

COMMISSION INTERNATIONALE
DE L'ENSEIGNEMENT MATHÉMATIQUE
(THE INTERNATIONAL COMMISSION
ON MATHEMATICAL INSTRUCTION)

**The 2017 ICMI Awards
Felix Klein and Hans Freudenthal Medals**

ICMI is proud to announce the eighth awardees of the Klein and Freudenthal medals.

- The *Felix Klein Medal* for 2017 is awarded to Deborah LOEWENBERG BALL, William H. Payne Collegiate Professor in Education and an Arthur F. Thurnau Professor in the University of Michigan, USA.
- The *Hans Freudenthal Medal* for 2015 is awarded to Terezinha NUNES, Professor Emeritus of Educational Studies at the University of Oxford, UK.



Deborah LOEWENBERG BALL



Terezinha NUNES

The *Felix Klein* and *Hans Freudenthal* Awards, given in each of the odd-numbered year since 2003, are two prizes created by ICMI for recognizing outstanding achievement in mathematics education research. They respectively honour a lifetime achievement (Felix Klein Award, named after the first president of ICMI – 1908 until 1920) and a major cumulative program of research (Hans Freudenthal Award, named after the eighth president of ICMI – 1967 until 1970). By paying tribute to outstanding scholarship in mathematics education, these Awards serve not only to encourage the efforts of others, but also to contribute to the development of high standards for the field through the public recognition of exemplars. Each award consist of a medal and a certificate, accompanied by a citation. They have a character similar to that of a university honorary degree. At the International Congress on Mathematical Education (ICME), the awardees are honored during the Opening Ceremony. Furthermore, the awardees are invited to present special lectures (ICMI

Award Lectures) at the Congress. The Felix Klein and Hans Freudenthal Awards are selected by an anonymous award committee of distinguished international scholars. The jury for the 2017 Awards was chaired by Professor Anna Sfard, Haifa University, Israel.

We give some key biographical elements below, and full citations of the work of the two 2017 medallists can be found at <https://www.mathunion.org/icmi/awards/icmi-awards>.

The following table gives a list of all the previous awardees since the creation of the medals in 2003:

Recipients of ICMI Awards since the creation of the medals in 2003

	<i>Felix Klein medal</i>	<i>Hans Freudenthal medal</i>
2003	Guy BROUSSEAU	Celia HOYLES
2005	Ubiratan D'AMBROSIO	Paul COBB
2007	Jeremy KILPATRICK	Anna SFARD
2009	Gilah LEDER	Yves CHEVALLARD
2011	Alan SCHOENFELD	Luis RADFORD
2013	Michèle ARTIGUE	Frederick LEUNG
2015	Alan BISHOP	Jill ADLER

Citation for Felix Klein Award 2017 to Prof. Deborah Loewenberg Ball

The *Felix Klein Award 2017* is awarded to *Professor Deborah Loewenberg Ball* in recognition of her outstanding contributions and her leadership role in deepening our understanding of the complexities of teaching mathematics and in improving the practice of teaching and of teacher education. These achievements are grounded in Deborah Ball's firm belief that research and practice of teaching are co-constitutive and must always be developed in tandem. Early in her life, Deborah Ball, at that time an exceptionally talented elementary school mathematics teacher, set out to investigate what was involved in the work of teaching children mathematics "for understanding." Her intention was to uncover the work in order to support the learning of teaching practice. Ever since then, her ambition has been to contribute in a substantial way to the project of improving ways in which mathematics teachers support their students' learning. This goal gave rise to two lines of work, both of them combining research with development in the domain of teacher education. The first strand, in which the research element came first, has been generating studies revolving around the question of what mathematical knowledge is required for teaching learners. In the second line of work, related to the practice of education in a more immediate way, the development of innovative teacher preparation programs has been combined with research, through which Deborah Ball has been trying to gain a better grasp of the moment-to-moment dilemmas with which teachers grapple in the classroom.

The first of these pursuits gave rise to the theory of MKT, Mathematical Knowledge for Teaching, the kind of knowledge that requires competence in both everyday and academic mathematical discourses, but is identical to neither. In her multiple studies, Deborah Ball and her colleagues have been able to identify many unique features of MKT, and then to corroborate the conjecture about a correlation between teachers' competence in this special brand of mathematics and the achievements of their students.

The second, newer strand of Deborah Ball's work is centered in *TeachingWorks*, a national organization she established at the University of Michigan to help in improving teachers' preparation and to define "a professional threshold for entry to teaching." The mission of the institute is to

identify “high-leverage” teaching practices, that is, those recurring elements of teacher’s classroom activities that are central to what Deborah Ball terms “the work of teaching”

Deborah Ball has been an elementary classroom teacher before and during her studies at Michigan State University, which she completed in 1988 with a PhD in mathematics education. Upon graduation, she joined Michigan State University, and in 1996 she was recruited to the University of Michigan to develop the mathematics education group. She has been teaching at the University of Michigan ever since then and also spent over a decade serving as Dean of the School of Education there. She has played multiple leadership roles, and not only within community of mathematics education but also within that of education at large, and not only within United States, but internationally. With more than thirty years of outstanding achievements in mathematics education research and development, Deborah Ball is a most distinguished member of mathematics education community and a highly deserving recipient of the 2017 Felix Klein Award.

Citation for Hans Freudenthal Award 2017 to Prof. Terezinha Nunes

The *Hans Freudenthal Award 2017* is awarded to *Professor Terezinha Nunes*, for her outstanding contribution to our understanding of mathematical thinking, its origins and development. For more than 35 years now she has been researching children’s mathematical learning, as it takes place in formal and informal settings. The results of her numerous, exemplarily designed studies combine into an insightful, consistent, and comprehensive story of the emergence and evolution of mathematical thinking. This constantly developing account has been inspiring the work of mathematics education researchers and informing mathematics teachers’ practices all over the world. It has had a major impact on both what we know about children’s learning of mathematics and on how we know and think about it.

Terezinha Nunes’ research has been immensely innovative and influential from its earliest stages. In one of her first studies, she documented the mathematical skills of young Brazilian street vendors who, although almost unschooled and incapable of executing paper-and-pencil arithmetic tasks, proved impressively proficient in complex money transactions. Her later research on the development of mathematical thinking, conducted in Brazil and the UK, spans multiple mathematical topics, from additive and multiplicative reasoning to fractions, variables, randomness and probability. She has studied children’s logical reasoning and its role in the learning of mathematics, as well as problem solving and the way mathematics is being used in science.

While forging her stories on children’s thinking about numbers, Terezinha Nunes has been transforming her own thinking as a researcher. She has come a long way from being a traditionally trained clinical psychologist, whose research was firmly grounded in Piaget’s ideas about human development, to being inspired by cultural psychology and the work of Vygotsky and his followers to at least the same extent. Her tendency for bridging apparent opposites and bringing the separate together finds its expression also in her attempts to improve the practice of teaching mathematics.

Terezinha Nunes began her studies in psychology in her native Brazil and earned her masters and PhD degrees at City University of New York (1975, 1976, respectively). She began her academic career in Brazil at the Federal University of Minas Gerais and the University of Pernambuco. Later, she moved to the United Kingdom, where she taught at the Institute of Education, University of London, Oxford Brookes University and, since 2005, at the University of Oxford. She is now Professor Emerita at the University of Oxford and a Fellow of Harris Manchester College, Oxford. Throughout her career, she has completed tens, if not hundreds of studies, most of which were conducted in Brazil and in the UK. An exceptionally prolific writer, she has authored or co-authored more than a dozen books and almost two hundred journal papers, book chapters and

encyclopedia entries in English and Portuguese. An ardent team player and highly appreciated teacher, Terezinha Nunes has been an inspiration to her colleagues and to her many students. As an outstanding researcher driven by an insatiable passion for knowing, one who has made a paramount contribution to mathematics education and is likely to continue adding substantial insights for years to come, Terezinha Nunes is an eminently deserving recipient of the Hans Freudenthal Award for 2017.