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COMMISSION INTERNATIONALE DE L'ENSEIGNEMENT MATHÉMATIQUE

(THE INTERNATIONAL COMMISSION ON MATHEMATICAL INSTRUCTION)

THE 2009, 2011 & 2013 ICMI AWARDS FELIX KLEIN AND HANS FREUDENTHAL MEDALS

ICMI is proud to announce the fourth, fifth and sixth awardees of the Klein and Freudenthal medals.

◊ The *Felix Klein* Medal for 2009 is awarded to Gilah C. LEDER, Professor at La Trobe University, Bundoora, Victoria, Australia.

◊ The *Felix Klein* Medal for 2011 is awarded to Alan H. SCHÖNFELD, Professor at the University of California - Berkeley, USA

◊ The *Felix Klein* Medal for 2013 is awarded to Michèle ARTIGUE, Professor at the University Paris Diderot, France.

◊ The *Hans Freudenthal* Medal for 2009 is awarded to Yves CHEVALLARD, Professor at the IUFM d'Aix-Marseille, France.

◊ The *Hans Freudenthal* Medal for 2011 is awarded to Luis RADFORD, Professor at Université Laurentienne, Canada.

◊ The *Hans Freudenthal* Medal for 2013 is awarded to Frederick Koon Shing LEUNG, professor at he University of Hong Kong, SAR China.

The ICMI Awards, given in each of the odd-numbered year since 2003, are the two prizes created by ICMI for recognising *outstanding achievement in mathematics education research*. They respectively honour a lifetime achievement (Felix Klein Award, named after the first president of ICMI — 1908–1920) and a major cumulative programme of research (Hans Freudenthal Award, named after the eighth president of ICMI — 1967–1970). By paying tribute to outstanding scholarship in mathematics education, the ICMI 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. The awards consist of a medal and a certificate, accompanied by a citation.

The ICMI Awards represent the judgement of an (anonymous) jury of distinguished scholars of international stature. The jury for the 2009 Awards was chaired by Professor Mogens Niss, Roskilde University, Denmark. The jury for the 2011 & 2013 Awards was chaired by Professor Carolyn Kieran, Université du Québec à Montréal, Canada.

Citation of the work of the six 2009, 2011 & 2013 medallists can be found below. Presentation of the medals, and invited addresses of the 2009 & 2011 medallists, occurred at ICME-12, Seoul, Korea, 9th July 2012. Presentation of the two 2013 along with the forthcoming two 2015 medallists will occur at ICME13 to be held in Hamburg, in July 2016.

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

	Felix Klein medal	*Hans Freudenthal medal*
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

CITATION FOR ICMI'S 2009 FELIX KLEIN AWARD TO PROFESSOR GILAH C. LEDER

It is with great pleasure that the ICMI Awards Committee hereby announces that the Felix Klein Medal for 2009 is given to IAS Distinguished Professor and Professor Emerita Gilah C. Leder, La Trobe University, Bundoora, Victoria, Australia, in recognition of her more than thirty years of sustained, consistent, and outstanding lifetime achievements in mathematics education research and development. With a background as a highly recognised secondary teacher of mathematics, Gilah Leder moved, through a number of steps, into research in mathematics education, with a particular emphasis – from the very beginning of her research career – on gender success and equity in mathematics education, but also more broadly on students' affects, attitudes, beliefs, and self-concepts in relation to mathematics education, at educational levels ranging from school to university. To a very high degree her work has contributed to shaping these areas and made a seminal impact on all subsequent research. Moreover, Gilah Leder has done significant work with regard to assessment in mathematics education, mathematically able students, research methodology, supervision of graduate students,

and teacher education. A characteristic feature of Gilah Leder's work - published in almost two hundred scholarly publications - is its application of perspectives and theories from sociology and psychology along with mathematical perspectives.

Gilah Leder's achievements include a remarkable amount of work for national, regional, and international mathematics education communities in a leadership role, as well as a committee or board member, an editorial board member for several journals and book series, as a mentor and supervisor of graduate students, as a visiting scholar in several countries, and as an invited key note speaker at numerous conferences in all continents.

Gilah Leder's first degree was a B.A. (Hons) in mathematics earned at the University of Adelaide, South Australia, (1963), where she also earned a Dip. Ed. (1965). She then moved to Monash University, Victoria, to do a M.Ed. (1973), and later on a Ph.D. (1979) on fear of success and sex differences in participation and performance in mathematics. Prior to that, she was a high school teacher in South Australia and Victoria (1963-1965), and then a research assistant, part time lecturer, and tutor at Monash University. She served as a Lecturer (1978-1982), a Senior Lecturer (1982-1987), and an Associate Professor of Education (1988-1993) at Monash University, before taking up, in 1994, a position as full Professor at the Graduate School of Education at La Trobe University, Victoria, where she remained until her retirement. During the years 2000-2007 she also served as Director of the Institute for Advanced Study and Director of Graduate Studies at La Trobe University. Having retired formally in 2007, Gilah Leder is currently an IAS Distinguished Professor and Professor Emerita at La Trobe, as well as an Adjunct Professor at Monash University.

Gilah Leder has received several honours and awards. She was President of the Mathematics Education Research Group of Australasia (MERGA), 1994-1998, of which she was awarded a Life Membership in 2002, President of the International Group for the Psychology of Mathematics Education (PME), 1999-2001, and a member of the Executive Committee of the International Commission on Mathematical Instruction (ICMI), 1995-2002. In 2001 she was elected Fellow of the Academy of the Social Sciences in Australia. She was a Guest Professor in Sweden 2002-2004. Her biography is included in Notable Women in Mathematics. Gilah Leder has had numerous editorial roles in first rank national and international journals and book series.

Another characteristic feature of Gilah Leder's work is her close collaboration with other researchers in several countries. In particular she is renowned for her highly significant supervision and mentoring of young researchers. Thus she was named "Supervisor of the Year" at Monash University in 1993 and supervisor of the "2002 Exemplary Doctoral Thesis" at La Trobe University. She has supervised more than 60 research students, many of whom have earned international renown.

It is, of course, impossible to mention more than a few of Gilah Leder's publications, many of which are highly recognised internationally. Suffice it to mention the following books that she has (co-)edited, *Assessment and learning of mathematics* (1992), *Mathematics and gender* (with Elizabeth Fennema) (1990), *Beliefs : A hidden variable in mathematics ?* (with Erkki Pehkonen and Günter Törner) (2002), and *Affect and mathematics education* (with Peter Grootenboer), special issue of MERJ (2005). She is also the author of prominent state-of the-art chapters and papers in special issues of journals (including *Educational Studies in Mathematics* and *ZDM*) and handbooks (including *Handbook on Research on Mathematics Teaching and Learning*).

In summary, Gilah C. Leder is an eminently worthy recipient of the Felix Klein Medal 2009.

Citation for ICMI's 2011 Felix Klein award to Professor Alan H. Schoenfeld

It is with great pleasure that the ICMI Awards Committee hereby announces that the Felix Klein Medal for 2011 is given to the Elizabeth and Edward Connor Professor of Education and Affiliated Professor of Mathematics, Alan H. Schoenfeld, University of California at Berkeley, USA, in recognition of his more than thirty years of sustained, consistent, and outstanding lifetime achievements in mathematics education research and development. Alan Schoenfeld, a research mathematician by training, developed his keen interest in mathematics education early on in his career. He quickly emerged as a pioneer and leader in research on mathematical problem solving and, more broadly, on mathematical thinking, teaching, and learning. His scholarly work shows a remarkable life-long pursuit of deeper understanding of the nature and development of mathematical learning and teaching at different educational levels. Starting with work on mathematical problem solving in the late 1970s, he broadened his interests in the mid-1980s to focus on mathematical teaching and teachers' proficiency. His work has helped to shape research and theory development in these areas, making a seminal impact on subsequent research. Alan Schoenfeld has also done fundamental theoretical and applied work that connects research and practice in assessment, mathematical curriculum, diversity in mathematics education, research methodology, and teacher education. His work is internationally acclaimed across disciplines with more than 200 highly-cited publications in mathematics education, mathematics, educational research, and educational psychology. His scholarship is of the highest quality, reflected in esteemed recognition from mathematical, scientific, teaching, and educational organizations over the years.

Another significant component of Alan Schoenfeld's achievements is the mentoring he has provided to graduate students and scholars; he has nurtured a generation of new scholars who generate increasing impact on the field of mathematics education research, both nationally and internationally. Alan Schoenfeld's achievements also include a remarkable amount of outstanding work for national, regional, and international communities in education, mathematics, and mathematics education. He has provided important leadership in prestigious professional associations and joint research endeavors, both nationally and internationally, and has been an invited keynote speaker at numerous conferences around the globe.

Alan Schoenfeld began his career as a research mathematician. After obtaining a B.A. in mathematics from Queen's College, New York, in 1968, and an M.S in mathematics from Stanford University in 1969, he began his doctoral studies in mathematics at Stanford, earning a Ph.D. in 1973. He became a lecturer at the University of California at Davis in 1973, and in 1975 a lecturer and research mathematician in the Graduate Group in Science and Mathematics Education (SESAME) at the University of California at Berkeley. During that time at Berkeley, he became interested in mathematics education research. This interest has kept him in the field of mathematics education for the rest of his professional career. After academic appointments at Hamilton College (1978-1981) and the University of Rochester (1981-1984), Alan Schoenfeld was invited back to U.C. Berkeley in 1985 to develop the mathematics education group. He has been a full professor since 1987, and now has a named chair in education and is an affiliated professor in the mathematics department. He has also been a Special Professor of the University of Nottingham since 1994.

Alan Schoenfeld's high-quality work and dedicated effort have earned him leadership positions in renowned professional associations in education, mathematics, and

mathematics education. He has been, among his many other leadership roles, an elected member of the U.S. National Academy of Education since 1994, a member of its Executive Board in 1995, and Vice President in 2001. He also served as the President Elect/President/Past President of American Educational Research Association (AERA) from 1997 to 2000. In addition, he has been instrumental in shaping the professional development of mathematics teachers by, for example, his service to the National Council of Teachers of Mathematics where he led the writing team for the high school standards of the *Principles and Standards for School Mathematics*, published in 2000.

It is, of course, impossible to point to more than a few of Alan Schoenfeld's publications. Suffice it to mention his highly-cited, groundbreaking book, *Mathematical Problem Solving* (1985), his chapter on cognition and metacognition, *Learning to think mathematically: Problem solving, metacognition, and sense-making in mathematics* (in the 1992 *Handbook for Research on Mathematics Teaching and Learning*), his rigorous study of the development and learning of a complex mathematical idea, *Learning* (1993, co-authored with J.P. Smith and A.A. Arcavi), his finely-detailed work on teacher decision making, *Toward a theory of teaching-in-context* (published in *Issues in Education* in 1998), and his most recent book, *How We Think* (2010). Alan Schoenfeld's seminal theoretical contributions are all based on, and buttressed by, long sequences of carefully designed experiments and their exhaustive analysis.

In summary, Alan H. Schoenfeld is an eminently worthy recipient of the Felix Klein Medal for 2011.

Citation for ICMI's 2013 Felix Klein award to Professor Michèle Artigue

It is with great pleasure that the ICMI Awards Committee hereby announces that the Felix Klein Medal for 2013 is given to Michèle Artigue, Emeritus Professor, Université Paris Diderot – Paris 7, France, in recognition of her more than thirty years of sustained, consistent, and outstanding lifetime achievements in mathematics education research and development. Michèle Artigue's research, which was initially in the area of mathematics, progressively moved toward mathematics education during the mid-to-late 1970s. She has been a leading figure in developing and strengthening new directions of research inquiry in areas as diverse as advanced mathematical thinking, the role of technological tools in the teaching and learning of mathematics, institutional considerations in the professional development of teachers, the articulation of didactical theory and methodology, and the networking of theoretical frameworks in mathematics education research. Michèle Artigue's theoretical contributions to the instrumental approach to tool use and her elaboration of the methodological tool of didactic engineering have had a significant impact and are but two examples of the way in which her work has advanced the field's collective expertise. Her research is internationally acclaimed with more than 100 groundbreaking articles and books published nationally and internationally, and with no fewer than 40 invited lectures outside France within the past five years alone. A seminal characteristic of Michèle Artigue's research is that it is always supported by deep mathematical and epistemological reflection. This reflective orientation, combined with her remarkable ability to build bridges between various issues, to identify fruitful directions for research, to clarify and discuss different approaches, and ultimately to enrich theoretical frameworks, make her contributions to the field of mathematics education research extraordinary in both their scope and coherence.

Michèle Artigue's distinguished scholarly work is matched by a record of outstanding service to the international mathematics education community. In addition to the strong leadership she has demonstrated within the *International Commission on Mathematical Instruction* (ICMI), she has played a central role in ICMI's program of international cooperation, the Developing Countries Strategic Group. She has also built relationships with UNESCO for both the *International Mathematical Union* and ICMI, which have given rise to her authoring the document "Challenges in Basic Mathematics Education", published in several languages by UNESCO, and serving as ICMI liaison officer for the development and launching of the *Capacity and Networking Programme*. Her international cooperation activity beyond ICMI has ranged from advising the European projects *Fibonacci* and *PRIMAS* to collaborating in program development with researchers in Spain, Brazil, Colombia, and Argentina. At the national level, Michèle Artigue has been active in the *Institut National de Recherche Pédagogique*, in the French Commission for the Teaching of Mathematics (a regional ICMI sub-commission), and within her own university. Another component of Michèle Artigue's service to the international community has been her editorial work over several years for the *International Journal of Computers for Mathematical Learning*, as well as her current co-editorship of the *Encyclopedia of Mathematics Education*, and her participation in the editorial boards of several prestigious research journals.

Michèle Artigue obtained her Ph.D. in mathematical logic in 1972 from the Université Paris 7. This was followed by a *Doctorat d'État ès Sciences* in 1984 and the *Habilitation à Diriger les Recherches* in 1987 from the Université Paris 7. During the years 1970 – 1991, she was Lecturer and then *Maître de Conférences* at the Université Paris 7, where she taught mathematics to undergraduate students. In 1991, she was named Professor of the IUFM (University Institute for Teacher Training) at Reims, where she remained until 1999, in charge of the training of future secondary school mathematics teachers. In 1999, she returned to the mathematics department of the Université Paris Diderot – Paris 7, as Professor and also Head of the *Institut de Recherche sur l'Enseignement des Mathématiques*. In September 2010, she was named Emeritus Professor.

When Michèle Artigue joined the newly created Université Paris 7, she was one of the first members of its Institute for Research on Mathematics Teaching (IREM). There she became interested in the developing theory of didactical situations and, for the thesis of her *Doctorat d'État*, conducted the first study in didactic engineering in an "ordinary" school. She found that the classroom as a dynamical system defied the then-current implicit models of reproducibility of didactical situations and thus was kindled her passion for theory building. When her research turned toward the integration of digital tools into the learning of upper secondary and university level mathematics, the need for theoretical foundations in this area was soon apparent to her. She and her research team sought to generate a framework that would avoid the traditional "technical conceptual cut". Drawing on Chevallard's anthropological theory of the didactic and Rabardel's cognitive ergonomic approach, the framework of the instrumental approach to tool use emerged. Further theoretical development was to occur when she collaborated on the two successive European projects, *TELMA* and *ReMath*. One of her early initiatives within the *ReMath* project was the formulation of an integrative theoretical frame, using for the first time the language of networking of theories. This construct is one that she has been continuing to develop both theoretically and methodologically with a group of *CERME* researchers.

Some of Michèle Artigue's most highly-cited publications include : the now-classic

article on the use of digital tools in mathematics education, Learning mathematics in a CAS environment: the genesis of a reflection about instrumentation and the dialectics between technical and conceptual work (2002); her seminal article on didactic engineering, *Ingénierie didactique* (1989); the article on epistemology and didactics, *Epistémologie et didactique* (1990); and her chapter on university-level teaching and learning, What can we learn from educational research at the university level ? (2001). In addition to her published contributions, Michèle Artigue has supervised more than two dozen Ph.D.s and *Habilitations à diriger les recherches*, and has mentored several young researchers, especially from developing countries.

In summary, Michèle Artigue is an eminently worthy recipient of the of the Felix Klein Medal for 2013.

Citation for ICMI's 2009 Hans Freudenthal award to Professor Yves Chevallard

It is with great pleasure that the ICMI Awards Committee hereby announces that the Hans Freudenthal Medal for 2009 is given to Professor Yves Chevallard, IUFM d'Aix-Marseille, France, in recognition of his foundation and development over the last two and a half decades of a very original, fruitful and influential research programme in mathematics education. The first part of the programme, developed in the 1980s, was focused on the notion of didactical transposition of mathematical knowledge from outside school to inside the mathematics classroom, a transposition which also transforms the very nature of mathematical knowledge. This idea has been further developed, in the 1990s and beyond, into a more general study of the varying institutional characteristics and cultures within which mathematics is being practised in terms of different praxeologies (combining praxis and logos). This gave rise to the so-called anthropological theory of the didactic (ATD) which offers a tool for modelling and analysing a diversity of human activities in relation to mathematics. On that basis Yves Chevallard has developed an entirely new approach to teacher training focusing on the needs and problems of the profession operating in what he calls "clinics for training" which are also cumulatively establishing "archives for training".

It is a characteristic feature of Yves Chevallard's work and impact that he continues to collaborate closely with colleagues in France and Spain and that his work has had a great impact internationally, and not the least so in Latin America. This is reflected in a large number of doctoral dissertations that have been written in various countries about, or within the framework of, his theory. International conferences on ATD have been held in 2005, 2007, and 2010, each of which has gathered about a hundred researchers from Europe, America, Africa, and Asia. In some countries, including Chile and Mexico, Yves Chevallard's work also has exerted a direct influence on curriculum development and in-service teacher training.

Yves Chevallard graduated from l'*École Normale Supérieure* in Paris (rue d'Ulm) in 1967 and earned *agrégation* in mathematics in 1970. After having taught mathematics at a *lycée* (high school) in Marseille, he moved - in 1972 - to Université d'Aix-Marseille II, first as an assistant and then, from 1986, as a 1st class *maître de conférences* (associate professor), working at the department of mathematics. With a background as a researcher in mathematical logic he turned his attention towards issues of mathematics education, greatly stimulated by the work of Guy Brousseau, whom he calls his mentor. During the years 1984-1991 Yves Chevallard was the Director of IREM d'Aix-Marseille

(IREM: *Institut de recherches sur l'enseignement des mathématiques*). After having been declared qualified for directing research in 1990 Yves Chevallard was appointed full university professor in 1991 at the newly created IUFM d'Aix-Marseille (IUFM: *Institut universitaire de formation des maîtres*), and promoted to the 1st class in 1999, where he was also chair of the scientific and pedagogical council 1991-2006. He is still working at this institution.

Yves Chevallard has served on a number of posts in the academic community in general and in the community of researchers in mathematics education in particular, mainly in France. Thus he was a member of national council of universities in France (CNU) 1982-1990. He has been member of the administrative council of IUFM d'Aix-Marseille since 1991, and is currently a member of the joint laboratory council UMR ADEF which gathers researchers from three scientific institutions in France. Yves Chevallard founded and directed (1994-2000) the journal *Skholê* published at IUFM d'Aix-Marseille. He was the editor-in-chief of *Recherches en didactique des mathématiques*, 2000-2002 and currently is a member of its scientific committee as well as of the editorial committee of *Éducation et didactique*. He was also for a number of years a member of the scientific committee of the book series *Raisons éducatives*, published by the University of Geneva. He was responsible for the units of education and didactics and for initiation of research in mathematics education at the University of Provence 2007-09 and has been a visiting professor at universities in Germany and Spain.

La transposition didactique - du savoir savant au savoir enseigné (1985, extended edition in 1991, Spanish translation in 1997) is his internationally most well-known work. A joint book in Spanish with Marianna Bosch and Josep Gascón, *Estudiar matemáticas. El eslabón perdido entre la enseñanza y el aprendizaje* (1997) provides what Yves Chevallard calls "a midway summary" of ATD. Moreover, several of his more than a hundred publications in journals and anthologies have reached an international audience, even though the far majority of them are written in French.

In summary, Yves Chevallard, who continues to be very prolific in his academic work, is an eminently worthy recipient of the Hans Freudenthal Medal 2009.

Citation for ICMI's 2011 Hans Freudenthal award to Professor Luis Radford

It is with great pleasure that the ICMI Awards Committee hereby announces that the Hans Freudenthal Medal for 2011 is given to Professor Luis Radford, Université Laurentienne, Canada, in recognition of the theoretically well-conceived and highly coherent research programme that he initiated and has brought to fruition over the past two decades, and which has had a significant impact on the community. His development of a semiotic-cultural theory of learning, rooted in his interest in the history of mathematics, has drawn on epistemology, semiotics, anthropology, psychology, and philosophy, and has been anchored in detailed observations of students' algebraic activity in class. His research, which has already garnered several awards, has been documented extensively in a vast number of highly renowned scientific journals and specialized books and handbooks, as well as in numerous invited keynote presentations at international conferences. The impact of Luis Radford's programme of research has been felt especially by the community of research in algebra teaching and learning where his theoretical and empirical work has led to significant new insights in this domain, and more broadly by the entire community of mathematics education research with his development of a groundbreaking, widely applicable theory of learning.

Further evidence of the impact of Luis Radford's work can be found in the many mentoring workshops for graduate students he has been invited to give in several countries that include Italy, Spain, Denmark, Colombia, Mexico, and Brazil. As well, he has influenced teachers, teacher educators, curriculum developers, and representatives of ministries of education at the regional and national levels by his seminars on the implications of his research. His scholarly work has also led to prestigious invitations at the international level, such as his participation in the scientific programme of the Symposium for the ICMI Centennial "The First Century of the International Commission on Mathematical Instruction (1908-2008): Reflecting and Shaping the World of Mathematics Education" in Rome in 2008. In addition, he has served as associate editor of For the Learning of Mathematics and is currently an associate editor of Educational Studies in Mathematics.

Luis Radford graduated from the Universidad de San Carlos in Guatemala in 1977 with a degree in Civil Engineering. He then taught at that university's Engineering School in the Department of Mathematics from 1978 to 1980. This was followed by studies at Université Louis Pasteur I, Strasbourg, France, where Luis Radford obtained a Licence in Mathematics and Fundamental Applications in 1981, a Diploma of Advanced Studies in Mathematical Didactics in 1983, and a *Doctorat de troisième cycle* in Mathematical Didactics in 1985. He then returned to Guatemala where he taught as an Associate Professor at the Universidad de San Carlos in the Humanities Faculty. In 1992, he moved to Canada where he obtained a position in the School of Education at Université Laurentienne, Sudbury, Ontario, at the rank of Full Professor.

The beginnings of Luis Radford's research programme, and the theoretical depth that was to characterize all of his work, can be traced back to the early 1990s when he initiated a study that examined the role of historical-epistemological analyses of learning within a socio-cultural perspective, and which he described in "On psychology, historical epistemology, and the teaching of mathematics: Towards a socio-cultural history of mathematics" (1997, in *For the Learning of Mathematics*). His work continued to evolve during the late 1990s, when he drew upon the works of Vygotsky, Bakhtin, and Voloshinov to develop a semiotic-cultural framework, a framework that was used to investigate the ways in which students use signs and endow them with meaning in their initial encounters with algebraic generalization of patterns. The journal article that is his most highly cited thus far, and which described the results of that particular phase of his research programme, is "Gestures, speech, and the sprouting of signs: A semiotic-cultural approach to students' types of generalization" (2003, in *Mathematical Thinking and Learning*). The further development of his semiotic-cultural theory of learning is revealed in more recent papers where, for example, he elaborated the notion that thinking is a sensuous and sign-mediated reflective activity embodied in the corporeality of actions, gestures, and artifacts (2010, in *Research in Mathematics Education*) and in a chapter in which he formulated learning as a process where knowing and being are mutually constitutive (2008, in *Semiotics in Mathematics Education*). Luis Radford's more than 170 publications, many of them highly cited, attest not only to the prolific nature of his research activity but also to the international interest it has attracted.

Luis Radford's research was awarded the Université Laurentienne 2004-05 Research Excellence award. He was also nominated for the prestigious Gold Medal of the *Social Sciences and Humanities Research Council* of Canada in 2005. His research programme was ranked first in three consecutive competitions of the Social Sciences and Humanities Research Council of Canada (Education 1): 2004-2007, 2007-2010, and 2010-2013.

In summary, Luis Radford is an eminently worthy recipient of the Hans Freudenthal Medal 2011.

Citation for ICMI's 2013 Hans Freudenthal award to Professor Frederick Leung

It is with great pleasure that the ICMI Awards Committee hereby announces that the Hans Freudenthal Medal for 2013 is given to Professor Frederick K. S. Leung of The University of Hong Kong, in recognition of his research in comparative studies of mathematics education and on the influence of culture on mathematics teaching and learning. His groundbreaking work, for which he is internationally known, is the utilization of the perspective of the Confucian Heritage Culture to explain the superior mathematics achievement of East Asian students in international studies such as the IEA Trends in International Mathematics and Science Studies and the OECD Programme for International Student Assessment. His research extends to the use of the same cultural perspective to explain characteristics of classroom teaching in East Asia, and more recently in explaining differences in teacher knowledge between East Asian and Western countries. His research has contributed significantly to the cultural perspective of mathematics education and has produced a framework for understanding the relation between culture and mathematics education. Frederick Leung's research and professional activities have had an important impact on policies and practices in mathematics education in East Asian countries and beyond. He has been a pivotal figure in promoting understanding between mathematics educators in the East Asian region and the rest of the world through, for example, his co-chairing of the 13th ICMI Study on "Mathematics Education in Different Cultural Traditions: A Comparative Study of East Asia and the West" and his numerous research publications in comparative studies of East Asia and the West. In the East Asian region, he has been instrumental in organizing the East Asia Regional Conferences in Mathematics Education and has been the liaison person in many initiatives of collaboration among mathematics education scholars in East Asia, and between scholars in East Asia and the West. Frederick Leung has been invited to be the keynote speaker in major mathematics education conferences in the region and around the world. He has also served on prestigious international committees, as well as on the editorial teams of the Second and Third *International Handbooks on Mathematics Education*. Frederick Leung's degrees include a B.Sc. (Mathematics) in 1977 and M.Ed. (Testing, Measurement and Evaluation) in 1984 from The University of Hong Kong, and a Ph.D. (Mathematics Education) in 1992 from the University of London, Institute of Education. From 1977 to 1982, he taught secondary school mathematics. He obtained the position of Lecturer at The University of Hong Kong in 1982, then Senior Lecturer in 1992, and Professor in 2006. Frederick Leung was awarded a Senior Fulbright scholarship in 2003 for research at UCLA and, from the Faculty of Education at The University of Hong Kong, both the Outstanding Researcher award in 2006 and the Outstanding Researcher Student Supervisor award in 2008. Early in his academic career Frederick Leung became interested in comparative studies of mathematics education. His master's thesis, part of which was published in *Educational Studies in Mathematics* (1987), compared the mathematics curricula in Guangzhou and Hong Kong. This research interest was further developed in his Ph.D. study where he compared the mathematics curricula of China, Hong Kong, and England. He found that the data could not be fully accounted for without reference to the similarities and differences among the cultures of the three sites. In the 1990s, Frederick Leung participated in the *Third International Mathematics and Science Study* (TIMSS) as Principal Investigator and National Research Co-ordinator for Hong Kong. He recognized that the cultural explanation he used for his Ph.D. research afforded an appropriate framework to interpret the superior performance of the East Asian countries

in the TIMSS study. Equally important, this framework of interpretation provided East Asian countries with a basis for exploring their own mathematics education identity, described in his highly-cited paper: In *Search of an East Asian Identity in Mathematics Education* (2001), Frederick Leung's research evolved from comparative study of student achievement in mathematics to comparative study of mathematics teaching in different countries, and led to the extension of his cultural explanation of mathematics achievement to interpreting results of classroom studies. An early publication reflecting this direction was his 1995 article: *The Mathematics Classroom in Beijing, Hong Kong and London*. His subsequent involvement in two international classroom video studies, the TIMSS 1999 Video Study and the Learner's Perspective Study, led to deeper development of his cultural perspective, as illustrated by his several publications related to these studies (e.g., *Some Characteristics of East Asian Mathematics Classrooms Based on Data from the TIMSS 1999 Video Study*, published in 2005). He elaborated further on the characteristics of the Confucian Heritage Culture in relation to mathematics teaching and learning in his scholarly presentation at the 2012 ICME-12 plenary panel. Frederick Leung's impressive research contributions include 21 funded research projects and more than 60 books, book chapters, and journal articles.

Frederick Leung's work has opened up a new dimension of looking at differences in mathematics achievement and classroom practices from the perspective of culture. His outstanding achievement in research, his contribution to mathematics education in the East Asian region, and his promotion of understanding between mathematics education communities in East Asian and western countries attest to the merit of Frederick Leung's receiving the Hans Freudenthal Medal for 2013.

In summary, Frederick Leung is an eminently worthy recipient of the Hans Freudenthal Medal 2013.