

Standards and Quality in Primary Schools: Mathematics 1998–2001

A report by HM Inspectorate of Education, May 2001

Extracts on Problem Solving and Enquiry

Teachers' planning for mathematics

In the final year of the inspection survey, HMI made additional evaluations of teachers' planning in mathematics and found it to be very good in 10% of schools, good in 55% and with important weaknesses in 35% of schools.

Where plans were weak, some omitted aspects such as mental mathematics or problem solving and enquiry. ...

Quality of programmes

Programmes generally gave good attention to each of the key aspects of mathematics. In some schools more emphasis was needed on programmes in problem solving and enquiry, which were frequently of poorer quality than other aspects. The table below shows HMI judgements of the quality of each of the key aspects of mathematics.

Programme	Very Good	Good	Fair
Information handling	5%	80%	15%
Number, money and measurement	15%	75%	10%
Shape, position and movement	10%	75%	15%*
Problem solving and enquiry	5%	45%	50%*

* includes a small number of unsatisfactory programmes.

Problem solving and enquiry programmes

Problem solving was an area of weakness with 50% of the programmes inspected rated as only fair. Too many schools relied on pupils solving mathematical problems from textbooks, an approach which did not help pupils to develop strategies for solving unfamiliar problems. At the other extreme, some teachers taught their pupils specific problem-solving skills but did not help them to apply these skills within day-to-day coursework in mathematics.

The characteristics of very good programmes in problem solving and enquiry are set out in Box 5. In the best programmes, problem solving was at the heart of the mathematics course, not a separate aspect, and was used throughout the course and in other areas of the curriculum.

5

Very good programmes in problem solving and enquiry: included a wide range of types of problem in varied real-life contexts; were well integrated into the mathematics programme; had a clear focus on strategies to solve problems; ensured progression in skills from P1 to P7, including reporting; and encouraged pupils to discuss approaches and reflect on solutions.

Pupils were encouraged to select and practise an extending range of strategies. At P1 to P3, pupils used trial and error and making a model, leaving strategies such as organised listing or making conjectures until later. The best teachers: ensured that by P7, pupils were meeting problems requiring them to choose from a range of strategies; ensured that pupils had acquired reporting skills from an early stage by talking to the group about their problem and making diagrams; expected older pupils to write about a problem and its solution in their own words; and encouraged pupils at all stages to collaborate in solving problems and to report as a group on their solutions.

Attainment in coursework

Standards of attainment in coursework in information handling, number, money and measurement, and shape, position and movement were good or very good in 90% of schools. Standards of coursework in problem solving and enquiry were significantly weaker with only 55% of schools judged to be good or very good.

Standards in problem solving and enquiry

Pupils were usually enthusiastic in problem-solving activities. As they moved through the primary school, most developed some awareness of the different strategies needed to solve mathematical problems and improve their skills. They were less competent in talking about ways of approaching a particular problem and in identifying and evaluating their approach. The majority of pupils needed support to attempt problems in an unfamiliar context. There were often weaknesses in recording problem-solving activities. Even where pupils were able to select and use a variety of strategies, they were sometimes unable to report their findings clearly.