Facing theoretical diversity: the TELMA contribution

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The first phase of the TELMA work on theoretical issues

- Trying to build an integrative description of the different teams including theoretical frames as a particular descriptive dimension:
  - from the descriptions provided by the teams
  - from the analysis of published papers selected by each team

- An unexpected theoretical diversity

- A limited insight on the exact role played by these theoretical frames in the research projects carried out by the teams
The theoretical diversity

- Situated Abstraction
- Social semiotics
- Theory of Semiotic Mediation
- Activity Theory
- Instrumental approach
- Theory of Didactic Situations
- Anthropological Didactic Theory
- cKc

IA constructs
How to deal with such a diversity?

- A specific methodological design:
  - the cross-experimentation

- Two specific constructs:
  - the notion of Didactical Functionality
  - the meta-language of Concerns
The notion of Didactical Functionality

- The starting point: when designing or analysing educational uses of technology, when thinking about the educational potential of a given ICT tool, one necessarily associates to it specific didactical functionalities.

- DF is thus seen as a reading key for describing, comparing and networking theoretical frames:
  - based on elements relevant for the different teams
  - approaching theories through their role in practice
  - with no particular theoretical connotation
The notion of Didactical Functionality (DF)

- Three interrelated dimensions:
  - a set of features/characteristics of the ICT tool
  - a specific educational goal
  - a set of modalities of employing the tool in a teaching learning process referred to the chosen educational goal
The meta-language of concerns

➢ The starting point:
  • Theoretical frames develop for fulfilling specific needs; for comparing and connecting theories, it can be thus productive to look at the needs their constructs try to respond.
  • Choosing one theoretical frame is choosing one particular lens. Each theory develops thus both a coherent and partial approach towards learning and teaching processes.
  • Looking at theories in terms of the *key concerns* they are sensitive to, and at the way they take these in charge, can be a productive strategy for comparing theories, for identifying the possibilities and needs of connections between them.
Attaching a set of concerns to each dimension of DF

The analysis of the artefact:

- Ergonomic concern
- Semiotic concern
- Epistemological concern:
  - Implementation of mathematical objects
  - Possible actions on these
  - Interaction between students and knowledge
- Social concern (interaction with other agents): students, teacher, virtual agents
- Teacher concern
- Institutional and cultural concerns

Concerns function as hierarchical and connected systems
Attaching a set of concerns to each dimension of DF

• Choosing an educational goal:

  • Epistemological (mathematical contents and practices)
  • Cognitive (cognitive processes and difficulties)
  • Social (social dimension of learning processes, collaborative work)
  • Institutional (relationships with institutional expectations)
Attaching a set of concerns to each dimension of DF

Modalities of employment:

- Context
- Nature and sequencing of tasks
- Functions given to the ICT tool and evolution
- Instrumental issues
- Social organisation and interactions
- Interaction with other environments
- Institutional issues
The cross-experimentation

Main characteristics:

- Each team is asked to experiment an alien technology
- Each experiment has its specific goals but is also a collective object of research
- Guidelines are collectively established for monitoring the whole process
- The experimentation is taken in charge in each team by the young TELMA researchers
- Reflective interviews are a posteriori carried out by the more mature researchers

Perturbating a system for understanding it better
Making visible the invisible, explicit the implicit
Making possible different kinds of comparisons
Expectations regarding theoretical work

- **Epistemic goals: understanding**
  - what theoretical frames are used and how they are used by the different teams
  - their real influence on the identification of didactical functionalities, on their implementation and on the analysis and interpretation of the collected data

- **Inferring from that understanding:**
  - Connection needs, possibilities and means

- **Methodological goals:**
  - Evaluating the potential of the methodological tools introduced for approaching connection issues
Contrasting French and Italian teams

The French teams:

• Expecting from the tool a ‘milieu’ with strong ‘a-didactic’ potential, thus the attention payed to the quality of the tool feedback and to the didactic variables of the tasks (epistemological concern);

• Trying to maintain a reasonable distance with the institutional mathematics (institutional concerns);

• Limiting the instrumentalisation needs (ergonomic and instrumental concerns).
Contrasting French and Italian teams

The Italian teams:

- More open to exploratory activities (epistemological concern);
- Focusing on the potential offered by semiotic mediations (semiotic concern);
- Very sensitive to the quality of social interactions (social concern);
- Not feeling obliged to anticipate possible mathematics outcomes, possible sharing of responsibilities between teacher and students, possible institutionalization.
Benefitting from differences

- Very different designs and classroom management, with evident influence of:
  - different distribution of emphasis in the sets of concerns
  - different treatment of common concerns induced by different theoretical choices

- Some possible productive connections, complementarities identified through the analysis:
  - a priori analysis (F → I)
  - milieu analysis (F → I)
  - semiotic mediations (I → F)
  - teacher’s role (potential hybrid construction)