

## **Brian Griffiths (1927–2008): A tribute to a pioneer in mathematics education**

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Brian Griffiths (Professor Emeritus, University of Southampton) was one of the pioneers of mathematics education and played a significant role in developing the field from the mid-1960s onwards. As well as being remembered for his work on what continue to be known as ‘Griffiths-type’ topological spaces, Brian’s most profound contribution to the establishment of mathematics education as an academic field was, with Geoffrey Howson, in offering a conceptualisation of the relationship between mathematics, society and curricula.

### **Introduction**

Brian Griffiths (Professor Emeritus, University of Southampton) died suddenly on Wednesday 4 June 2008 in Southampton, UK. In many ways Brian was a pioneer in mathematics education, playing a significant role in developing the field from the mid-1960s onwards. Appointed as Professor of Pure Mathematics at Southampton in 1964, Brian managed to combine prowess in mathematics (through his work on what continue to be known as ‘Griffiths-type’ topological spaces; see, in particular, Griffiths 1954, 1956) with formidable expertise in mathematics education (especially in terms of conceptualising, in collaboration with Geoffrey Howson, the relationship between mathematics, society and curricula; see Griffiths and Howson, 1974).

It is for these reasons that the Executive Committee of BSRLM (the British Society for Research into Learning Mathematics), under its current chair Professor Janet Ainley (University of Leicester), agreed to dedicate the June 2008 BSRLM conference (that just happened to be taking place at the University of Southampton) to Brian. The BSRLM event included a session attended by Brian’s widow, Catherine, in which tributes were paid to Brian by Geoffrey Howson (Professor Emeritus, University of Southampton) as a colleague and collaborator, Janet Ainley (University of Leicester) as Chair of BSRLM, Candia Morgan (Institute of Education, University of London) on behalf of the editorial board of the journal *Educational Studies in Mathematics*, and Tim Rowland (University of Cambridge) as a former student of Brian’s.

In this article we provide an account of Brian’s contributions and give some insight into his talents as a teacher and his life-long commitment to humanism. We do this against the backdrop of the establishment of mathematics education as an academic discipline.

## **The growth of mathematics education**

The late 1950s and early 1960s were a time of great change, not only in society in general, but also in mathematics (and science) education in particular. As Cooper (1985, p128) makes clear, concerns in many ‘western’ countries over potential shortfalls in the technical, scientific and mathematical workforce intensified after the successful launch in late 1957 of the Sputnik satellite by the then Soviet Union. Plans for significant curricular reforms in mathematics were galvanized at the Royaumont Seminar of 1959, held near Paris and organised under the auspices of the Organisation for European Economic Co-operation (OEEC), the forerunner of the OECD (Organisation for Economic Cooperation and Development), see OECD, 1961.

Following the Royaumont Seminar, reform of mathematics teaching gained significant momentum, reflected in a series of follow-up conferences, including one at Southampton in 1961 chaired by Professor (later Sir) Bryan Thwaites (at that time Professor of Theoretical Mechanics at the University of Southampton). One particularly significant outcome of the Southampton conference was the *School Mathematics Project* (SMP), a major UK curriculum developer and for many years the leading publisher of school mathematics texts used throughout the UK and around the world. This project, which began in 1962 as a University of Southampton research project, continues to this day to be based at the University of Southampton (for details, see Thwaites, 1972; Howson, 1987). It was to this context that Brian took up his appointment as Professor of Pure Mathematics at Southampton in 1964.

That Brian had a commitment to mathematics education was clear in his inaugural professorial lecture (Griffiths, 1966) where he used a quotation from the Greek poet Archilochus that “the fox knows many things, but the hedgehog knows one big thing” (p 4) to underline his view that “by stressing the Hedgehog vision [of key ideas in mathematics], we shall teach mathematics better to our students and thus have an incidental effect on human happiness” (p19). That a professor of pure mathematics should devote a major theme of his inaugural lecture to mathematics education was (and remains) significant – and a portend of things to come.

## **Developing undergraduate mathematics provision**

Brian did not take long to move into action at Southampton - weekly research seminars were established and, shortly after, an MSc course. The mathematics department expanded, with Brian playing a major role in this. Brian’s first concern was developing undergraduate mathematics provision. In this he pioneered, and supported others in, the development of undergraduate course options on the history of mathematics, the mathematics curriculum, problem solving and investigations, mathematical modelling, and student-directed projects. These developments were influential in undergraduate mathematics education both within the UK and internationally. It is a tribute to Brian’s efforts that the annual UK conference on the teaching of mathematics to undergraduates (that Brian founded with Heine Halberstam in the mid 1970s) continues today, as does the tradition of innovative

undergraduate mathematics education at Southampton - with a recent example being the 'undergraduate ambassadors scheme' (see Cooper and d'Inverno, 2004; 2005).

### **Mathematics education as a discipline**

In 1968 another significant development in the field of mathematics education took place – the journal *Educational Studies in Mathematics* (ESM) was founded by the then president of the International Commission on Mathematical Instruction (ICMI), Hans Freudenthal (see Hanna and Sidoli, 2002). Brian was a member of the founding editorial board, serving from 1968-78. As well as having an article in the very first issue of *ESM* (see Griffiths, 1968), Brian was a regular contributor. He proposed ideas about the need for mathematics curricula to value and develop mathematical insight (Griffiths, 1971; 1978), arguing that while it is intuition that allows us to see *that* something may be (or is), it is insight that allows us to see *why* it is so. Later, in a major funded project, Brian reported on a study of university-level examinations in mathematics (Griffiths and McLone, 1984a; 1984b).

Of Brian's contributions to mathematics education, the most profound grew from an undergraduate course in mathematics curriculum studies taught and developed by Brian, together with Geoffrey Howson, beginning in 1966. The resulting book (Griffiths and Howson, 1974) remains a key moment in mathematics education, cementing, as the authors state on the first page, the new discipline of mathematics education and the new specialist mathematics educator. The book, as the authors say, is "an attempt to establish an intellectual framework for mathematics education, which we view as a subject sufficiently specialised in its own right to be distinct from other disciplines" (p340). This is achieved through setting out the relationship between four factors – "the nature of society, the nature of its children, the nature of its teachers, and the nature of mathematics" (p1). Brian continued to work on these themes in his later writing (see, for example, Griffiths 1998; 1999).

During all this time, Brian was in demand, not only within the UK but also internationally. In the UK he served on the advisory panel for the *School Mathematics Project* and on the Council of the *London Mathematical Society*. He chaired the UK *Joint Mathematical Council* and the steering group for *LAMP (Low Attainers Mathematics Project, 1983-6)* and its successor *RAMP (Raising Achievement in Mathematics Project 1986-9)*. Internationally, as well as serving on the founding editorial board of *Educational Studies in Mathematics*, Griffiths also served on the editorial board of *ZDM (Zentralblatt für Didaktik der Mathematik)* and was a *Beirat* (counsellor) on the governing body of the *Institut für Didaktik der Mathematik (IDM)* at Bielefeld, Germany.

Brian also wrote a number of books and monographs with teachers in mind. In these he looked at classical mathematics from a contemporary viewpoint (for example, *A comprehensive textbook of classical mathematics* written with Peter Hilton; chapters on analysis in the *SMP Companion to Advanced Mathematics*) and provided introductions to advanced mathematical topics, such as *Topology* (ATM,

1967), *Surfaces* (CUP, 1976), and *Mathematics of Models* (with Adrian Oldknow, 1993).

### **A student's perspective**

Tim Rowland writes: I arrived in Southampton to study mathematics in the year that Brian (always Professor Griffiths to me) was appointed to his Chair. By a most happy coincidence, Geoffrey Howson was appointed to be my undergraduate tutor.

My first encounter with Brian Griffiths as teacher was in my second undergraduate year, when the mathematics department moved into its new ten-floor 'palace' (the 'maths tower', still standing). Brian was quite young, of course - a mere 37. I remember him as youthful rather than young, with spiky, greying hair and a distinctively mischievous twinkle in his eye! I think that the twinkle was an emanation of his sense of pleasure in doing and teaching mathematics, and the confident knowledge that doing mathematics with him would hold some surprises for his students. That second year course was innocently entitled 'Geometry'. My notebook confirms that it was a kind of *tour-de-force*, taking in graph theory, projective geometry and the topology of the projective plane. His notes included novel pedagogical features such as 'Motivational Digressions'. He lectured without recourse to notes, although it was evident that he had prepared a 'roadmap' in advance, there being no such thing as a syllabus or learning objectives in those heady days. Thus the ideas unfolded as he spoke, recorded in his readily-legible script on the board. On occasion this very human, live performance was all too evident. My notes from his third-year course on Geometric Topology include a false start to a proof of the 'Ham Sandwich Theorem' (that there exists a plane that divides both the bread and the ham in half) and a fresh subheading, "Trying to sort out the Ham Sandwich Theorem".

In that final year, Brian had ushered in two astonishingly forward-thinking innovations, one of which I pioneered. This was the option of an individual 'project' in lieu of a taught course in the final undergraduate year. About six of us (from around 150 mathematics students) took up the option in the first year of offering, on a wide range of topics. It afforded me my first opportunity to study Number Theory 'properly', supervised by Keith Hirst. An account of this new perspective on what undergraduate mathematics might look like became one of the first papers to be published in *Educational Studies in Mathematics* (Hirst & Biggs, 1969).

The second innovation, mentioned earlier, was the final-year option of a course entitled *Curriculum Studies in Mathematics*. Although Brian and Geoffrey had conceived the course together, Howson was overseas that year and Brian taught it as a solo (doubtless virtuoso) performance. In time, I progressed to the MSc in Pure Mathematics, which majored in Algebra and Topology. I recall my interview for the course with Brian when he asked me "How do you think about mathematics: in pictures or in symbols?" Clearly, the novel notion of thinking modularities was behind his question.

## Concluding Comments

It is this range of achievements that cement Brian's place as one of the pioneers of mathematics education and as one of the significant figures in its establishment as an academic discipline. Above all, Brian was a supremely nice person always willing to share his expertise. He never stopped being active in mathematics education and it is fitting that, at the time of his death, the current issue of the *Mathematical Gazette* (dated March 2008, vol 92, issue 523) contains a piece by Brian on the Golden Ratio. Brian contributed significantly to mathematics education and will be sadly missed.

*Hubert Brian Griffiths: born 26 September 1927, Horwich, UK; died 4 June 2008, Southampton, UK.*

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