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# Teacher's activity analysis within a didactic perspective

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**Abstract**: This communication first presents the theoretical framework (the Joint Action Theory in Didactics) we use to analyse ordinary teaching/learning activities in science classrooms. This theory has been developed in French didactic research and takes account of the three-way relationship linking teacher, student and a piece of knowledge to be taught and learned. Our general purpose is to describe and understand school science practices. In the second part of the communication we present the corresponding methodology and its different steps through the analysis of a physics inquiry-based lesson developed in grade 8 and dealing with the voltage law. Lastly, we discuss some points with regard to the symposium issues.

**Keywords**: Physics teaching and learning – didactic perspective – joint action theory – video analysis.

This communication concerns the analysis of a teacher's and students' activity observed during ordinary science lessons. It aims to discuss theoretical and methodological issues within the scope of a research programme, the purpose of which is to describe and understand school practices in science. Our work was conducted under the umbrella of the Joint Action Theory in Didactics (JATD) (Sensevy, 2007, 2009). This theory has been developed within French *Didactiques*. It allows us to analyse the functioning of the didactic system defined as an irreducible three-way relationship linking teacher, student and a piece of knowledge to be taught and learned. Thus the focus of didactic research is to study the dynamics and the evolution of interactions between students and teacher in connection with the content knowledge embedded in the learning environment.

First we give an insight into the JATD. Then we specify the methodology used, illustrating it with examples taken from one of our studies. Lastly, we discuss these elements in relation with the symposium issues.

## JATD as a theoretical framework

The JATD attempts to account for both the socio-historical and situated dimensions of the didactic action, trying to model the human transactions concerning the transmission of a socio-historically built culture (Ligozat and Schubauer-Leoni, p. 88-91). It models the didactic interactions between the teacher and the learner as an organically cooperative learning "game", i.e. "a joint game within a joint action" (Sensevy, 2009, p. 115). To describe the learning game as it occurs in situ with regard to a particular piece of knowledge, the researcher can use a set of specific descriptors: the didactic milieu and the didactic contract doublet; the genesis triplet (mesogenesis, chronogenesis, topogenesis); and the game quadruplet (defining, devolving, regulating, institutionalising). We give a brief description of this system of concepts below.

According to Brousseau (2003, p. 3), the didactic milieu is "all that acts on the student and/or that the student acts on" and, in reference to the JATD, we add the teacher to the student in this definition. The milieu includes material elements (e.g. light sources, screens, books etc.), cognitive and symbolic elements (e.g. already known notions, conceptual network, etc.), and the semiotic processes co-constructed through the ongoing interactions. The didactic contract governs these transactions over the successive and different learning games occurring during a lesson. It is considered as "a set of largely implicit rules, of usual ways of acting (with regard to the subject being studied) that the teacher and the students find suitable in the context of the didactic relationship" (Sensevy and al., 2005, p. 158).

The genesis triplet accounts for the dynamics of the didactic transactions:

- mesogenesis (i.e. genesis of the milieu) describes the process by which, over time, the teacher (re)organizes the milieu and the milieu is reorganised by the students' interventions.
- chronogenesis (i.e. the genesis of the didactic time) describes "the evolution of the knowledge proposed by the teacher and studied by the students, as it unfolds during the joint action" (Sensevy, 2009, p. 117)
- topogenesis (i.e. the genesis of position) describes the teacher's and students' respective responsibilities for the progress of knowledge in the class.

These three dynamics evolve in concert: to every stage of the mesogenesis corresponds a topogenetic state and a chronogenetic state which allow the teacher's and the students' joint action to be described (Authors, 2009, p. 29)

The game quadruplet concerns the way the teacher intervenes when the didactic game is played, to start and maintain the didactic relationship (Sensevy, 2007, p. 29):

– Defining; the teacher defines the rules of the learning game and the objects that are included in the game, for the students to be able to play the game.
– Devolving; when the game has been defined, the students have to accept to play *proprio motu* and to establish a relation that is as appropriate as possible to the milieu.
– Regulating; as the students do not immediately play using a pertinent strategy, the teacher must intervene to modify their behaviour in order for it to become more relevant to winning the learning game.
– Institutionalising; during the game, the teacher has to point out to the student that his/her activity has reached the knowledge at stake, which is valid not only in the classroom but also in a larger, external social community.

**Method**

This theoretical framework was used to analyse a physics inquiry-based lesson developed in grade 8 and dealing with the voltage law (Authors, 2010). Extracts of this study will illustrate our methodology during the communication.

Our methodology is linked with JATD and is based on the collection of data related to the three irreducible poles of the didactic system. Video data of the lesson constitute the main corpus. The auxiliary corpuses usually comprise various interviews with the teacher and students, curriculum documents about the knowledge taught, students' work, etc. The teacher's interview deals with the school environment, the aims and the organisation of the lessons observed and the *a posteriori* analysis of their development. Students' interviews concern their relation to the knowledge at stake and an account of what they did or learned during the lesson.

The study is carried out through a qualitative analysis of the video, triangulated with the other corpuses. The first step aims to reduce the video data to a condensed synopsis which accounts for the course of the lesson as developed by the teacher (academic tasks, knowledge themes tackled, etc.) and as analysed by the researcher in terms of successive learning games. The Transana software is used in the second step, first to transcribe the lesson. Then, the video is cut into episodes indexed with keywords originating from JATD. A change in any descriptor of the joint action generates a new episode.

The Transana outputs provide: 1) a global, static view of the lesson based on the number of episodes related to each keyword; 2) a global, dynamic view of the lesson based on the distribution of keywords over time. The latter allows us to select particular learning games as identified in the synopsis and comprising successive episodes. Their analysis is triangulated with elements of the auxiliary corpuses. This analysis aims to document the continuously evolving dynamics of transactions (that is to say: the triple genesis of the milieu, the didactic time, and the teacher's and students' positions) as well as how the teacher starts and maintains the didactic relationship (that is to say: defining, devolving, regulating and institutionalising

over the successive learning games). By doing this, we account for the continuous modifications of both the didactic milieu and the didactic contract and thus the knowledge really taught and learned. Examples will show the use of the different JATD descriptors in this analysis.

**Discussion**

With regard to the purpose of the symposium, we discuss some points related to the use of this theoretical framework and this methodology as they arise from our study.

The *didactique* perspective refers to the nature of the disciplinary content taught and learned as taken into account by the descriptors of JATD in the three-way relationship. Thus the objects we consider and investigate are closely linked to the progress of the knowledge in the class through teacher and student transactions and joint action. These objects are built theoretically and epistemologically.

In other respects and speaking more generally, the focus of this kind of research concerns the intertwined teaching and learning processes and not what is really learned by the students. We claim, however, that this type of study may give insights into the students' learning pathways *in situ*. But to better understand science students' learning and science teaching, a wider time scale analysis should be more fruitful. The question thus concerns how our methodology can be extended and adapted for long-term observation. For this, a first step in reducing data could be to use a cycle synopsis pointing out the articulation between the different lessons referring to the knowledge in question. The following steps could be the same as we described in the previous methodology as they will concern each lesson of the cycle. Therefore, software like Transana will be very valuable to analyse all the lessons as a whole.

In any case, we will use videos to collect data from classrooms. Because a video provides an analogical recording of a part of the classroom reality, it empowers the researcher. The use of specific software like Transana gives the researcher some quantitative information linked to qualitative analysis helping him to objectivise his/her conclusions. But, at the same time, this qualitative analysis provides him/her with numerous intermediate data which may require other software to distinguish patterns among them. Moreover, to be analysed with Transana, the video must be cut into (small) episodes and this cutting can constitute an obstacle to the analysis of global dynamics. That is why, in our methodology, we combine the outputs from Transana with a semiotic analysis referring to knowledge in progress. Thus, in the course of our analysis, the video is progressively put aside and replaced by qualitative interpretations based on the different types of condensed data (Transana outputs, synopsis, and verbal transcriptions)

**References**

Authors (2009). The didactic milieu: from an empirical study in a sensitive area to a theoretical thought? about the concept. *Education et Didactique* 3 (1), 7-43

Brousseau, G. (2003). *Glossary of some concepts belonging to the theory of didactic situations in mathematics*. Retrieved September 1st 2010 from http://pagesperso-orange.fr/daest/guy-brousseau/textes/Glossaire_Brousseau.pdf

Ligozat, F. & Schubauer-Leoni, M.-L. (2009, July). The joint action theory in didactics: Why do we need it in the case of teaching and learning mathematics? In Proceedings of the *Sixth Conference of European Research in Mathematics Education* (pp. 83-92).

Sensevy, G., Schubauer-Leoni, M.-L., Mercier, A., Ligozat, F., & Perrot, G. (2005). An attempt to model the teacher's action in the mathematics? class. *Educational Studies in Mathematics*, 59, 153-181

Sensevy, G. (2007). Categories to describe and understand the didactic action In G. Sensevy & A. Mercier (Dir.), *Agir ensemble : l'action didactique conjointe du professeur et des élèves* (pp. 13-49). Rennes: Presses Universitaires de Rennes.

Sensevy, G. (2009 - January). Outline of a joint action theory in didactics. In Proceedings of the *Sixth Conference of European Research in Mathematics Education* (pp. 113-122). Lyon, France.

Authors. (2010 - September). Micro didactic analysis of a video corpus related to a physics lesson within the Joint Action Theory in Didactics. Communication in a symposium at the "AREF 2010" conference, Geneva.