

Inaugural Emma Castelnuovo award for excellence in the practice of mathematics education

Objektyp: **Group**

Zeitschrift: **L'Enseignement Mathématique**

Band (Jahr): **61 (2015)**

Heft 1-2

PDF erstellt am: **10.08.2024**

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

**Inaugural Emma Castelnuovo award for excellence
in the practice of mathematics education**

ICMI is delighted to announce the first recipients of the Emma Castelnuovo Award for Excellence in the Practice of Mathematics Education: Hugh Burkhardt and Malcolm Swan.

We look forward to honouring them at ICME-13 in Hamburg next year with the other ICMI medallists.

The following is the full citation from the Award Committee chaired by Professor Jeremy Kilpatrick.

The Emma Castelnuovo Award for 2016 goes to Hugh Burkhardt and Malcolm Swan, University of Nottingham, Nottingham, UK.



Hugh Burkhardt



Malcolm Swan

It is with great pleasure that the ICMI Castelnuovo Awards Committee hereby announces that the 2016 Emma Castelnuovo Award for Excellence in the Practice of Mathematics Education goes to Hugh Burkhardt and Malcolm Swan in recognition of their more than 35 years of development and implementation of innovative, influential work in the practice of mathematics education, including the development of curriculum and assessment materials, instructional design concepts, teacher preparation programs, and educational system changes. Burkhardt and Swan have served as strategic and creative leaders of the Nottingham based Shell Centre team of developers. That team has included many talented individuals over nearly 4 decades, in parallel with the contributions of more recent teams of international collaborators. Burkhardt and Swan are selected because of their continuous leadership of this work. Together, they have produced groundbreaking contributions

that have had a remarkable influence on the practice of mathematics education as exemplified by Emma Castelnuovo.

Burkhardt and Swan's approach is distinguished by their efforts to address the problem of improving learning strategically and across all levels of education by :

- Designing activities for learners based on an understanding of their thinking;
- Designing lessons that promote deep learner engagement in those activities;
- The Designing professional development to help teachers use the activities and lessons;
- Designing system change (e.g., in assessment, curriculum, and teacher support) to promote the above; and
- Encouraging educational researchers to value more highly the impact of change on the educational system.

In 1976, Hugh Burkhardt was appointed Director of the Shell Centre for Mathematical Education. Struck by the limited influence of educational research on what happens in schools, he decided to focus the Centre's work on research and development aimed at having a direct impact on classroom practice. He saw tools for practitioners as key products, complemented by research papers on the insights that emerged. He saw the importance of excellence in design in determining the quality and impact of those products. Over the years, he recruited some exceptional designers of classroom materials and assessment instruments. His appointment of Malcolm Swan was a key element in the success of the many projects they have subsequently led, with Burkhardt leading the strategic design of the products and processes, and Swan leading the detailed design of the learning activities for students, the teaching approaches, and the professional development programs that support teachers to attend to a full range of mathematical practices.

Since the late 1980s, the Shell Centre's work has been entirely dependent on funding of projects from outside the University of Nottingham. Through multiple administrative arrangements and formal name changes, the Shell Centre team has maintained a continuity of identity and purpose, built around Burkhardt and Swan, with contributions over the years from many other talented educational designers. The nature and quality of the work has appealed to funding agencies, so that funding has been continuous and has grown, building to a current team of about ten people in Nottingham and many more through collaborative projects. For example, a project that has received considerable attention is the Mathematics Assessment Project, a collaboration between the Shell Centre team and the University of California, Berkeley. Its 100 Classroom Challenges, which are formative assessment lessons based on diagnostic teaching, have received over 3 million lesson downloads. Through the MAP and other projects, Burkhardt and Swan continue to have an extensive impact on mathematics teaching and assessment around the world.

Hugh Burkhardt obtained his Ph.D. in mathematical physics in 1957 from the University of Birmingham. He served as Lecturer, and then Senior Lecturer, in mathematical physics at the University of Birmingham from 1960 to 1976. Since then, he has been at the University of Nottingham, where he served as Director of the Shell Centre for Mathematical Education until 1992. He has subsequently led a series of international projects, particularly in the U.K., U.S.A., Australia, and the European Union. He is the Project Director of the Mathematics Assessment Resource Service (MARS) and a Visiting Professor at Michigan State University. He founded the International Society for Design and Development in Education (ISDDE) to nurture a community of educational designers so that the quality of work improves through shared expertise, and he chairs the advisory board of its e-journal, *Educational Designer*.

Through his strategic leadership of the Shell Centre team, contributions to many of its influential products and development of its engineering research methodology, Burkhardt has made outstanding contributions to educational design and to thinking about structured educational change. He has worked on improving educational practice through the use of high quality assessment, fostering

the synergy of research and development in educational design, and creating partnerships to work with educational systems, funding bodies, and mathematics education experts. His initiatives often involved questioning established orthodoxies in mathematics education and design, resulting in innovations in the strategic and structural design of products that form the basis of new and more effective approaches. The impact on learning and teaching in classrooms has been his priority throughout. In 2013, he was awarded the ISDDE Prize for Educational Design for his lifetime achievement.

Malcolm Swan obtained his Postgraduate Certificate in Education (PGCE) with Distinction in 1976 from the University of Nottingham and his Ph.D. in Education there in 2005. He joined the Shell Centre in 1979 and until 2007 was Lecturer in the Centre and the School of Education at Nottingham. From 2007 to 2008, he was Associate Professor and Reader in Mathematics Education, and from 2009 to the present, Professor of Mathematics Education at Nottingham. He directs the Centre for Research in Mathematics Education (CRME), which evolved from the Shell Centre. His research provided a basis for design research into materials for teaching and for effective programs for professional development of teachers. His expertise is evident in the products of his role as hands-on “lead designer” for most of the Shell Centre team’s projects.

Through multiple applied research projects with colleagues, Swan has led the Shell Centre work on developing and implementing tactical lesson designs and templates that enable teachers having a wide variety of personal skills to enact challenging pedagogy.

The imaginative tasks and assessments that have resulted are crafted to highlight significant points of learning in a wide range of topics. They are a testament to his creativity as well as to his understanding of mathematical learning, student engagement, and the needs of teachers. In 2008, he was awarded the ISDDE Prize for Educational Design, for the classic publication *The Language of Functions and Graphs*.

Burkhardt and Swan’s educational vision for mathematical learning encompasses all strands of mathematical proficiency, but focuses especially on conceptual development, mathematical modelling, problem solving, and reasoning. Their vision of the classroom is one where students are active learners, learning through problem solving, discussion, reasoning, and collaboration. The instructional materials, professional development materials, and system changes coming out of the Shell Centre work have enhanced the mathematics education of millions of students worldwide. In summary, Hugh Burkhardt and Malcolm Swan are eminently worthy recipients of the first Emma Castelnuovo Award.