Presidents and presidential addresses

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A century of *Mathematical Gazettes* does not correspond to 100 Presidents of the Mathematical Association, since during the period up to the 1950s, Presidents served for two years. They were expected to give an annual address, which would be published in the *Gazette*. There are a few omissions for a variety of reasons, some rather strange. T. P. Nunn, 1917–19, in one of his two addresses advocated that astronomy was suitable as a school subject. The talk was illustrated by several working models which could not be represented properly in a written text so he requested that the address should not be published. There were obviously difficulties in arranging meetings and following up the Proceedings of meetings during both world wars, so there are some omissions. The address of E. T. Whittaker, 1919–20, on some mathematical problems awaiting solutions does not seem to have appeared, and only a single address was given by J. M. Wilson, 1920–22, in which he summarised the first 50 years in the history of the Association and described it as the passing of Euclid from our schools. His successor T. L. Heath was prevented by ill-health from giving an address. Apart from such instances there have been very few gaps in the annual publications of Presidential Addresses.

In the early years the interests of the Mathematical Association concentrated on pupils in grammar schools and on the teaching of undergraduates, so it is not surprising to find that Presidents were chosen almost exclusively from Professors of Mathematics in University Departments. They were mathematicians of distinction and many of them were elected to Fellowships of the Royal Society and quite a few had their mathematical work recognised by a knighthood. The names of some of the Presidents were household names to university students as they were authors of authoritative textbooks, which were valued by students and teachers. Whittaker and Watson's book on mathematical functions was a wonderful reference book (E. T. Whittaker, 1919–20, G. N. Watson, 1931–32). Whittaker also produced a standard text on analytical dynamics. G. H. Hardy, 1924–26, was the authority on analysis and an initiator in his subject. L. N. G. Filon, 1937–38, was the authority on geometry. A. S. Eddington, 1930–31, was a famous astronomer and his books on cosmology and relativity were written for both scholars and laymen.

The next few decades produced Presidents with wider backgrounds than work in an academic department, but 1951–52 was a landmark when Mary Cartwright was elected President. She was not only our first woman president, but she was one of the first women elected to Fellowship of the Royal Society. An increasing number of school teachers brought their experience of the classroom to the Presidency and several working in training, supervising and advising teachers helped the Association broaden its horizons. In 1985 it elected Hilary Shuard as President and her interests lay in the primary field. It also gave the Association pleasure to elect as

Presidents members who had given years of service such as E. A. Maxwell, 1960–61 and J. T. Combridge, 1961–62. The Association still recognises the importance of involving active workers in Mathematics itself with world-wide reputations. Michael Atiyah served in 1981–82 and went on to become President of the Royal Society.

Applications of Mathematics: Natural Philosophy

From its earliest days the Association has been interested in the application of mathematics to other fields, which is natural in the successors of the Newtonian tradition. In 1910 H. B. Turner spoke on the outer satellites of Jupiter and Saturn; T. P. Nunn advocated astronomy as a school subject; A. S. Eddington in 1931 talked about the end of the world from the standpoint of a mathematical physicist and in 1948 H. Spencer Jones explained the continuing interest in the world about us. By 1962 mankind had launched satellites to explore the solar system and our President V. C. A. Ferraro summarised the scientific exploration of space since the age of Galileo. In 1974 W. H. McCrea reviewed the history of the solar system, the highly accurate observations made by the ancient world and the detailed mathematical models produced followed by theories and new models through Kepler and Newton to the developments in the 20th century of special relativity and cosmology and speculation on the origin of the universe. There is an unlimited future in these applications of mathematics and the pursuit of this branch of natural philosophy is instinctive in the human race.

Other applications

Not all Presidents, who worked on applications discussed them in their talks. In 1915, A. G. Greenhill chose to talk about mathematics in Artillery Science, which seems appropriate for that era. In 1916–17 A. N. Whitehead discussed technical education and advocated various reforms as well as relating it to learning about literature and mathematics. In 1930 W. F. Sheppard talked about mathematics and frequency statistics. In 1985 Peter Coaker, a mathematician working in industry, shared his experiences and knowledge of the uses of mathematics with his audience.

Some Presidents, who would have been classed as applied mathematicians, chose to talk about topics in pure mathematics which fascinated them. In 1957, G. F. T. Temple explained his ideas on how mathematics would grow and what he saw as the future of the subject, and in 1969 C. A. Coulson enthused about some topics which had excited him at school. Some of these had been profound but simple discoveries by great mathematicians of the past, but which produced results intelligible in schools as well as throwing light on complex problems in atomic theory or biology. James Lighthill was President of the Association in the centenary year 1970–71. The Association was on a high plane at the time. He was proud of the work of mathematics teachers in schools and considered they

were the envy of the world. In looking to the next 100 years, he advocated flexibility, a study of the problems of linguistics and communication and a stimulus for students with special mathematical gifts.

Geometry

Though the improvement of the teaching of geometry in schools was the intention of the original group who founded the Association, it is a subject which has not figured frequently among Presidential Addresses. In 1896 J. Larmor spoke on geometrical method and, in 1913, E. W. Hobson's chosen subject was geometrical constructions with compasses. After a long gap, G. H. Hardy, though an analyst, posed the question *What is Geometry?* There followed another long gap until, in 1955, W. V. D. Hodge reviewed the changing views on geometry. In 1982, Michael Atiyah chose geometry as his topic. He started with the geometry perfected by the Greeks and followed with an account of how the need to describe objects and their positions in a three-dimensional space led to new developments. Finally the mathematics was extended to spaces of many dimensions.

General topics

From time to time Presidents have used the Presidential Address to cover the history of some aspect of mathematics, to review the changes they have seen in mathematics within their lifetime or to take a good look at what the Association has achieved. Others have taken the chance to highlight some interesting and amusing bits of mathematics. Rolph Schwarzenberger, 1984, gave an entertaining account of results that were obtained by famous mathematicians but were based on a fallacy. When the mistake was discovered it often led to very important theorems. The analogy was how much a teacher could learn about the way children's minds were working by the mistakes they made and this was the first step in correcting them. He concluded by putting forward his ideas on the kind of test which would give an accurate assessment. Another entertaining contribution, *Five types of ambiguity*, came from William Wynne Willson in 1994.

Examinations

Until late in the 20th century, examinations and assessment were not controversial subjects and were ignored. L. C. Tuckey in 1945 called his address *Teachers and examinations*; otherwise the word was avoided until in 1988 Margaret Rayner gave a historical account of examinations in schools. These started informally to satisfy the wishes of small number who wanted some independent measure of what their pupils had learned and could use. The schemes developed along with the needs of teachers and their pupils, and the outside world had a need for such a measure. The administration of the system became part of the duty of universities. It was a complete and fascinating story. At that time the long-established system was still going along quite happily and centralisation and bureaucracy were a distant cloud on the horizon.

University mathematics

The teaching of mathematics in universities has not escaped the attention of our Presidents, but it turns up only occasionally. In 1926, G. H. Hardy put forward a case against the Mathematical Tripos at Cambridge. Then, in 1945, S. Chapman discussed the training of mathematicians in universities, but it was left to Ida Busbridge in 1965 to give a comprehensive account of mathematics in the universities at that time, to look at possibilities for the future and to list points which puzzled her and gave her cause for concern. She stressed that the universities had not only the responsibility of training mathematicians of the first rank but also mathematicians whose future needs would fall far short of such a syllabus. Many students would want to study Mathematics in combination with other subjects and she speculated that two and three subject degrees would become common. A problem faced by universities at that time (and it has not gone away) arose because first year undergraduates had widely different mathematical backgrounds and had followed different A level syllabuses, which included some innovations like SMP. Clive Kilminster, in 1980, discussed a specific topic which caused difficulties to first year undergraduates as it had to mathematicians for two and a half millennia – the definition of a real number. It did not surprise him considering the disagreements and misunderstandings among some of the most famous names in history. Earlier R. L. Goodstein, in 1976, had tackled a similar topic, scoffing at the idea that the then fashionable set theory would resolve all difficulties. Only a strict logical argument could produce a proper description of number.

Post-war era

The changes in the education system in the period following the Second World War produced bright hopes for the future, but threw up problems which attracted the attention of the Association and its Presidents. Mrs E. M. Williams, in 1966, faced the problem of the kind of mathematics suitable for secondary modern schools and suggested a syllabus for CSE. She was keen that this should include logic and some abstract work. She was passionately concerned about the mathematical education of girls.

Margaret Hayman, in 1975, gave a masterly review of the changes, which by then included the introduction of comprehensive schools. She was an experienced and successful teacher and she pointed to some of the weaknesses in comprehensive schools, which seemed to be based on the assumption that all children would benefit from the academic style education which previously had been available to only a few. The argument was that since only the few tended to prosper in later life this new education would provide success for all. A careful analysis of her own experiences as a teacher convinced her that the mathematics the majority of children would need in later life was limited and it should be possible to teach this through and in the context of real life situations. There had been angry reactions to some of the changes. J. B. Morgan, in 1963, felt that he was living through the destruction of some of the finest things in the nation's schools. As a

practising teacher he was aware that it was not possible to devise a syllabus for a high flyer which would also be suitable for a general user. At about this time 'new mathematics' began to appear in schools. It was condemned by C. T. Daltry in 1973. He called it an attempt, under the influence of the Americans and French, to introduce mathematics in schools as a watered down version of an organic structure to be followed by problem solving, instead of the reverse process. Such arguments have gone on ever since. Bertha Jeffreys in 1969 tried to show that it was possible to reconcile the old and new ideas.

The importance of mathematics was recognised when the Cockcroft Committee was set up to report on it. Douglas Quadling, in his 1981 address, asked many questions about the shortage of teachers and the loss of morale among them. He was concerned about what children learned and how, but he was full of hope that Cockcroft would be able to show how problems could be solved.

The Role of the Teacher

Several teachers, who became Presidents, stressed their concern for providing opportunities which would stretch the able pupils and how best to encourage creativity and discovery. K. S. Snell, in 1952, tried to predict how school mathematics would develop. B. T. Bellis, in 1972, asked the same questions, but coming from north of the border, he brought a freshness to the subject. F. W. Kellaway, in 1967, and A. P. Rollett, in 1968, were both concerned about social distinctions which still existed in schools. There was concern over bridging gaps which existed between teachers of different age groups and between different schools. The existence of a happy rapport between teacher and taught was important at any stage. Alan Tammadge, in 1979, and Frank Budden, in 1983, stressed the importance of providing for the mathematically gifted. Perhaps Geoffrey Matthews, in 1978, summed it all up when he stated that a teacher's responsibility is to pass on enthusiasm to children in the class, and to this end it is necessary to have a collection of simple but interesting problems and unexpected contradictions. He believed that the business of keeping mathematically alive is what the Association is about.

Computers

Anita Straker, in 1987, threw out a challenge to change and to make sure that computers were used to advantage in the mathematics classroom. It was important not to cling to the past but to make efficient and effective use of the new technology. Hilary Shuard, in 1986, pressed for computers in primary schools as well as describing a way forward in primary education.

On the training of teachers

The training of mathematics teachers was the subject of a Presidential Address by G. H. Ryan in 1908. He was a pessimist who considered that

mathematics was a neglected subject in England and he saw the future as bleak. No one else seemed to think the provision of trained teachers was a topic of special note until the 1970s. There had been several references to the shortage of teachers and to lower morale and feelings of lack of esteem, but there had been no major talks. Edwin Kerr, in 1977, reviewed the changes in the school system since 1945 and worried about the shortage of teachers. The topical anxiety then was about the economics and social consequences of the creation of VIth form colleges. The political repercussions of the National Curriculum provided subjects for several Presidential Addresses. Geoffrey Howson, in 1989, produced at tale of woe in which he compared the poor performance of schoolchildren in England with children of comparable ages from other European countries and Japan. He felt that the shortage of qualified mathematics teachers was a disaster and that the Association should set its mind to the problem. Margaret Brown, in 1991, and Alan Bishop, in 1992, spoke about the problems which had arisen following the introduction of the National Curriculum. The whole scheme was flawed and created difficulties for teachers throughout the education world. There had been little consultation with people who had experience in working with children in the classroom as to what was practical or useful.

Conclusions

One or two Presidents have used their Addresses to map out the purpose and role of the Mathematical Association. E. A. Maxwell, in 1961, reviewed the work it had done and its main achievements and looked ahead to what could be done in the uncertain future. Peter Reynolds, in 1990, looked at the role of the Association in the light of recent political changes and saw it as an instrument for in-service help for teachers so that they can improve their skills and aim to improve the teaching of the subject in schools. John Hersee, in 1993, also stressed the role of the Association in the light of the almost daily changes in schools and education. He felt that it was important to encourage independent thought among teachers, to give them the chance to suggest alternative ideas and, in short, to encourage good practice.

Perhaps the last word should go to J. T. Combridge in 1962, a man endowed with common sense and good humour and a devoted voluntary worker for the Mathematical Association. The concerns of the Association should be – What are we to think? – How can we think? – What are we to do? – What makes real mathematics? Better teaching will mean fewer people frightened off the subject. For a mathematician the subject is *sovereign*. There should be freedom to pursue personal interests within the Association, but those who have freedom should not disdain service.

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