

Presentation CERME

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I'm going to present today a numerical resource for maths teachers ; one more ? perhaps, but this one is the result of a work which rely on theoretical hypothesis and want to be a part of the teachers milieu in a situation of construction.

As you can hear, I'm referring to the theory of didactical situations of [Brousseau, 2004] and in this framework we consider that teachers are confronting themselves to a milieu when they are preparing lessons ; depending the position of the teacher and following first Brousseau, then [Margolinas, 2004], [Bloch, 2005] and others, we think that the structuring of the milieu allow us to understand the point of view of the teachers using what Margolinas calls descendant analysis, in which the core point is the S+3 situation, in which the teacher is confronting to his/her naturalized conception about teaching and learning ; our position is to consider that teachers who are going to use this resource share our main hypothesis about the importance of research problems in the construction of knowledge ; following this hypothesis, the builder teacher in the construction situation interact with the M+2 milieu (the milieu of project) and conduct to the choices the teachers will do related to the mathematical background of the didactical situation ; in this situation teachers are projecting the possible construction of knowledge of a generic pupil and are describing the global choices about the didactical situation they have to build. This choices are the components of the M+1 milieu with which the teacher interact in the construction of his/her local project. The resource EXPRIME is an element of this milieu and participate to the point of view of the teacher related to the projected lesson.

On an other hand, the resource appears to be an element of the global documentation of the teacher and contribute to the construction of documents (in the meaning of [Gueudet et Trouche, 2008], and in this sens leads to be modified in a documentary genesis :

« A document entails, in particular, operational invariants, which consist of implicit knowledge built through various contexts of utilization of the artifact, and can be inferred from the observation of invariant behaviors of the teacher for the same class of situations across different contexts. »
Gueudet, Trouche CERME communication

1 What I am going to say

1.1 First slide

I'm going to present a digital resource built to be used by maths teachers ; this resource as been built leaning on fundamental hypothesis related to the conceptions of knowledge constructions ; the analysis of this resource has used a crossed analysis between didactical and ergonomics concepts. The goal of this resource is to give aid to maths teachers to use research problems in their teaching.

For this presentation I'm then going to present you our hypothesis and the analysis which conduct to the writing of this resource.

1.2 Second slide

Our work is based on a first hypothesis : the importance of research problems in the construction of knowledge, and this construction of knowledge goes through an adjustment to the milieu in the meaning of the didactical situations theory (seen as environmental conditions) ; as we can see, two different analysis can be completed, one taking as departure point the point of view of pupil in a situation of action and the other taking as departure point the point of view of teacher in a situation of construction.

Different works have shown both the benefits of the use of research problems in the construction of knowledge and both the difficulties and the interest of teachers. We assume that the main obstacles at the use of problem research in the classroom are :

- the important part of experimental dimension clashes with the main representation of mathematics amongst maths teachers and more generally in the society,
- the focus on heuristics and reasoning skills is in contradiction with institutional constraints of teaching maths notions, particularly in the French curricula,
- difficulties for teachers to pick out the mathematics part of the work of students, and as a result to focus on the notions which have to be institutionalized,
- difficulties to assess such a work, knowing that the usual assessment modalities are not appropriate.

1.3 Third slide

The construction of this resource leans on an ascendant analysis, a descendant analysis and an ergonomic approach

The descendant analysis takes into account teachers in a construction situation (in the meaning of the structuring of the milieu [Margolinas, 2004] ; it means that teachers are confronting to a milieu of project which conduct

to the choices they will do related to the mathematical background of the didactical situation ; in this situation, teachers are projecting the possible construction of knowledge of a generic pupil and are describing the global choices about the didactical situation they have to build. This choices are the components of the didactical milieu with which the teacher interact in the construction of his/her local project. The resource EXPRIME is an element of this milieu and participate to the point of view of the teacher related to the projected lesson.

Références

- [Bloch, 2005] BLOCH, I. (2005). *Quelques apports de la théorie des situations à la didactique des mathématiques dans l'enseignement secondaire et supérieur*. Thèse de doctorat, IUFM d'Aquitaine.
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