

Editorial

Since its beginnings as an academic discipline, mathematics education, in its dimensions of both research and school practice, has explored visions, constructs, interpretations and contexts which are linked to different fields of knowledge. Such fields might appear very distant from mathematics, concerning other disciplines or forms of knowledge that are more general and transversal. This choice is not the result of an intellectual or ideological whim, but a need, which stems from the awareness that education in general, and mathematics education in particular, is a world in which paths from various worlds come to converge: that of sciences of education, semiotics, linguistics, art, play, environment etc. A need that stems from the necessity of interpreting the delicate process of teaching-learning mathematics through different lenses.

The *Didattica della matematica. Dalla ricerca alle pratiche d'aula* journal cannot but be part of this perspective, and proudly so, by welcoming contributions that show a mathematics education which increasingly opens to the stimuli and questions coming from both the world of research and that of teaching practice, also opening up to other perspectives and visions. The fourteenth issue, like some of the previous ones, also highlights this perspective.

The first article in the *Riflessione e ricerca* section of this issue presents the Triple S (Social, Structural and Specialized) framework, intended as a semiotic tool for understanding mathematical memes, i.e. mathematical mutations of image memes. By using data from experiments conducted with students of various school grades, the author shows how this tool can be employed in research to investigate students' cognitive processes, as well as in teaching to design activities involving mathematical memes. The second article presents the results of an experiment carried out in two eight-grade classes of a lower secondary school in Italy,¹ designed to integrate classroom teaching-learning activities with a visit-laboratory to the museum of Palazzo Madama in Turin. The work presents the design and methodological choices, discussing them in the light of the theoretical framework of informal mathematics education, with a special focus on the teacher's role, the balance between the museum visit activities and the class curriculum, and the assessment methodology implemented. The third article, which is available both in the original language and in Italian, investigates in-service secondary² teachers' geometrical figure apprehension in relation to two aspects: their ability to construct geometrical proofs and to predict didactically their students' difficulties and mistakes. The research, conducted within the frame of an in-service training course in mathematics education, shows how certain concepts from Duval's geometrical figure apprehension can shed light to various facets of teaching and learning geometry.

There are four articles in the *Esperienze didattiche* section. The first article presents a didactic path carried out during an entire school year in two first cycle bclasses (i.e., classes composed of first and second graders) of the Istituto di Lugano in Switzerland. The experience shows how teachers can transform various kinds of constraints and difficulties into opportunities to design activities in a new, creative and suitable way for their pupils, while activating specific mathematical skills. The second article presents a teaching experiment to discover number systems, in particular the Chinese

1. The lower secondary school in Italy lasts three years and corresponds to the grades from 6 to 8.

2. Secondary education in Cyprus consists of two cycles: the *Gymnasio*, which corresponds to the grades from 7 to 9, and the *Lykeio*, which corresponds to the grades from 10 to 12.

ancient numeral system. The path has been carried out in a fourth-grade Italian primary school³ class; the historical and mathematical contexts, combined with explorations of the Tartaglia-Pascal's triangle (in its Chinese version), encouraged the development of mathematical skills in the numerical field in line with an active and conscious citizenship education. The third article focuses on a teaching and learning project centred on an experience of communication between classes of different compulsory school orders: the students of two eight-grade classes of the lower secondary school in Minusio, Switzerland, took on the role of teachers, preparing an itinerary of activities on triangles to be proposed to the children of two third-grade classes attending the primary school in Locarno. The experience allowed the pupils to experiment with some of the peculiarities of the teaching profession (from planning to assessment, through the realisation and management of the activities) and to work in an interdisciplinary perspective with Italian language. The fourth and last article presents a didactic experience in which different areas of learning are approached, the most relevant of which are the study of the environment and the mathematical area. The pupils of the kindergarten in Avegno, Switzerland, have experienced a path centred on games, in particular old-time games, by activating, from an interdisciplinary perspective, mathematical skills related to the game reproduction and analysis, and linguistic skills linked to the comprehension and production of descriptive and procedural texts.

We are aware of the need to continue providing a wide-ranging service, open to new stimuli and perspectives. That is the reason why we wish to all those who follow us to enjoy the reading, whether they are teachers, researchers, readers, students, interested people from the most varied areas of human knowledge.

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3. The primary school in Italy lasts five years and corresponds to the grades from 1 to 5.