

**ANNALES de DIDACTIQUE et de SCIENCES COGNITIVES,
Volume 13, 2008, IREM de STRASBOURG
ABSTRACTS**

PATRICK GIBEL *Analysing with theory of situations a primary school lesson devoted to improvement of reasoning*

Abstract. The purpose of this article is to take as object of study reasoning processes elaborated by the pupils during a sequence “The biggest number”, proposed in a class of fifth graders in a primary school. This research, made within the framework of the theory of didactical situations in mathematics, aims at analyzing on the one hand pupils reasoning processes, on the other hand, more precisely, conditions in which the reasoning processes were produced. We will analyse their possibilities to use them to take a decision, formulate a assertion, express an explanation or elaborate an argument depending on whether the conditions, which define the situation, require, or not, their uses.

FRANÇOIS PLUVINAGE & MIRELA RIGO LEMINI *Maieutics live*

Abstract. The authors had the chance to observe a class of 6th grade students in an elementary school in Mexico City. During the lesson observed, which was also video-taped and transcribed, the notion of speed was introduced to the children. The teacher, well-experienced, did not follow the pedagogical prescriptions of collaborative work suggested by the text book presently in use, but rather applied a discursive teaching method in the mode of Socrates’ Maieutics. Her main idea was to induce her students to use the ratios that arise from distance divided by time. However during the lesson, difficulties arose in the understanding and application of those ratios. One outstanding student, Marina, proposed a proportionality chart that the teacher initially deemed to be false, rejecting the proposal and failing to give it a place in her teaching process. The article analyzes the tangible parallel between the lesson observed and Socrates’ interview of the slave in Plato’s *Menon*, and highlights a few exceptions that are interesting in view of their didactic significance.

LAURENT VIVIER *From number synthesis to belief in naïve set theory*

Abstract. In this work we study the number summary required by the French curriculum for 14 and 15 years old pupils. We point out that, in textbooks and class lessons, the role played by the five classical number sets is huge for this synthesis. We discuss this fact by identifying what is relevant for mathematics in French secondary education. The analysis focuses on French mathematics curricula, textbooks and classrooms. We use the notion of settings defined by Régine Douady, the semiotic theory of Raymond Duval and the anthropologic theory of Yves Chevallard. Throughout this article we propose some ideas for a real number summary.

GEORGES TOUMA *Interpretation Cognitive Activity*

Abstract. During the process of scientific phenomena’s algebraic modelling, pupil must switch from a physic rationality frame to a mathematic rationality frame mobilising different semiotics registers. In this article, we raised the problem of discontinuity and rupture of semiotic register (Duval, 1995) inherent to rationality frame switch (Lerouge, 2000) during algebraic modelling activity in experimental science. More specifically, we raised the limits

and the lakes of the three semiosis cognitive activities – formation of a representation in a semiotic register - treatment and conversion – so that the pupils has access to the conceptual meaning of a mathematic representation of an experimental science phenomenon. We also defined the interpretation cognitive activity.

ROSA ELVIRA PÁEZ MURILLO, FELIPE ALFARO AGUILAR & CARLOS ALBERTO TORRES MARTÍNEZ *Studying functions through simulations with engineering students*

Abstract. This paper show the results coming out from a research led at the Autonomous University of Mexico City, in the context of a national project about teaching of calculus for engineering students. In order to identify the difficulties encountered in learning and building the concepts of co-variation and function, the use of the virtual simulation of a concrete situation was selected: transmission of movements by a fixed pulley. The students under observation received printed work sheets along with HTML pages using Java Applets for interactive work. Three research activities were prepared, ordered by growing difficulty. Two of them are reported in this paper, as they were considered to be illustrative of the difficulties that students face in understanding process of the phenomenon. This experience also showed that some elements from the simulation, as well as the misunderstanding of the involved mathematical notions (variables, parameters, algebraic relationships, domain and rank of a real function) can generate learning obstacles.

GEORGE KOPSPENTARIS & PANAYIOTIS SPYROU *Assessing the development of geometrical thinking from the visual towards the analytic-descriptive level*

Abstract. The transition to a more advanced stage of geometrical thinking, identified by Van Hiele as the transition from Level 1 to Level 2, is characterised by the gradual primacy of geometrical structures over the gestalt unanalysed visual forms and by the application of the geometrical properties of the shapes. The solution techniques adopted by students of different educational levels and of a range of formal geometrical education experience have been investigated through a number of specially designed for this purpose items. The results indicate that the perceptual strategies are present in the students' strategy choices, including university students. It is suggested that the typical tests that assess the development of geometrical thinking should be complemented with items focusing on this issue.