

SUMMARIES

The new "Aster".

Jean-Pierre Astolfi

This new version of the journal Aster is a development of the internal bulletin of the experimental sciences didactics team of the Institut National de Recherche Pédagogique. It aims to supply teachers who are involved in innovatory work or training courses, or who merely wish to change their teaching practice, with useful didactic tools. It is its intention to avoid the rigid separation of scientific analysis from the practising teacher's problems, which constantly threatens didactics. It is open to contributions from outside INRP.

A technique for analysing implicit models teachers have of science teaching.

Anne Vérin - Brigitte Peterfalvi

The "Q-sort" technique is used here as a means of exploring the different conceptions that science teachers have of their teaching, and to measure what can be imputed to personal choice of values in the research work they are associated with.

On the notion of the didactic contrat.

Anne-Marie Drouin

The notions of didactic contrat and transposition are nowadays central to the didactics of mathematics. To what extent are they specific to this field? What adaptations are necessary in order to "transpose" them to other fields? Whereas it does not claim to supply fully worked-out answers, this text sums up discussions and observations developed between the members of the INRP team working on the didactics of experimental sciences.

Pupils' conceptions of photosynthesis.

Guy Rumelhard

With reference to the former syllabus, a seminar was devoted to pupils' conceptions of photosynthesis. This article uses three types of analysis based on different data: pupils' answers to questions in the classroom, historical studies from an epistemological point of view, text-books. It endeavours to define a number of difficulties that pupils may encounter while acquiring the concepts of photosynthesis. Some proposals for overcoming the obstacles and resistances defined are then discussed from an interdisciplinary point of view.

Psychoanalysis and didactics. On mental representations and causality.

Alain Kerlan

Psychoanalysis challenges the specialist in didactics with its method of investigating mental representations. Pupils' mental representations are indeed at the centre of the didactics of experimental sciences. The psychoanalytic method however arises from a general conception of mental activity and of the way the psychic system operates. What psychoanalysis can offer here is perhaps not so much a methodological model as a conceptual and theoretical framework, which can be tried out in the problematics of children's representations. Whatever the conclusions one may draw, the psychoanalytic approach at least obliges us to recognize that scientific thinking is born, educated and established as a part of the whole psychic activity, to which it never ceases to belong.

Energy and movement. Ideas expressed by children while studying mobile toys.

Jacqueline Agabra

An analysis of primary school classes where the notion of energy is introduced through the study of mobile toys shows that children produce explanatory ideas in this context. Thus they prefer to use kinematic chains to describe the mechanisms, even though they sometimes mention the source of energy. As they are convinced that the persistence of a movement implies constant contact with the causal agent, they construct a hydraulic model which reduces electricity to mechanics. They also use the idea of impetus which, in their minds is connected with a fund of power or energy, although the ideas of interaction or transfer are not necessarily present.

Heat. Temperature. Changes of state.

Annie Laval

The aim of this study was firstly to investigate the ideas of children entering secondary school about the physical phenomena occurring in their every day life, and the way teaching affect these ideas. The research which was done on these questions with 11-15 year-old pupils is described in the first part of this article. Using the results of this research, proposals are then made as to how teaching might be adapted to the pupils' preconceptions. Classroom experiments have shown what the main difficulties are and have tested which notions are accessible to pupils of the first years of secondary school.

Using a Logo System: possibilities and problems.

Jean-Luc Zimmermann - Christian Nidegger - André Giordan.

The introduction in primary schools of microworlds, new machines and new languages, requires extreme vigilance as regards the building up of knowledge by pupils and the teaching techniques to be applied. The first stage of this research,

undertaken in school learning situations, defines the obstacles encountered and discusses the place of the computer as a tool, as well as technical and pedagogic proposals for its use.

On defining the objectives of an introduction to the physical sciences.

Jean-Louis Martinand

This article consists for the most part of substantial extracts from the text of the synthesis written by Jean-Louis Martinand stating the main lines of his *thèse de doctorat d'état* defended in may 1982 at Orsay's University. On the basis of his innovative teaching and research in three fields :

- the formulation of a course on production techniques for children of 13-14 year-olds
- an analysis of the notion of the chemical element as taught to 12-13 year-olds
- an approach to the notion of hardness for 11-12 year-olds,

he derives two notions that prove crucial for the didactics of physical science : the notion of social practices of reference and the notion of the objective-obstacle.

The development of scientific thinking (biological orientation) in children of 6-14.

Jacques Lalanne

This article takes up the main arguments of a *thèse de 3e cycle* written from a constructivist approach to concepts, following Piaget. The development of scientific thinking is analysed from a systemic stand point: a set of systems constitutes a whole in movement but nevertheless implies different states of equilibrium which it is possible to recognize and to describe. This is particularly clear in the case of the levels of concept formulations which are set forth here.