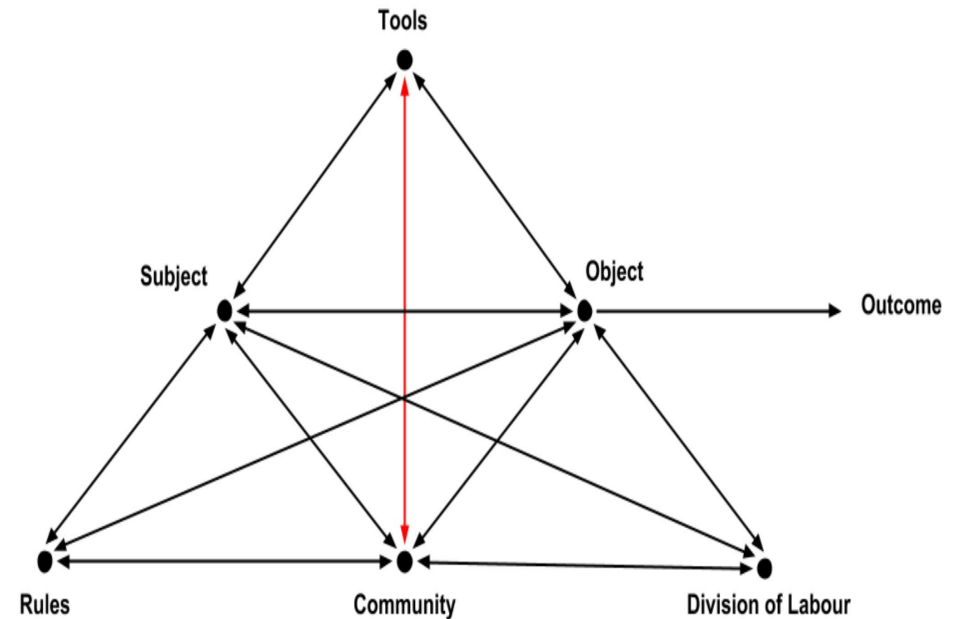
*“These were grade 10 students and the most common phases were, “but I don’t learn that way” and “but I’m not good at writing”. Both of these sound rather banal but the emotional response was like nothing I’ve ever experienced. One mother phoned me to tell me her son hadn’t slept all weekend because he was so anxious about having to go to my math class because I was going to get him to problem solve and write about it.”*



## 2. Tensions between community and tool.

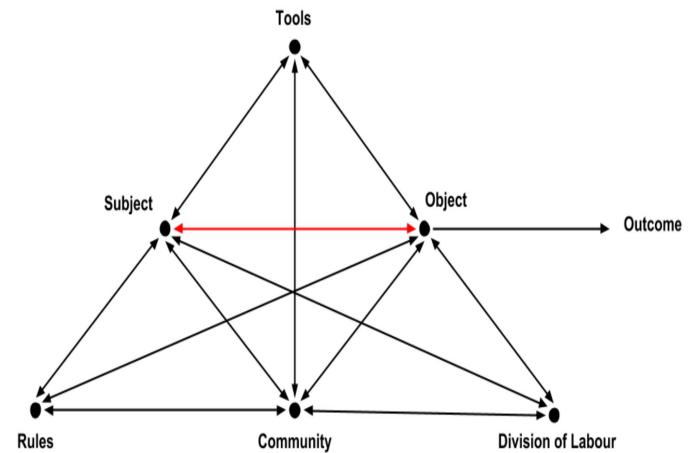
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*“I was trying to offer something different”, he says, noting that his students’ responses were, “No, we’re not doing it. No. We’re out.”*



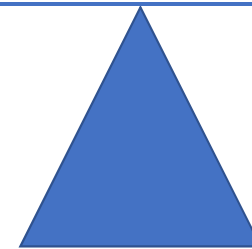
### 3. Tensions between subject and object.

*"I can't be successful unless I have their trust. I can't be successful unless I have them with me and they see me as an advocate for them and not a barrier for them."*



teacher/student  
relationship

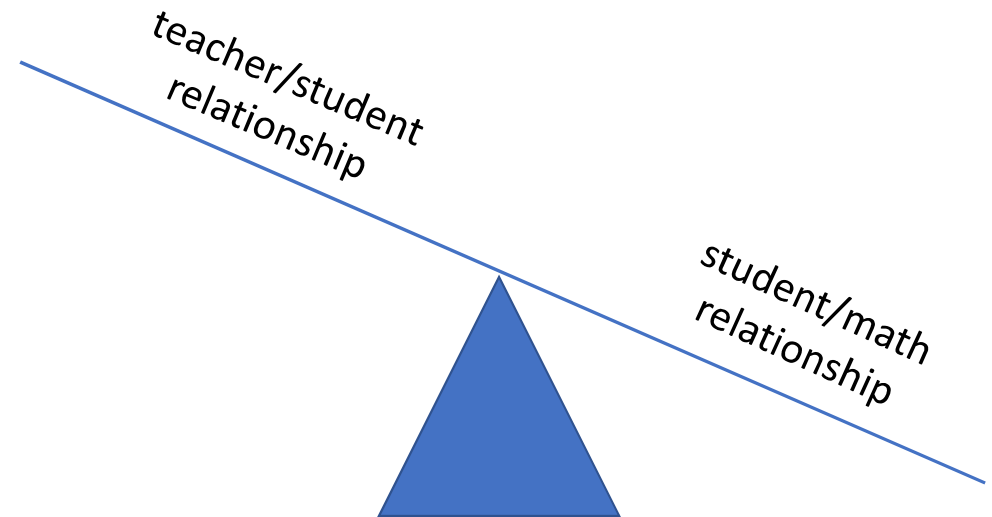
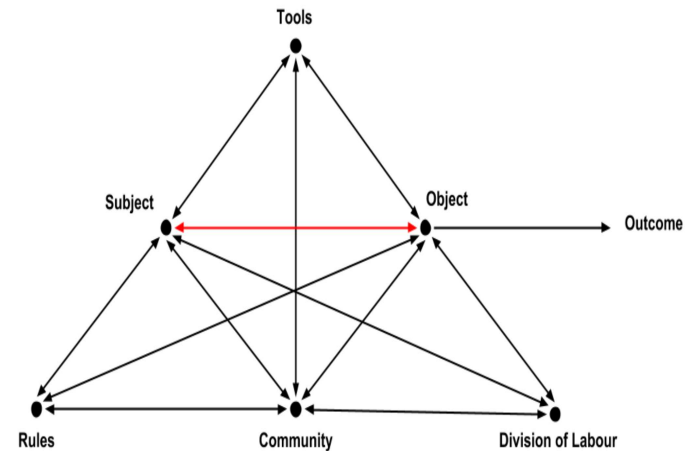
student/math  
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### 3. Tensions between subject and object.

*"I can't be successful unless I have their trust. I can't be successful unless I have them with me and they see me as an advocate for them and not a barrier for them."*

*"I have to manage the tension between moving in a pedagogical direction that I think is best for their learning but at the same time that won't cost me the relationships I have with them or then I've lost them entirely."*



## Additional Noticings:

### 1. The volume of tensions and their nexus.

A buildup of tensions has “a transformative power in that it promotes a new wave of activity with clear actions and goals” (Jaworski & Goodchild, 2006, p. 359).

This appears to be the stage Dan is entering.

The numerous tensions he experienced produced an undesirable outcome, but the usefulness of understanding this through the lens of his activity system is that it pinpoints the location of the tensions.



## Additional Noticings:

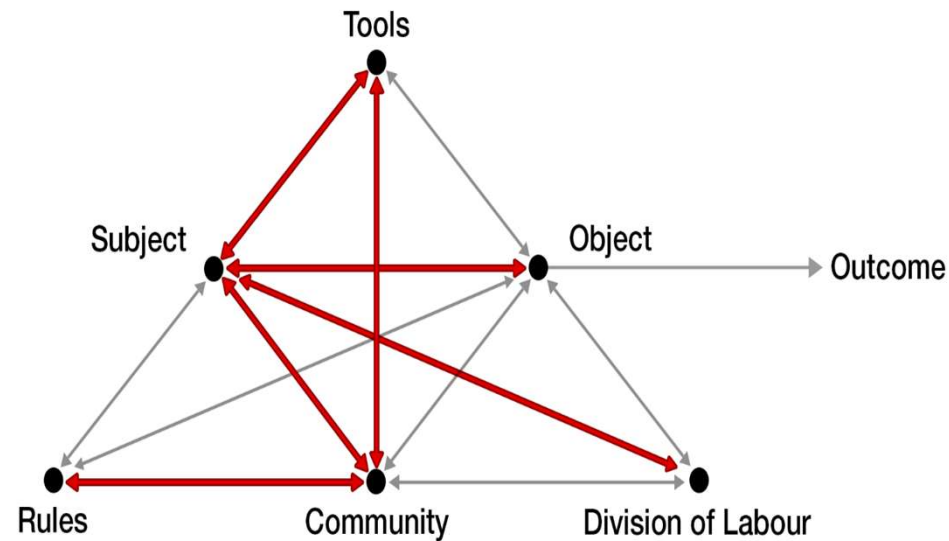
### 2. The formation of new objects.

“Through their activities people constantly change and create new objects”  
(Engeström, 2009, p. 306).

The concern is what might the new object be?

Could the cumulative effect of undesirable outcomes result in the formation of an object that moves him farther away from the *“research based practice, a practice that encourages thinking, you know, conceptual understanding”*, that he desires?

Conclusion:



Dan's Activity System

*“When I think back on this, it didn’t occur to me... it wasn’t a possibility that this wasn’t going to work. So when it started to go sideways, I didn’t know what to do. I didn’t realize, so I continued to push forward with it. And then the pushback happened with the kids.”*