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ABSTRACTS

Maggy SCHNEIDER, Pierre JOB, Yves MATHERON & Alain MERCIER. Praxemic extensions related to sets of numbers: from complex numbers to integers.

Abstract. This paper focuses on the learning and teaching of negative numbers. This topic has been intensively studied using, among others, theoretical frameworks stemming from psychology - we give a summary of those researches in the first part of the paper. It is our aim to point out the peculiarities of a purely didactical approach. We do so using didactic concepts and most notably that of a praxemic extension. This concept will be put to use to bring to light the kind of problems and/or debates teachers and students have to face when dealing with extension of sets of numbers. This is made possible by contrasting negative numbers with complex numbers – hence the title. Lastly we expose the main lines of two didactic engineerings, closely related to the praxemic extensions analyzed above, and show what kind of shape they display when they are cast in contrasting curricular settings.

Irène FERRANDO, Lluís M. GARCI-RAFFI, Lorena SIERRA. A proposal of action to introduce modelling in secondary classroom.

Abstract. The official Spanish program points out the necessity to develop modelling process in real contexts. However, several studies suggest that secondary teachers have difficulties to implement modelling activities in their classes. In this work we present, throughout the description of an experience developed by one of the authors, a proposal of action to introduce modelling in secondary classroom. The final goal of this ongoing work is to design a teaching material that could be easily used by secondary teachers.

Mireille SABOYA, Nadine BEDNARZ, Fernando HITT. Self-control engaged in algebra : analyze of students' productions and a clarification on their conceptualization. Part 1 : problem solving.

Abstract. Our reflection takes its roots, first in a theoretical analysis of what constitutes an activity of control when doing mathematics and, on the other hand, in an empirical study conducted on a group of secondary students (14 -15 years). A written questionnaire on various components of algebra, supplemented by individual interviews with some students, forms the basis of the experiment. We examine here more specifically two items of this questionnaire, which proved particularly rich for the analysis. Data analysis reveals many facets about the control activity exercised by the students throughout the process, shedding new light on the conceptualization that we had been able to establish after theoretical analysis

Viviane-DDURAND-GUERRIER, Thomas HAUSBERGER, Christian SPITALAS. Definicions and Exemples : Prerequisites for the Learning of Modern Algebra.

Abstract. The aim of this paper is a first didactical study of the learning difficulties of modern algebra concepts in a first degree in mathematics at University. This study is

part of a wider research whose goal is the development of a didactics of mathematical structuralism supported on its epistemology. The empirical data analyzed in this paper are taken from a questionnaire, submitted to third year mathematics students at Montpellier University, in order to test the acquisition of notions previously identified as prerequisites to the learning of group theory. First, we develop the epistemological and cognitive aspects on one hand, and the input of logical semantics on the other hand. Next, we present the *a priori* and *a posteriori* analysis of the questionnaire submitted to students, and then return to our research question to provide a first set of elements of response to the problem of the teaching and learning of modern algebra. We end our paper by a general conclusion and new perspectives opened up by this work.

Samatha QUIROZ, Fernando HITT, Ruth RODRÍGUEZ. Evolution of prospective school teachers' conceptions on mathematical modelling.

Abstract. This article related to a doctoral research project deals with the conceptual processes of mathematical modelling of elementary school preservice teachers in a Mexican educative institute. Based on the Theory of the Conceptual Fields, we analyze and explain the initial *conceptions* of the preservice teachers regarding to mathematical modelling. Through a methodology that combines the *lesson study* and the notion of *hypothetical learning trajectories* for organizing the lesson, we realize the evolution of conceptions in both different planning and implementing cycles. The study put forward an innovative theoretical-methodological approach as regards a collaborative inquiry between the researcher and the preservice teachers.

Maha ABBOUD-BLANCHARD & Aline ROBERT. Training trainers of secondary school mathematics teachers : a need, an experience and a current question.

Abstract. It seems obvious that teacher educators should themselves be trained. Nevertheless, rare are research studies that consider this issue. In this paper we trace the history and present the theoretical background of a university program for training trainers of secondary mathematics teachers, established since 2004, grounded on a master degree of didactics of sciences. We first situate this experience in comparison to other similar ones and present its guidelines and discuss opinions of teachers who participated in it. We then develop the research that underpinned this program and its interrelation with the training hypotheses, including assumptions made on the development of teaching practices. We finally discuss why and how such training, made in a university context by researchers, could have an impact on teachers' professional development and what questions it raises for the research in this field.

Laurent VIVIER. Note de Lecture sur APOS theory, a Framework for research and curriculum development in mathematics education.

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