

**ANNALES de DIDACTIQUE et de SCIENCES COGNITIVES**  
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**ABSTRACTS**

**Éric RODITI. Subject, Knowledge and Activity: Discussing their articulations.** p. 9 - 16  
**Abstract.** In this text we introduce a scientific discussion about how some objects are taken into consideration within research on mathematics education. The subject, knowledge and activity, along with how they are intertwined, are the objects that constitute the core of the proposed reflection. Many researchers base their studies and issues on theoretical frameworks some of which are outside the field of didactics. Indeed the debate focuses on the question of the nature of this scientific field and of its results.

**Jean-François MAHEUX et Jerome PROULX. Toward mathematical doing: Attempts at a new positioning in didactics of mathematics.** p. 17 - 52

**Abstract.** In didactics of mathematics, reflections and observations on the nature of mathematical “knowledge” and “knowing” have led to a broader view of what is meant by learning mathematics. Progressively taking distances from perspectives in which mathematical “knowledge” is the object of reference, studies have come closer to the contexts in which students do mathematics. There is still, however, a tendency in our field to focus on what students might know, understand or learn in relation to a specific “knowledge”. In contrast, the epistemological perspectives in which we as authors are positioned view the local and emergent character of the mathematical activity as so central that it invites us to “replace” questions of knowledge with ones about mathematical doing. In this article, we investigate this path, both theoretically and empirically. In so doing, we look into the theoretical and ethical foundations of such a positioning and offer a practical illustration of its implications for research in mathematics education (through analyses of data from a study on mental mathematics). We show how important aspects of studies in didactics of mathematics continue to be relevant and significant in this positioning and how new questions emerge and others disappear.

**Sophie RENÉ DE COTRET. Might or should we not refer to knowledge for grasping mathematical doing?** p. 53 - 61

**Abstract.** In their paper, MAHEUX & PROULX propose to look at the mathematical activity of the student from the « doing maths » point of view. They suggest that this focus must let out the reference to the mathematical knowledge as usually conceived. If I do agree with the focus they propose, I question, strictly speaking, the fact that the knowledge is not useful in this analysis.

**Lalina COULANGE. Mathematical doing: New theoretical and methodological perspective for studying knowledge and knowing?** p. 63 - 70

**Abstract.** In their research work, MAHEUX and PROULX propose to take distance from mathematical "knowledge" and "knowing" and to focus on mathematical doing. The both theoretical and empirical path that they investigate leads me to question further the role of mathematical knowledge and knowing in the research in didactic of mathematics. Do mathematical knowledge and knowing appear as 'real' or theoretical objects in didactic studies? How do "knowledge and knowing" influence the ways in which researcher may observe and analyse the learning/teaching of mathematics?

**Jean-François MAHEUX et Jerome PROULX. Faire mathématique : un débat porteur.** p. 71 - 72

**Elizabeth MONTOYA DELGADILLO et Laurent VIVIER. Changes of field within the Mathematical Working Space framework.** p. 73 - 101

**Abstract.** Research on Mathematical Work Spaces has been developed for more than fifteen years in the field of Geometry. Taking advantage of international meetings, it has been necessary to develop this framework to other fields such as Algebra, Analysis and Probability. In this context, we are interested in articulating mathematical fields in the mathematical work. Our study on changes of field is based more specifically on Geometrical Working Space distinguishing an initial field, or source, and a final field, or resolution. Examples analyzed in this article are taken from researches in Chile and France and allow us to build a set of questions to study changes of field.

**Claire GUILLE-BIEL WINDER. Situation of reproduction of figure by folding: PLIOX.** p. 103 - 128

**Abstract.** This work presents the study of a situation of reproduction of figure by folding which is called a PLIOX (Guille- Biel Winder, 2013). We put this situation as a spatial problem into the 3D micro-space (Berthelot & Salin, 1992). If we consider it as a geometrical problem, we identify that G1 is the corresponding geometric paradigm (Houdement & Kuzniak, 2000 & 2006), we analyze the function of this situation for the development of the geometrical thought (Van Hiele, 1986), we use a cognitive and semiotic point of view (Duval, 1995) to see that the situation uses shape modifications (decompositions and reconfigurations), as well as positional modifications. We finally identify various didactic variables and mathematical knowledges at stake. This work leads us to the presentation and analysis of different phases of PLIOX situation.

**Zahid ELM'HAMEDI. Effects of empirical learning on the understanding of the concept of arithmetic mean.** p. 129 - 169

**Abstract.** The goal of this research is to evaluate the effects of empirical learning on understanding of the concept of arithmetic mean, at the Moroccan students in 3rd year of college (14-17 years old). This empirical learning is materialized by some practical activities allowing the apprehension of usual properties of this concept. These practical activities are established before traditional and official courses introducing this statistical notion, usually focused on application of the formula of an arithmetic mean of a sample. We chose random sample constituted of 144 students (74 boys and 70 girls) under above school level. We have applied randomization principle in order to form two equal groups: Experimental group and Control group. The experimental design adopted is formed by four steps composed with tasks to be achieved by the students. The first task, addressed to the Experimental group only, involves implementation of the above practical activities. The results of this research, deduced by application of Factorial Analysis, show that empirical learning have positive effect on understanding of arithmetic mean at students in 3rd year of college. Thus, this study suggests not only that the arithmetic average concept is more complex than the direct application of the above computational algorithm, but also implies that the average concept should be taught beyond this famous rule.

**Nathalie SAYAC et Nadine GRAPIN. Multiple Choice Testing at the End of Primary School: Strategies and Levels of Confidence. p. 169 - 197**

**Abstract.** The use of multiple choice items, especially in large-scale assessments, increasingly grows without questioning the strategies used by pupils to answer these types of questions, particularly in mathematics. The research presented in this paper aims to investigate how students in their final year of primary school proceed to answer multiple choice questions in the number domain and the level of confidence they give to their answer. Comparisons with students' levels of knowledge and used response strategies complement broader concerns.

**Britta Eyrich JESSEN. How can study and research paths contribute to the teaching of mathematics in an interdisciplinary setting? p. 199 - 224**

**Abstract.** This study investigates the perspectives of using study and research paths (SRP) as a design tool for bidisciplinary work at upper secondary level. This study is using a special kind of diagrams both as tool for SRP design and as a tool to analyse the actual SRP realised with students. Specifically I present the design and realisation of a SRP combining mathematics and biology. The results point to advantages of the SRP approach in terms of the way bidisciplinary work is organised, but also challenges in relation to the design process. As for the last point, the test of the designs raises the question to what degree of detail is it necessary to know the practice and theory of both disciplines in order to formulate questions that help students to develop the intended praxeologies, and also for the weak students to discover the need of mathematics for solving problems in other disciplines.

**Osiel RAMÍREZ-SANDOVAL, César f. ROMERO-FÉLIX, Asuman OKTAÇ. Coordinating semiotic registers in the use of linear map in the plane. p. 225 - 250**

**Abstract.** This paper presents an analysis of interviews with college students, which includes various situations involving the concept of linear map. Our goal is to analyze the coordination of registers by students and their relationship to the success and efficiency to solve the given situations. To clarify the concept of coordination of registers, we describe successful cases of coordination and various ways in which this coordination is not achieved, with analysis of possible sources causing non-coordination, for example the confusion of registers. To achieve meaningful analysis, we study the representations used by students, as well their verbal explanations, segmented into interpretable units. We include a discussion through examples about the notion of mixing registers.

**María del Rocio JUAREZ, Adelina ARREDONDO et François PLUVINAGE. Comparative Study of Pre-service Mathematics Teacher Education in France and Mexico. p. 251 - 283**

**Abstract.** This paper presents a comparative study of mathematical and pedagogical competencies that prospective teachers of mathematics can acquire in France and Mexico. In order to identify these competencies, a questionnaire was designed on the basis of common knowledge and skills coming out from curriculum and national proofs. The observed results suggest some possible ways in order to improve teacher education in both countries.