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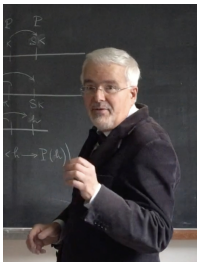
The 2024 Felix Klein, Hans Freudenthal and Emma Castelnuovo ICMI Awards

Commission Internationale de l'Enseignement Mathématique
(The International Commission on Mathematical Instruction)

ICMI is proud to announce the tenth recipients of the Klein and Freudenthal Awards and the third Emma Castelnuovo Award, who were made public at the opening ceremony of ICME-15 in Sydney, Australia, on July 8, 2024:

- Ferdinando Arzarello, Professor Emeritus of the University of Turin, Italy, receives the *2024 Felix Klein Award*, in recognition of his more than forty years of sustained, consistent, and outstanding achievements in mathematics education research and development.
- Ole Skovsmose, Professor Emeritus of Aalborg University, Denmark, receives the *2024 Hans Freudenthal Award*, for his outstanding contributions to the very foundations of mathematics education through his career-long explorations of Critical Mathematics Education.
- Kaye Stacey, Professor Emeritus of the University of Melbourne, Australia, receives the *2024 Emma Castelnuovo Award* in recognition of her more than 40 years of research-based design, development and implementation of innovative, influential work in the practice of Mathematics Education.



Ferdinando Arzarello

Ole Skovsmose

Kaye Stacey

We give some key elements below. The three full citations 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:

	Felix Klein Award	**Hans Freudenthal Award**	**Emma Castelnuovo Award**
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	
2016			Hugh Burkhardt and Malcolm Swan
2017	Deborah Loewenberg Ball	Terezinha Nunes	
2019	Tommy Dreyfus	Gert Schublring	
2020			National Council of Teachers of Mathematics

Recipients of ICMI Awards since the creation in 2003.

Extracts of the citation for the Felix Klein Award 2024 to Prof. Ferdinando Arzarello

The *Felix Klein Award for 2024* goes to *Ferdinando Arzarello* Professor Emeritus of the University of Turin, Italy, in recognition of his more than forty years of sustained, consistent, and outstanding achievements in mathematics education research and development. Professor Arzarello's work has been broad in theoretical and practical scope, encompassing work that provides a basis for synthesizing major theoretical ideas while at the same time being aimed at, and having, a significant impact on the research and teaching of mathematics. It has been deep and rigorous, with his broad perspective being grounded in detailed analytic studies. His work is distinguished

by broad collaborations, including with teachers, and by the ways in which he seeks theoretical groundings for empirical studies.

Arzarello's theorizing has been multifaceted, expanding the boundaries of what is understood to be "mathematical" and then building on those ideas in instruction. In his ICME-10 plenary lecture in 2004, for example, beginning with the meaning of the mathematical objects in the classroom, he introduced the idea of the "cognitive space of Action, Production and Communication (APC-space)" to frame how these meanings emerge and evolve in students with the help of the teacher. The components of the APC space, as he says in the paper, are the body, the physical world, and the cultural environment, namely the role of the perceptual experiences and the interaction with the environment are put into relation with the cultural dimension. The title *Mathematical landscapes and their inhabitants: Perceptions, languages, theories* also reflects the tension that arises from students' phenomenological perception of mathematical processes and mathematics as a theoretical corpus embedded in a cultural dimension.

Arzarello's research and development work on geometry teaching and learning contributed to and then profited from these theoretical understandings, as well as their evolving goals and potential, as technological artifacts became available and they themselves evolved.

Arzarello's role in the development and implementation of networking theories must also be noted. Along with his engagement in scientific research, Ferdinando Arzarello has played significant institutional and leadership roles in mathematics education.

In summary, Ferdinando Arzarello is an eminently worthy recipient of the Felix Klein Medal for 2024.

Extracts of the citation for the Hans Freudenthal Award 2024 to Prof. Ole Skovsmose

The *Hans Freudenthal Award for 2024* goes to *Ole Skovsmose*, Professor Emeritus of Aalborg University, Denmark, for his outstanding contributions to the very foundations of mathematics education through his career-long explorations of Critical Mathematics Education.

Skovsmose's professional work springs from his experiences as a student and mathematics teacher. From 1968 to 1975, he studied mathematics and philosophy at Copenhagen University, while also working as a teacher at the Copenhagen Day and Evening Teacher Training College. His doctoral work at the Royal Danish School of Educational Studies drew inspiration from his personal experience that mathematics in classrooms tended to be oppressive for students; but that it was also possible for the teacher to bring alternative ways of working with mathematics that did not reproduce

such oppression. His early doctoral writing was not looked on favorably, because it lay too far outside of the disciplinary traditions; but he persevered and earned his Ph.D. in 1982.

A postdoctoral stay at Cambridge University with Alan Bishop in 1990–91 was crucial in shaping Skovsmose's seminal book Towards a Philosophy of Critical Mathematics Education. This comprehensive work was submitted to examination at the Faculty of Engineering and Science, Aalborg University, for the degree of Doctor of Science, the highest research degree that exists in Denmark. Skovsmose is the only Danish mathematics educator to have been awarded this academic title.

Towards a Philosophy of Critical Mathematics Education lays out the fundamentals of Critical Mathematics Education – broadly, that mathematics and mathematics education are rooted in the historical, cultural, political and economic structures of society. As such, they cannot be considered value-neutral practices, but rather deeply entangled in the production and reproduction of both goods and evils in past and contemporary inclusions and exclusions.

Indeed, the very enterprise of mathematics education is fundamentally different now than it was decades ago. It is impossible to conceptualize the field, even when working in classrooms, without attention to the ways in which our work is rooted in the historical, cultural, political and economic structures of society. This significant and ongoing contribution to our collective understanding makes Ole Skovsmose an eminently deserving recipient of the Hans Freudenthal Award for 2024.

Extracts of the citation for the Emma Castelnuovo Award 2024 to Prof. Kaye Stacey

The *Emma Castelnuovo Award for 2024* goes to *Kaye Stacey*, Professor Emeritus of the University of Melbourne, Australia, in recognition of her more than 40 years of research-based design, development and implementation of innovative, influential work in the practice of mathematics education. She led the development of innovative curriculum materials for teaching and teacher preparation, and a sequence of assessment projects that pushed the boundaries of what can be achieved in making assessment align more closely with the full spectrum of learning goals. These ground-breaking contributions have had a remarkable influence on the practice of mathematics education as exemplified by Emma Castelnuovo.

Through over 40 years of creative work on important challenges in mathematics education, Kaye Stacey has made major contributions in three main strands:

- the teaching of problem solving;
- the use of new technologies in mathematics teaching;

- the study of research knowledge on students' thinking and the embedding of this knowledge in the design of influential assessments in Australia and, later, worldwide.

In each of these areas Kaye Stacey has turned her insight-focused research, and that of others, into tools for practitioners, using an exemplary process of imaginative design and careful iterative development. The impact on the practice of mathematics education in each of the three areas is supported by evidence and comments from users.

Kaye's work on these diverse themes has been unified by the strategies that underlie her strong research-practice link:

- designing research projects that address topics central to mathematics teaching;
- active dissemination to teachers;
- formal work in school curriculum and assessment.

She has played a leading role in major research-based and curriculum projects at state, national, and international levels.

In summary, Kaye Stacey's work has combined principled innovation in research, design, and development with large-scale impact. The design concepts are original, and the resultant materials are influential. For 40 years, she has performed excellent and influential work in the practice of mathematics education as exemplified by Emma Castelnuovo. She is an eminently worthy recipient of the 2024 Award.

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