

## **THE VIEWS OF OLDER ADULTS ON SCHOOL MATHEMATICS PAST AND PRESENT**

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*This research presented here considers issues in the teaching of mathematics from the point of view of a group of people aged 75 and over. It draws on written accounts of their use of and attitude to mathematics. Extracts are identified in which they reflect on their own experiences of learning mathematics at school or give their views on more recent mathematics education. Common themes are mental arithmetic and the use of calculators. Most respondents report positive views of their own mathematics education and reservations about more recent systems. Some accounts reveal inaccurate views of current practices in mathematics teaching.*

### **INTRODUCTION**

This paper examines the views of a group of older adults on the teaching and learning of mathematics. It is based on extracts drawn from written accounts about their use of and attitudes to mathematics. Data was available for a large number of adults but for the purposes of this study, analysis has been carried out only of those written by people aged 75 and over. This group was selected partly because many of them raised issues about education but also because their age made it possible to make some statements about the education they received and hence findings can be considered in relation to the education system in operation at the time they received their schooling.

### **BACKGROUND**

The people we are concerned with here were aged between 75 and 91 when writing these accounts in 2004. This means that the youngest in our sample had their education interrupted by the Second World War, though many of them had already left school by then. By the time the 1944 Education Act (known as the Butler Act) was introduced, the youngest in our sample were 15 and hence too old to benefit from the reforms it brought. The Butler Act is regarded as laying down the foundations for the modern education system (Mackinnon, Stratham and Hales, 1996). In particular it established a system of primary, secondary and further education with transfer between primary and secondary school at eleven plus. The Butler act is also credited with extending educational opportunity by securing a satisfactory secondary education for all children (Evans, 1985).

In the era preceding the Butler Act, most children in England began their education in elementary schools. Pupils were legally required to attend school from ages 5-14, but many schools admitted pupils at the age of three. This system is described by Smith (1949) who states that only a small minority of children went beyond elementary schools. The organisation of these schools varied with some having departments for infants, juniors and seniors.

The mathematics curriculum in elementary schools is discussed by Brown (2001) as part of a discussion of the developments of arithmetic teaching in England. She points out that arithmetic became part of the curriculum in all elementary schools as a result of the revised code of 1862. This mainly stated the types of calculation students should be required to carry out. These increased in complexity from oral addition to long division and calculations involving ratio and proportion. Pupils also needed to carry out calculations related to money and to the existing system of imperial measures. Teaching tended to emphasise drill, practice and repetition, with neat presentation also considered important. There was little fundamental change in the elementary school number curriculum for many years, and thus the adults in our sample are likely to have received an elementary education along these lines.

Those receiving some secondary education are likely to have studied aspects of mathematics other than arithmetic. It is not possible to be precise about this, given the variation in ages of people in the sample and the different types of school they may have attended. Some possibilities are suggested by Howson (1982) who describes the curricula of central schools as having a commercial or industrial basis and hence including geometry, algebra, scale drawing and other aspects of mathematics alongside arithmetic. He also discusses possible content for grammar school curricula including geometry, algebra and trigonometry. It is therefore likely that some of the writers in our sample studied these aspects of mathematics at school.

## **DATA AND METHOD**

The data used for this study comes from the Mass-Observation archive based at the University of Sussex. The archive specialises in gathering material about everyday life in Britain. The data used for this project comes from the contemporary collection which contains data from 1981 to the present day. This data takes the form of responses to 'directives' which are sent out several times a year to those taking part in the project, who are described either as correspondents or writers. Most directives are composed of several questions or subjects which the writers are invited to respond to. This paper is based on responses to a question about number asked as the first part of the Spring 2004 directive. The question was designed to explore people's use of and feelings about number. In the sections that follow, the discussion will be based on analysis of the responses given by writers who gave their age as 75 or over. There were 40 such writers, 18 men and 22 women.

## **FINDINGS**

### **Overview of findings**

Issues related to education were raised by many of the writers in our sample. 25 of them explicitly mentioned mathematics education, either in relation to their own learning of mathematics at school or in discussing the school education of younger people. Common themes were mental arithmetics and the use of calculators. A further 12 writers raised related issues such as the importance of mental arithmetic or

their attitudes to calculators but did not relate them explicitly to education. Extracts relating to these issues are considered in more detail in the following sections.

### **Remembering school mathematics**

Many of the writers talked about learning mathematics when they were at school, often relating it to their own competence later in life. A particularly common theme was mental arithmetic and the learning of multiplication tables.

To those of us taught mental arithmetic in our earlier years, the use of everyday numbers is natural as to go almost unnoticed...

(Ralph, age 82)

When I moved from infant school to Junior school, the school day lasted a half hour longer. In that half term the extra time was spent practising our tables.

(Wendy, age 80)

Similar comments occurred in other accounts and some, like Ralph, imply that the ability to calculate mentally is common to most of their generation and is linked to the schooling they received. Although many of the writers were positive about their ability to calculate mentally, not all were as relaxed as Ralph about use of mathematics. However, even those with negative views about mathematics appeared to be able to make reasonably accurate use of basic arithmetic. For example, Gloria started her writing under the heading 'Using Numbers' by saying 'I don't. I loathe & avoid them.' Later, she talked about a job she once had in a bookshop:

I was put onto extending complicated invoices, with 12½% and 17½% discounts. I quite enjoyed these & refused to use a calculator. A hawk eye in the office would find 2 or 3 mistakes in 100 of my invoices. This I thought good. I'd never achieved 97% in an arithmetic exam.

(Gloria, age 78)

The majority of the quotes about school mathematics referred to arithmetic, perhaps reflecting the curriculum experienced by many of our writers. A related theme was calculation related to measurement, including the need to work with imperial measures. There were differing views on this with some expressing nostalgia for the old system and others regarding it as a waste of their time.

I am astounded that the UK kept the imperial measurements for so long and often wondered why it was ever invented. The waste of time I spent as a child calculating tons, 20cwts, 4 qtrs, 2 stones, 14 lbs, 16 ozs, etc. It was not until we were decimalised that I wondered if industry did what we had to do at school. We were given several weights in all these units and had to total them up by entering each item under its respective column and dividing the base unit (i.e. 16oz) and carrying the lbs over to the lb column. It took ages to do. Linear was the same, with their inches, feet, yards, rods, chains, furlongs and miles.

(Henry, age 78)

Some did mention other aspects of mathematics, sometimes to record what they had studied but sometimes to indicate that they knew there were aspects of mathematics they had not been taught at school. Opinions varied about whether they had ‘missed out’ by being offered a narrow mathematics curriculum.

I had a good grounding in mental arithmetic as a child- learning multiplication tables by rote... My great regret is that I never learned about mathematics. I enjoyed geometry but found algebra more difficult. I learnt to use logarithms, but we never tackled trigonometry properly at school as it was not on the syllabus for matriculation.

(Brian, age 82)

I know nothing about higher mathematics and I don’t have any sense of inferiority over this. Along with most other people, the use of numbers in everyday life is as natural as language and I daresay we know enough to see us through.

(Ralph, age 82)

### **Current and Recent Mathematics Education**

Many of the writers talked about the mathematics education which they felt had been received by those younger than them. This frequently arose in the context of stories about younger people unable to do what our writers perceived as simple calculations, usually in the context of shopping or other transactions involving money. A common theme was the reliance of younger people on machines.

I am appalled at the inability of younger people to use figures. Without a calculator they are lost. I used calculators once when I was at work for long calculations, but it takes away your natural ability so I stopped using one and carried on. I firmly believe that some children ... would believe a calculator if it said that  $2+2=5$ .

(Jack, age 83)

Although many of the comments made were about younger adults, some of the writers did talk explicitly about school education today. There were several examples which suggested that the writers did not have an accurate picture of current practices.

What used to be called ‘simple’ arithmetic; addition, subtraction, multiplication and division were not beyond the abilities of the average elementary school child of my time. I’ve no idea if pupils at today’s enormous comprehensives are even taught such skills. Seeing the universal use of calculators makes me rather doubt it.

(Ralph, age 82)

I don’t think many young people know how to add or subtract, never mind divide or multiply. We were brought up to divide pounds, shillings and pence but I wouldn’t recommend it even for a bit of fun.

(Graham, age 85)

As with both the quotes above, writers often discussed schooling today in comparison to their own experiences. Although some seemed critical of schools or of younger

people, others were more sympathetic or saw changes as reasonable, as in Henry's comment about imperial measurements. A slightly different point of view was expressed by Gladys, who felt that children at school today were missing out.

...I can't be doing without numbers in my life- the simple arithmetic type. I only went to school until 14 so didn't go on to logarithms, geometry and the more sophisticated maths. And I feel I missed out. But I think today's children miss out in the mechanical age of being able to use their brains in the way we did by learning tables and working out sums in our head.

(Gladys, age 78)

## **DISCUSSION**

In considering the comments made by the writers, it is important to remember that this is self-reported data. We cannot claim that it gives us factual information, but it tells us about the views and attitudes of the writers. Although they exhibit a range of views and experiences, there is some commonality. The majority report an education which emphasised mental arithmetic and believe that this has helped them in their lives. There is also a fairly widespread belief that those educated more recently are less able to calculate mentally. Many of the writers felt calculators were to blame for this and were surprised at the apparent reliance of the younger generation on machines. Although it is not possible to check the factual basis of this information, the comments about the mathematics curriculum experienced by the writers are in line with the type of education available at the time. The majority of them still seem to subscribe to the philosophy behind the system they were educated in.

The views of the writers on more recent education can be compared with what is known about developments in the mathematics curriculum in England. It is clear from looking back at curriculum advice (e.g. Nuffield Mathematics Project, 1967) that the second half of the twentieth century saw a broadening of the primary mathematics curriculum with less emphasis on number. Until the introduction of the National Curriculum in 1989, there was no centralised curriculum for primary mathematics, meaning that wide variations between schools were possible. However, in practice the curriculum was partly determined by the need to prepare for secondary education. Another factor leading to commonality was the use of commercial mathematics schemes by the vast majority of primary schools. The reality, therefore, was that the emphasis on basic arithmetics and learning number facts probably was reduced compared to the period between the wars, but these things still had a key place in the primary mathematics curriculum. This situation is summed up by Brown (1999) who says that most schools continued throughout to teach and test number bonds and multiplication tables and that calculators were used sparingly if at all.

It is easier to check the information given about the perceived mathematics curriculum when the writers gave these accounts in 2004. At this point the National Numeracy Strategy (DfEE, 1999) had been running for five years and primary schools were offering a curriculum in which mental calculation had a central place.

Some of our writers clearly have inaccurate views of current practice, though others are better informed. Henry, for example, reported that he had 14 grandchildren and that he helped some of them with their maths homework. Henry showed a realistic view of current practices and it is reasonable to assume that he gets some of his information from observing his grandchildren and looking at their work. It is interesting to speculate where the other writers gained their information.

Although this work is based on a small number of people, it does suggest a fairly widespread view amongst older people that mathematics education has changed for the worse since they were at school. In some cases, their descriptions of current practice are clearly inaccurate. In other cases the information given may be correct but a cause for concern is that few seem to see any good reason for changes in the curriculum or for use of calculating devices, either in school or elsewhere. This presents a challenge to the mathematics education community in terms of better publicising current practices and the rationale behind them.

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