

ABSTRACTS

Houdement, Catherine; Petitfour, Édith. *Semiotic analysis of mathematical activity, a didactic need in the context of school adaptation.*

Abstract. The research we are conducting seeks to understand what is being played out between the actors (students, teacher) which could enlighten us on some difficulties for teaching mathematics in special education. It explores the semiotic dimension of mathematical activity. In this paper a learning situation of the decimal numeration is proposed to three students with intellectual disabilities in a Medical-Educational Institute. The analyse is based on the different signs activated through interactions between students during a brief episode. The study points out the presence of "semiotic misunderstandings" and the role of interactions in the activity, including social interactions, between students or with the teacher.

Auquière, Amélie; Demonty, Isabelle; Fagnant, Annick. *Impact of semantic structures and schematic diagrams on performance and problem-solving strategies.*

Abstract. This study focuses on the impact of the introduction of "range-tout" schematizations on pupils aged 9-10's problem-solving strategies. Coming from a test submitted to a micro-intervention and a post-test, the results highlight the impact of the semantic structures on children's spontaneous strategies (complement-procedure vs comparison-procedure) and on the way they appropriate the schematizations. Qualitative analyzes show that the introduction of schematizations positively affects students' performance when they encounter their spontaneous approaches, but that it is counterproductive (in the short term) when it directs them towards a different (and less economical) strategy.

[GREFEM] Bednarz, Nadine; Lajoie, Caroline; Maheux, Jean-Francois; Saboya, Mireille. *Contextualising in teaching and learning mathematics: a stake for teacher training.*

Abstract. Research in mathematics education shows that dwelling upon questions regarding "contextualizations" in teaching and learning mathematics is important for teacher training. In this article, we examine in terms of contextualization, three training practices (addressing primary or secondary prospective teachers at Université du Québec à Montréal – UQAM) targeting the same mathematical content (division). Through each case, following an inductive process, we analyze *a posteriori* the meaning of contextualizing, including its assigned function by the teacher-students or the teacher-educator, whether the contextualizations were explicitly requested or emerged in students' work. A transversal reading of the cases shows the richness of meanings associated with contextualization and identify potential avenues for teacher training.

Moutet, Laurent. *Analysis of a special relativity teaching sequence: The contribution of the extended MWS.*

Abstract. The aim is to analyse the tasks performed during the modelling process of a special relativity teaching sequence in a "Terminale S" class in France (grade 12). Didactic engineering will be the methodological framework chosen for this study. Three theoretical frameworks will be used (DST, ADT and extended MWS) during the *a priori* analyses of the tasks to be performed in this sequence. The extended MWS framework will only be used for *a posteriori* analyses.

Caglayan, Günhan. **Coordinating representation registers: linear algebra students' understanding of orthogonal Legendre polynomials in the inner product space \mathbb{P}_n in a technology-assisted learning environment**

Abstract. The purpose of this research study was to understand how linear algebra students in a university in the United States make sense of the orthogonal Legendre polynomials as vectors of the inner product space \mathbb{P}_n in a DGS (Dynamic Geometry Software)-MATLAB facilitated learning environment. Math majors came up with a diversity of innovative and creative ways in which they coordinated semiotic registers for understanding inner products of Legendre polynomials along with other notions inherent in the inner product space, such as Triangle Inequality, Pythagorean Theorem, Parallelogram Law, Orthogonality and Orthonormality, Coordinates Relative to an Orthonormal Basis.

Research participants not only produced such creative inner product space visualizations of the Legendre polynomials with the associated integral inner product $\langle f, g \rangle = \int_{-1}^1 f(x)g(x)dx$ on the DGS, but they also verified their findings both analytically and visually in coordination. The paper concludes by offering pedagogical implications along with implications for mathematics teaching profession and recommendations for future research.

Emprin, Fabien. *How statistical analysis of texts can help research in didactics: the example of Reinert's method.*

Abstract. In this paper, we analyse statistical analysis of texts' potential for researchers in didactics. We focus in Reinert's method. Research methodologies lead us to analyze corpus with large amount of text. Without making it the only tool of analysis we show on two specific examples how this statistical treatment makes it possible to access corpuses hardly accessible otherwise or to make hypotheses facilitate then the human analysis. First we present the foundations and techniques related to this kind of analysis and then we develop the analysis around two examples: the processing of exchanges between trainers and trainees through a digital portfolio and the analysis of the mathematics primary school curricula in France since 1976.