

Editorial

«We should learn to navigate on an ocean of uncertainties, sailing in and around archipelagos of certainty. We should teach strategic principles for dealing with chance, with what is unexpected and uncertain, as well as ways to adapt these strategies in response to continuing acquisition of new information. We cannot eliminate uncertainty, we have to negotiate with it».¹

(Morin, 2015, p. 35)

1

The world of education is a complex and articulated world, especially when it deals with mathematics, where all the involved figures, teachers, researchers, students, pursue jointly the same common goal: to find paths, ways, methodologies, models, etc. to be effectively tested and validated. It is a world where attempts are daily made, and unfortunately not always successfully, but the real challenge, the real nourishment, is inherent in knowing how to learn to sail in a sea of uncertainty with perseverance and with the motivation to find “archipelagos of certainty”, from which to start again to undertake a new journey. In his words, Edgar Morin, one of the most important philosophers and sociologists of the second half of the 20th century, significantly describes the spirit that inhabits the places of the world of education. It is a matter of looking for those islands, those mainland points that you can rely on and that enables you to navigate, with a few more tools, on the uncertain waters of reality. They are certainly not easy places to find, partly because of the effort of navigation itself, partly because they are islands usually hidden from a surface view.

The journal *Didattica della Matematica. Dalla ricerca alle pratiche d'aula* takes part in all this, thanks to the contributions of researchers and teachers, who are engaged in trying to identify archipelagos regarding processes of teaching/learning mathematics, with the help of students. In this sense, mathematics education is only one of the many oceans of research and practice in education, but it is certainly a wide ocean that brushes several continents and is crossed by various currents. The fifth issue of the journal is a clear example of the complexity of this ocean, and at the same time of its incredible variety, richness and beauty.

The *Research and reflection* section presents three articles describing some of these metaphorical places. The first contribution is part of an interdisciplinary project titled: “*Italmatica. Understanding mathematics at school between common language and specialist language*”, which focuses on the relationship between language and mathematics, identifying processes related to reading as the “gateway” to understanding mathematics problems. The contribution also proposes ideas, reflections and significant activities addressed to those teachers who intend to deal critically and consciously with the processes related to the understanding of a mathematical text. The second article focuses on gender differences in mathematics learning: males perform better than females in most countries and at all school levels. Through an analysis of Italian and international surveys related to gender differences in mathematics in the context of standardized tests, the article

1. Translated by the author from the Italian version: «Bisogna apprendere a navigare in un oceano di incertezza attraverso arcipelaghi di certezza. Bisognerebbe insegnare dei principi di strategia, che permettano di affrontare l'alea, l'inatteso e l'incerto e di modificare il loro sviluppo, grazie a informazioni acquisite strada facendo. Non si elimina l'incertezza, si negozia con essa».

presents the causes underlying the gender gap in mathematics. The third contribution describes in detail the “ArAl Project, Didactic paths to promote pre-algebraic thinking”, born in the '80s in Italy. Starting from the theoretical field of the early algebra and thanks to decades of research and experience conducted by teachers and researchers, the article convincingly argues how it is possible and appropriate to approach and develop the algebraic thinking earlier in primary school, instead of waiting that students are 13-14 years old as is usually the case.

The *Teaching and learning experiences* section proposes four contributions. The first describes a path in continuity between kindergarten and primary school: throughout a school year, the children collaborated and worked on the design and construction of a trolley cart to transport materials from one school to the other, thus mobilizing different transversal and mathematical skills; the second contribution describes a didactic path, centered on the Pythagorean theorem, carried out following the flipped classroom approach in a lower secondary school: besides a balance of the experience, the article presents the lessons realized on the topic and provides the used materials, in order to facilitate the replicability of the experience; the third article describes a path proposed to third grade students, focusing on the theme of the subjective perception of time: thanks to the students' statements extrapolated from diaries, questionnaires, interviews and discussions, it provides a significant picture of children's beliefs on this complex and elusive theme; the last contribution of the section, finally, describes a didactic path on the circumference at kindergarten, designed according to the theoretical framework of Semiotic Mediation: the article analyses the artifacts used by children, the role of the teacher, and the processes of transformation that allow the transition from perceptual-motor signs and artifacts to mathematical signs.

The variety and substance of the contributions in this issue only confirm what we stated at the beginning: the world of research in mathematics education is a complex, rich and multifaceted world. We believe that accounting for this complexity is a fundamental step to manage to investigate it, to find some of the fixed points, namely the archipelagos where to stop and rest for a while, before resuming the journey by sea with greater strength and confidence.

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References

Morin, E. (2015). *Insegnare a vivere. Manifesto per cambiare l'educazione*. Milano: Raffaello Cortina Editore.

