

## EDITORIAL

### **The precursor models in Science Education: questions and perspectives**

For the past six decades, the learning and teaching of the natural sciences have constituted a distinct field of research within which theoretical trends, as well as general and specific research questions, methodologies, answers, and scientific uncertainties.

This unique field of study, known in the English-speaking world as Science Education and in the French-speaking world as Didactique des Sciences, has intersected with many other scientific disciplines throughout its long history of development. In addition to the core sciences themselves (Physics, Chemistry, Biology, etc.), it was closely linked to Educational Sciences, those branches of Psychology focused primarily on the study of learning processes, the Epistemology of Knowledge, etc. In this context, specific concepts emerged and evolved, becoming the focus of specialized research programs that have met with varying degrees of acceptance, dissemination, influence, and impact.

Perhaps the most significant trend in Science Education research has focused on studying the processes by which children's thinking transitions from a naïve and intuitive approach to the natural world to an understanding based on conceptual entities consistent with those found in school scientific knowledge. Among these entities, mental models occupy a significant place, as their structural and functional elements correspond to those of scientific models. In Science Education, these mental models were approached in different ways: Sometimes attention was paid to their characteristics, other times to their possible stability and adaptability and often to the processes by which children abandon their initial representations of the phenomena of the natural world in order to be led to the more elaborate forms of reasoning imposed by the formation of stable mental models.

In this broad context, the concept of the precursor model was proposed in the 1990s by the psychologist Annick Weil-Barais and the physicist Gérard Lemeignan. In this sense, an attempt was made to study the possibilities for constructing entities in students' thinking, which possess some of the characteristics of complete models and which can serve as intermediate stages in the development of mental models that embody the characteristics of school-based scientific knowledge.

This research perspective did not follow a linear course either from the point of view of the researchers who worked or from that of the level of education. Following an initial, extensive research program on the teaching of classical mechanics to secondary school students, which was completed and systematically presented by 2000, the effort immediately continued with initiatives to introduce the sciences within the framework of Early Childhood Education, specifically for children aged 3–8.

This effort has already been developed in a twenty-year cycle and has now yielded research results in a wide range of concepts and phenomena from elementary Physics, Biology and Chemistry. This topic has attracted the interest of small research groups in several countries and thus the relevant dialogue has begun to develop.

With this orientation, the *Mediterranean Journal of Education* attempts in this issue to offer a forum for discussion on precursor models, in order to record the views of researchers who have different levels of interest, experience and involvement with theoretical, methodological or didactic issues. We hope that this initiative will foster a fruitful dialogue, the deepening and maturation of the quests related to the precursor models in the learning and teaching of the Sciences.