

**ANNALES de DIDACTIQUE et de SCIENCES COGNITIVES,**  
**Volume 15, 2010, IREM de STRASBOURG**  
**ABSTRACTS**

Monique Pariès *Knowledge Circulation in Mathematics Classes: What Variation Across Teachers' Practices? Case Studies* 9 – 42.

**Abstract.** From a case study comparing the same teacher acting in two different mathematics classes of the same age but different levels, we try to analyze the variability of the ways by which the teacher supports the pupils' work, particularly through his or her speech. We suggest that the differences that can be observed actually represent a differentiation of the tasks offered by the teacher to the two classes. We then challenge these first results with a few other cases.

Georgios Kosyvas *Open problems: concept, categories and difficulties* 43 – 71.

**Abstract .** What is the concept of the open-ended problem? Why is it necessary to pose open problems for research in the class? Which are the essential difficulties of treatment of the open problems in the class? How could we treat them? This text supplements a series of articles of the bibliography devoted to the resolution of the open problems. It presents short data of the practice and exposes many statements of the organized open problems of categories, favourable for research with groups of co-operation in the class with the level of the high school and senior high school. It brings new elements on the subject, and recalls for memory of the already treated questions.

Alain Kuzniak *On the nature of geometric work at the end of compulsory school in France* 73 – 93.

**Abstract.** The purpose of the study is to define the nature of geometric work implemented in France at the end of compulsory school. To make the study, the notions of geometric paradigms and geometric working spaces (GWS) have been used. The reference GWS study is based on an analysis of the French Curriculum published in 1996 and 2005 and textbooks and classrooms observations have been used to precise the appropriate GWS. From the study, the appropriate GWS appears more and more fragmented and oscillates on a confused way between geometric paradigms. This GWS fragmentation is mostly due to the fact that the geometric work is not longer led by epistemological aims, but by an adaptation to the mathematic level of the students.

Éléna Boubilil-Ekimova *Geometrical Difficulties Among Future Teachers* 95 – 116.

**Abstract.** This article reflects on a study we have conducted in the organization of didactical formation for the teaching of geometry. We seek to draw a portrait of mathematical knowledge among teachers and future teachers in elementary schools. Analysis of research undertaken in the teacher formation relating to the mathematical preparation of teachers in primary education, made it possible for us to emphasize their difficulties and the principal reasons in the gaps in mathematical knowledge among students. In this article, we identified and described the difficulties of prospective teachers in the solving of concrete geometrical tasks and in the teaching of geometry during their practice in the schools.

Caroline Bulf *The role of symmetry in the geometrical nature of work of stone-cutter and cabinetmaker* 117 – 139.

**Abstract.** Through interviews with stone tailors and cabinet makers, we analyse the using of the concept of symmetry. This study points out how symmetry orient the craftsman's gestures towards a large list of techniques relatively fixed. Craftsman's behaviour may be from

teaching's residue, contextual adaptation, knowledge or references to expertise. The entanglement of all these factors is such that we admit the concept of symmetry has got a special status which stresses from all these influences : that means the concept of symmetry is not a familiar concept nor a scientific one, if we refer to Vygotski's terms, but halfway between these conceptions, such that a "naturalized" concept.

Viviane Durand-Guerrier, Carl Winsløw, Hiroaki Yoshida *A model of mathematics teacher knowledge and a comparative study in Denmark, France and Japan* 141 – 166.

**Abstract.** A model for mathematics teacher knowledge based on the anthropological theory of didactics is presented together with a methodological discussion of how to assess such knowledge in practice. To this end we propose a concrete method involving "hypothetical teacher tasks" and individual as well as collaborative work of the teachers to be assessed. This discussion is illustrated by a small scale comparative study of how future lower secondary mathematics teachers (just about to graduate) from Denmark, France and Japan approach two hypothetical teacher tasks (related to teaching geometry and arithmetics).

Laurent Vivier *Un medio teórico para la noción de tangente en la enseñanza secundaria* 167 – 193.

**Résumen.** En Francia, en clases de grado 11, la introducción de la derivación se apoya fuertemente en la consideración de rectas tangentes a una curva ¡Pero la noción de tangente no es definida en forma general! Investigadores en didáctica de las matemáticas abordaron este problema. Una de sus conclusiones fue la necesidad de enseñar la noción de tangente para, después, utilizarla en la introducción de la noción de derivada. Con un punto de vista didáctico e histórico, esbozaremos una solución al problema de enseñanza planteado. Al adaptar el método de René Descartes, se define fácilmente la noción de tangente a las curvas algebraicas. Esta etapa parece importante para cambiar las concepciones de muchos de los estudiantes, que tienen una idea global, y no local, de la tangente. Luego, una introducción de la nueva noción de derivación es posible a partir de la noción de tangente, cuando la tangente ha adquirido el estatuto de objeto matemático.

Avenilde Romo Vázquez *Engineering Projects: Study of a practical activity in engineering education* 195 – 212.

**Abstract.** This text is based on the Romo's thesis (2009), the center of which being the place of mathematics in three projects belonging to mathematics training for prospective engineers. Learning involves solving linear differential equations with constant coefficients, equipped by the Laplace transform, the last phase (determination of the original) having two variants (with or without convolution). The didactic transposition is partly determined by the aims of teaching (learning effects are the goal, but other influences are critical and, in a course of vocational training, we may not neglect the institutional references. The computer resources available today raise the question of praxeology really useful: What knowledge is empowering management of parameters and interpretation of software outputs? What is the contribution of elements of knowledge for effective use of treatment by simulation?

Note de lecture sur l'ouvrage de Gueudet & Trouche par Alain Kuzniak *Ressources vives. Le travail documentaire des professeurs de mathématiques* 213 – 217.