TDS-theme:

Using TDS to understand and develop mathematics teaching in primary classrooms in France and Norway

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Our theme in the Special Issue

- SI : about theories to study teacher practices
- Our group : TDS (and other theories ?) to study teacher practices but…to study teacher practices **we emphasize on learning situations implemented in class** rather than directly study teachers' individual conceptions and… in research where teachers and researchers collaborate to design situations and implement them in class

TDS as a tool in collaborative projects?

- As researchers, we see TDS as a tool to study situations implemented by teachers in the perspective to study practices, or to create situations to propose to teachers and discuss with them the way to implement them in class.
- For teachers, it is not easy to have the same view as researchers. During class, teachers are submitted to antagonistic tensions: learning objectives, social objectives, institutional objectives... Thus, and moreover in the case if primary school teachers, it is often difficult to identify and keep in mind the link between the mathematical knowledge at stake and the problem the students have to solve. We think TDS is a tool to **create and guarantee (?)** this link : how the knowledge is at stake in the problem.

Our research studies: LaUDiM (Heidi)

THE STUDY

Language use and development in the mathematics classroom (LaUDiM): 4 year intervention study (2014—2018; data collection Grades 2—4).

WHO:

2 teachers (one at each of the two schools – grade 4 next academic year)
6 researchers: 4 mathematics teacher educators, 1 PhD student, and 2 pedagogues (teacher educators).

GOALS

1) To develop teaching resources (situations with adidactical milieus)
2) To understand teaching and learning processes in the classroom → focus on pupils' development of language to express mathematical ideas
3) To develop second-year student teachers' mathematics field practice, using video as a tool

Our research studies: LaUDiM (Heidi)

METHODOLOGY (design, implementation, validation):

- ✧ Preliminary analysis: epistemological analysis of the mathematical topic at stake. (VIDEO) (all present)

- ✧ Planning (for 2 classroom sessions): further discussion of the knowledge aimed at, *a priori* analysis, discussion of teaching recourses, development of tasks, adidactical milieu (VIDEO) (all present)
  → The teacher creates the teaching resources as a result of the two preceding stages

- ✧ Implementation in the classroom of session 1 (VIDEO) (one teacher and at least two researchers)

- ✧ Reflection immediately after classroom session 1 → possible adjustments before classroom session 2 (AUDIO) (one teacher and at least two researchers)

- ✧ Implementation in the classroom of session 2 (VIDEO) (one teacher and at least two researchers)

- ✧ Video discussion where we discuss excerpts of videos from the classroom: *a posteriori* analysis (relative to the a priori analysis) (VIDEO) (all present)

Our research studies : LéA Valenciennes Denain (Marie-Jeanne, Christine)

WHO:

Participants in the project are 2 researchers (Christine and Marie-Jeanne); 4 or 5 “formateurs”: 2 (or 3) teachers-teacher trainers (class but for 1/3 of their work they have to train in-service or pre-service teachers); 2 teacher trainers (without class) and 10 “regular” teachers.

In black, the enlarged group with 10 to 12 regular teachers. With them 2 (or 3) sessions of 3 hours and

GOALS

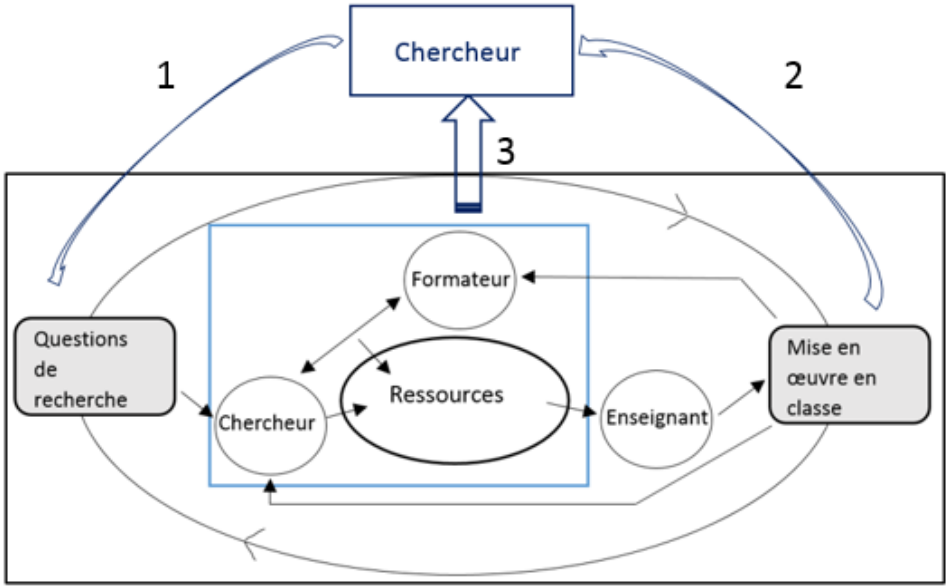
- To design situations to improve student learning of geometry (in agreement with previous work) : to enrich the way students look at figures. A means to do that: restoration of figure : reproduce a figure from a given model and a beginning (little part of the figure already reproduced) and by using the available instruments.
- To enrich ordinary practices ("continuity" in the enrichment of practices ? gradual integration of new practices within the existing practices ?) We articulate our work with another theoretical construct: « la double approche » (Robert, Rogalski).

Our research studies : LéA Valenciennes Denain (Marie-Jeanne, Christine)

METHODOLOGY (some aspects)

A scheme to explain our methodology (collaboration with teachers and teacher trainers in our present research):

In blue, the restricted group: observation and analysis of sessions in class.



Another position of the researcher outside the device

arrow 1: first questions and hypotheses for the research

arrow 2: reflection from the observations in class

arrow 3: reflection from the work in the restricted group to discuss and modify the first hypotheses.

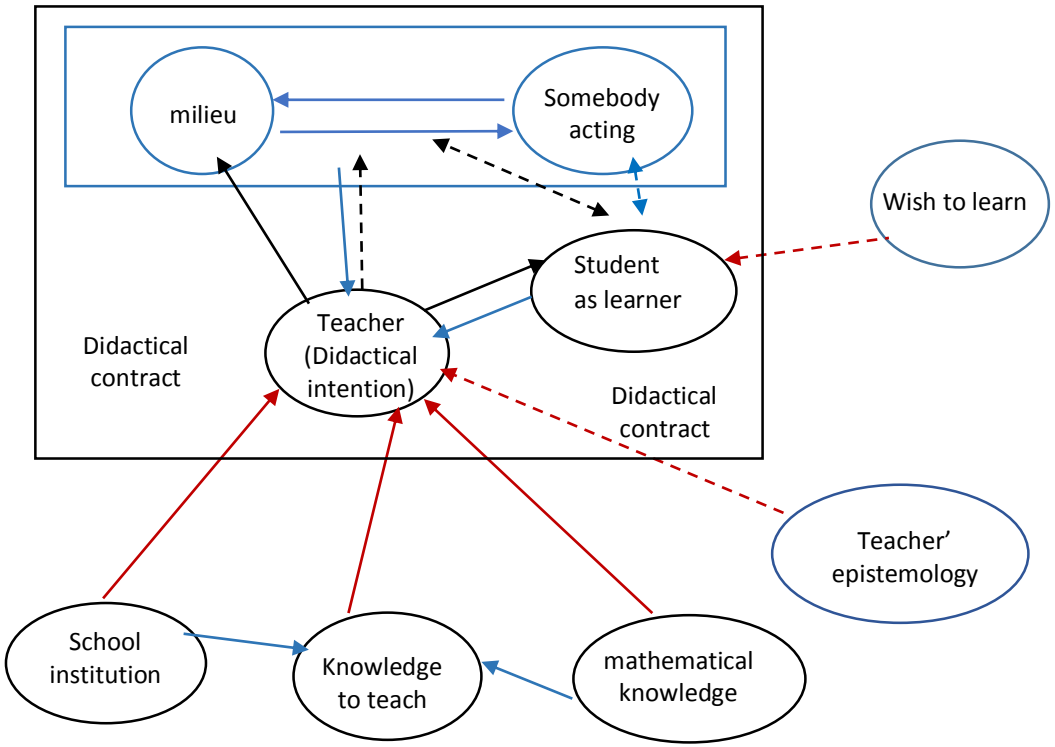
Our common questions

We think it may be interesting to focus our paper on collaborative work between researchers, teachers and teacher trainers

The main issue : how can TDS be a tool to **create and guarantee** the link between the mathematical knowledge at stake and the problem the students have to solve in the context of a collaborative work between researchers, teachers and teacher trainers ?

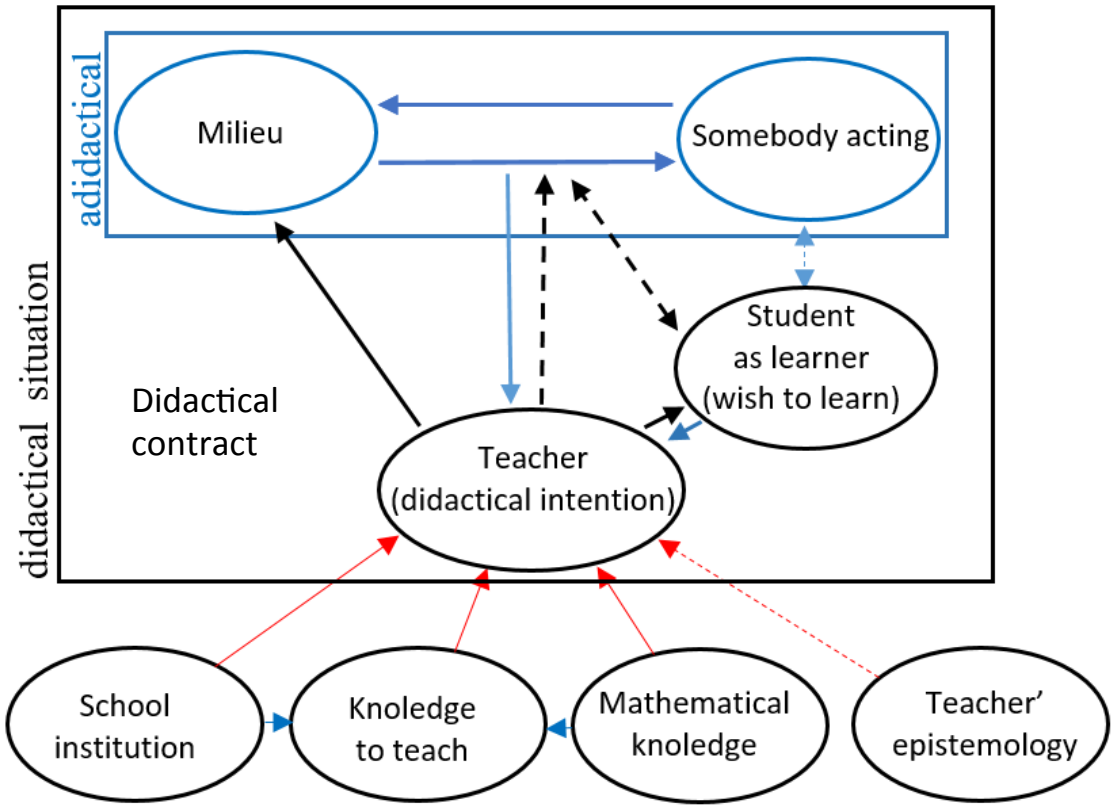
And, we have begun to explore this issue by making diagrams…

The teacher as an actor in the didactic situation (M.J.)



- Blue rectangle: the adidactic situation inside the didactic situation (black rectangle)
- Black arrows: the teacher acts on the milieu (to construct it before the class or to modify it during the class); eventually on the relation between the actor and the milieu to change the game (devolution for instance), on the students' knowledge (institutionalization for instance).
- Blue arrows: the teacher takes information about the (adidactic) relationship between the student and the milieu, about the students' knowledge (in act or expressed).
- Red arrows: constraints and objectives of the teacher.
- Dotted arrows: indirect or implicit relations.

The teacher as an actor in the didactic situation (1st reorganisation)



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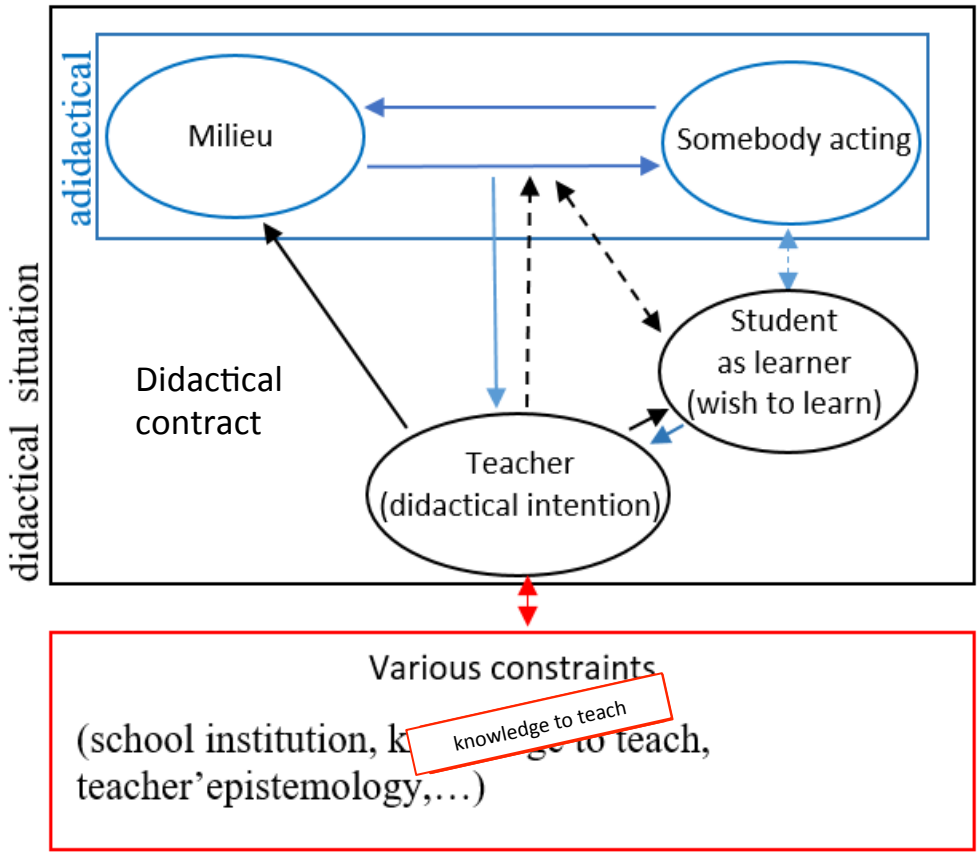
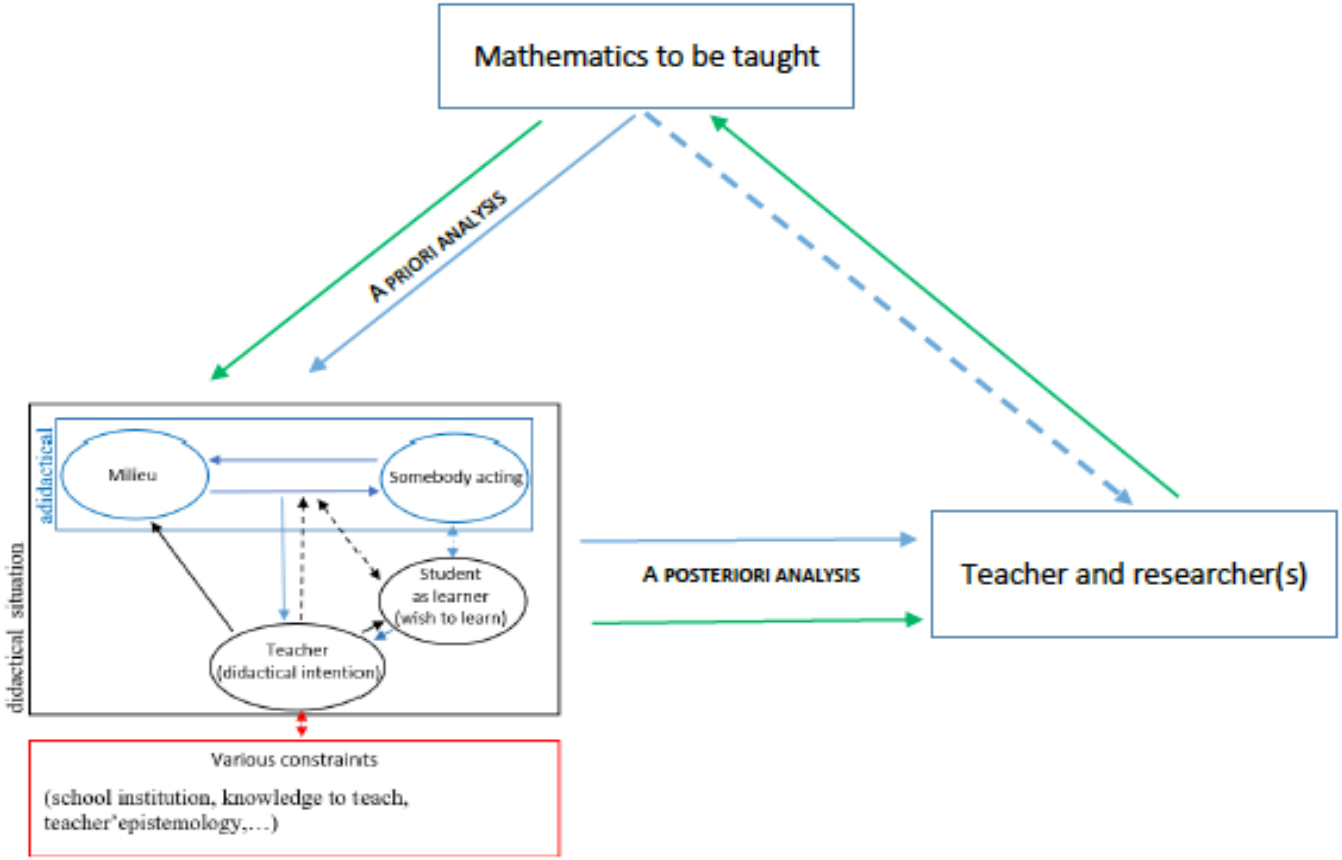
- Red arrows: constraints and objectives of the teacher.
- Dotted arrows: indirect or implicit relations.

Diagram representing situation and various constraints upon it (diagram simplified by Christine)



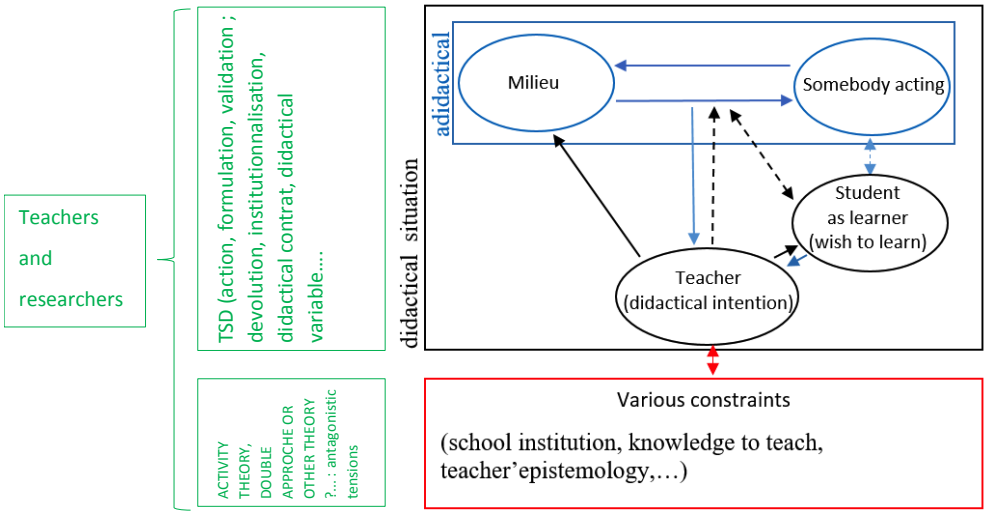
Knowledge to teach for the teacher.
Knowledge to act (implemented in the adidactic situation).
Knowledge to learn for the student

Diagram extended by Heidi



Collaboration between teacher(s) and researcher(s)

Diagram extended by Christine



- The relations with theories