



The Effects of National Testing in Science at KS2 in England and Wales

Executive summary



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1.0 Executive summary

Introduction

The research aimed to explore the effects of compulsory national testing in science on Year 6 (Y6) teachers and the teaching of science in England, as well as the impact of the abolition of statutory testing in science at Key Stage 2 (KS2) in 2004 on Y6 teachers and the teaching of science in Wales.

Objectives of the research

The objectives of the present research were to:

- Explore approaches to the teaching of science in England and Wales with an emphasis on assessment of pupils' learning at KS2
- Investigate the impact of changes in end of KS2 assessment in science on teachers and the teaching of science in Wales
- Understand the views of teachers in England and Wales about the strengths and weaknesses of current assessment arrangements
- Understand the views of teachers in England about the value and impact of school and college achievement tables based on test results
- Make recommendations based on research findings to inform changes in assessment procedures and practice in science at KS2 in England and Wales where appropriate.

Research methods

The research methodology was designed to systematically gather and explore a range of views about the teaching of science and the impact of assessment procedures and practices in Y6 in England and Wales.

The research utilised both quantitative and qualitative methods:

- A telephone survey of teachers in England and Wales
- Focus group discussions in England and Wales.

Quantitative research

A telephone survey of 600 teachers, science coordinators and headteachers – 300 from England and 300 from Wales – was conducted by Ipsos MORI in September/October 2007. The telephone survey gathered information about approaches to science teaching in Y6 and views and experiences of assessment procedures and practices used to determine pupils' level of attainment in science at the end of KS2 in England and Wales.

Qualitative research

Eight focus group discussions were conducted – 4 in England and 4 in Wales – involving of a total of 74 Y6 teachers, science coordinators, headteachers and secondary science teachers. Discussions were designed to explore participants' experiences and views of science teaching and assessment of pupils' learning in Y6 and to investigate in greater depth issues arising from the telephone survey.

Conclusions

1. Teaching and learning strategies used for science in Y6

- a) The telephone survey revealed markedly similar approaches to teaching and learning in science in Y6 among sub-groups of Y6 teachers, science coordinators and headteachers in England and Wales and across the two countries.
- b) Telephone survey responses, confirmed by focus group discussions, provided evidence of an understanding of current thinking about effective teaching and learning strategies for science at KS2, where progression in pupils' knowledge and understanding of science is most effectively achieved through the development of pupils' science process skills.
- c) Focus group discussions in England revealed that Y6 teachers utilised a range of teaching strategies found to be effective in supporting revision of the KS2 science curriculum and the development of those aspects of pupils' science knowledge, understanding and skills likely to be included in national test papers.
- d) Teachers reported that the pressure of test preparation in Y6 classes in England was not the sole reason for a reduction in time devoted to practical science activities and investigations in Y6 classes; behaviour management issues across KS2 contributed to teachers' reluctance to encourage hands-on science activities in the classroom.
- e) There was evidence to show that changes in assessment procedures and processes in Wales were having some impact on approaches to teaching and learning in science in Y6. Released from the need to prepare pupils for national tests, Y6 teachers were able to concentrate on the development of pupils' knowledge and understanding using the National Curriculum *Scientific Enquiry* programme. It was felt this also facilitated summative teacher assessment of the whole of KS2 science.
- f) Focus group discussions revealed the growing popularity of Interactive White Boards (IWB) for the teaching of Sc1 in Y6 classes in England and Wales. Sophisticated software provided opportunities for whole class 'virtual' investigations that were pupil-friendly and stimulating. Some Y6 teachers used IWB programmes to elicit pupils' existing ideas at the beginning of science topics and to monitor and assess learning during investigations.

2. Main challenges facing Y6 teachers in the teaching of science in England and Wales

- a) The main challenges faced by Y6 teachers in England and Wales were reported to be a lack of time generally for science in Y6 and the need to revise the entire KS2 science curriculum in two terms in preparation for national tests in England and summative teacher assessment in Wales.
- b) Teachers in England and Wales maintained that the situation in Y6 was compounded by a lack of classroom support for science, to assist teachers in the general management and organisation of science lessons and, in Wales, to facilitate teacher assessment of group and individual work in science.

- c) Headteachers in England expressed concern about the impact of science revision and test preparation on Y6 teachers' attitudes towards science, particularly those lacking in confidence in teaching the subject.
- d) The impact of national testing on pupils' attitudes towards science at KS2 was raised as a cause for concern by focus groups of headteachers, Y6 teachers and science coordinators.
- e) Particular challenges reported by Y6 teachers in Wales centred on the need for summative teacher assessment for science in Y6, including:
 - Concerns about the accuracy of National Curriculum statements of attainment to inform assessments – despite the provision of optional test materials to support summative judgements
 - A lack of accuracy and consistency in internal and external moderation practices, particularly in determining pupils' levels of attainment in science at KS2.

3. Assessment strategies used for science in Y6

- a) Summative assessment strategies used by Y6 teachers in England were said by participants to be selected to provide pupils with support and feedback needed to prepare them for KS2 national science tests.
- b) Formative assessment strategies used by Y6 teachers in England and Wales were said to include informing pupils of the learning intentions for science topics and lessons and providing feedback to pupils on their work. Feedback to pupils without marks was utilised in one of two ways:
 1. To inform pupils of their progress on practice tests and to feedforward in offering advice on ways in which performance in tests might be improved, or
 2. To support pupils' learning in science and facilitate teacher assessment for summative purposes.

4. Assessment procedures and practices for science in Y6

- a) Participants in focus groups in England maintained that statutory national testing in science at KS2 informed assessment procedures in the following ways:
 - Y6 teachers were left with little option but to devote a considerable amount of time in science lessons to test preparation, particularly in the spring term
 - There was a tendency for Y6 teachers to focus on aspects of science likely to be tested and this resulted in a narrow curriculum for science and fewer opportunities for pupils to undertake science investigations or other practical activities in science in Y6
 - Test preparation in its current form contributed little to pupils' understanding in science. The sole purpose was to equip pupils with sufficient factual knowledge and scientific terminology to answer written questions on science test papers.
- b) In Wales optional test materials were used in all Y6 classes in schools represented. However, practice varied in the following ways:

- In a small number of schools optional tests had simply replaced statutory national tests in Y6 as a means of determining pupils' level of attainment in science at KS2
- In other schools optional tests were utilised to inform Y6 teachers' judgements of pupils' level of attainment in science
- The remainder of schools represented used optional test materials to provide supplementary evidence to support summative teacher assessment.

5. Perceived and actual effects of the abolition of national testing for science at KS2

- a) Participants in England were generally positive about the potential advantages to teachers and pupils of an abolition of national testing in science at KS2 in favour of summative teacher assessment of pupils' levels of attainment in science. The key benefit was perceived to be an opportunity to integrate science investigations and other practical activities more fully into science lessons throughout the year. However, teachers maintained that the success of such an initiative would largely depend on the quality of internal and external moderation procedures and practices to ensure consistency in the interpretation of levels of attainment within and across schools.
- b) Survey respondents and focus group participants in Wales suggested that the abolition of national testing and developments in summative teacher assessment for science at KS2 had positively affected the teaching of science in Y6 classes in primary schools where changes in assessment procedures and practices had been more fully implemented. Freed from the restrictions of test preparation, teachers said they were beginning to utilise a broader range of teaching strategies, encouraged by requirements for summative teacher assessment to include judgements of pupils' levels of attainment in all KS2 National Curriculum programmes of study for science.
- c) Headteachers in Wales, while fully supportive of changes in assessment procedures at KS2, called on the Welsh Assembly and local authorities to provide the following:
 - Clear and consistent guidance on summative assessment procedures at KS2
 - Detailed information about the content of the revised KS2 curriculum for science to be implemented in 2008 to inform action plans for continuing professional development for Y6 teachers.
- d) Secondary science teachers in England claimed to mistrust KS2 national test results for science. Test scores were said to provide inaccurate information about pupils' actual levels of attainment in science at the end of KS2, necessitating re-testing of pupils during the autumn term of Y7. Participants thought that summative teacher assessment in Y6 had the potential to provide more accurate assessments with the caveat that this was dependent on clear assessment criteria, rigorous moderation procedures and the use of sub-levels in the assessment of pupils' attainment at KS2 to further enhance accuracy.

- e) Survey responses provided clear evidence to support findings of other studies that test preparation in England dominates the teaching and learning of science in Y6. Evidence emerged of a strong conviction among respondents in England and Wales that moderated teacher assessment was capable of providing more accurate information about pupils' levels of attainment in science at KS2 than national test scores.

6. Perceptions of links between assessment and standards

- a) Participants in England expressed dissatisfaction with the current practice of basing *school and college achievement and attainment tables* (SCAATs) on national test scores for science at KS2. The main reason was the perceived inaccuracy of national tests in determining pupils' levels of attainment in core curriculum subjects at KS2.
- b) Following the abolition of SCAATs in Wales in 2004, headteachers had devised alternative strategies to inform parents of Y6 pupils about their child's progress and summative level of attainment in science at KS2. While communication currently involves a relatively lengthy process of parent-teacher discussion and personalised reports, it was said that this provided more accurate information than was previously the case when reporting to parents was based on pupils' national test results.

Recommendations

The following recommendations are informed by the findings of this research.

Recommendations for policy makers

England

1. If national testing in science at KS2 is to be retained, policy makers should explore ways in which assessment might positively promote the development of pupils' understanding in science through the use of process skills in Y6, enabling teachers to utilise a broader range of teaching strategies and approaches to science than is currently the case.
2. Policy makers should evaluate national tests for science. There is a need for consideration of the following:
 - The extent to which preparation for science tests in Y6 classes has the effect of narrowing the science curriculum and limiting opportunities for pupils to engage in practical science work in Y6
 - Ways in which science tests might be developed to ensure that tests access the full range of skills and knowledge that pupils experience in KS2 science.
3. Policy makers should review the appropriateness of the formulation of SCAATs based on national test scores in English, mathematics and science.

Wales

1. Policy makers should consider ways in which assessment procedures and practices, recommended schemes of work and optional test materials for science at KS2 might reflect the importance of teaching strategies such as science from stories, drama/role-play and field trips to enhance the teaching and learning of science in Y6.

England and Wales

1. Policy makers should consider ways in which revision of the entire KS2 science curriculum in Y6 to facilitate summative assessment in science at KS2 might be avoided.
2. An evaluation of levels of classroom support for science in Y6 is needed by policy makers in an effort to assist Y6 teachers in England in undertaking whole class practical science revision sessions and to facilitate summative teacher assessment in Y6 classes in Wales.

Recommendations for further research

England

1. Further research is needed to explore the impact of assessment procedures and practices in science at KS2 on pupils' and teachers' attitudes towards science in Y6.
2. Research on primary-secondary transition should be undertaken to explore the following:
 - Existing good practice in supporting pupils' learning in science during transition from KS2 to KS3, to identify ways in which this might be disseminated
 - Factors that support pupils' learning in science and those which inhibit progression in individual learning and impact on pupils' attitudes towards science during transition between primary and secondary school.

Wales

1. Further research is needed to investigate developments in approaches to teaching and learning of science in Y6. The aim of the research should be to determine the extent to which revised assessment procedures and teaching practices positively promote the use of investigations and practical activities in developing pupils' knowledge and understanding of science at KS2.
2. There is a need for further research to investigate and monitor the development of Welsh Assembly policies and initiatives for assessment in science, with particular reference to internal and external moderation procedures at KS2.
3. There is a need for further research and monitoring of developments in the use of optional test materials for science in Y6 to explore ways in which materials are used to inform or support summative teacher assessment in providing accurate information about pupils' levels of attainment in science at the end of KS2.
4. Further research and monitoring of developments in assessment procedures and practices should be undertaken to explore:
 - Developments in assessment procedures for science at KS2 to identify factors likely to encourage or inhibit change towards the use of summative teacher assessment in science at KS2
 - The revised National Curriculum for science with an emphasis on the extent to which it supports changes in summative assessment procedures and practice at KS2

- Progress in Welsh Assembly guidance to support the development of summative teacher assessment for science at KS2.
5. Further research should be undertaken to explore the nature and effectiveness of procedures introduced to replace SCAATs in informing parents about their child's progress and attainment in science at KS2.

England and Wales:

1. There is a need for further research to explore formative teaching strategies for science used by Y6 teachers in England and Wales. The aim of the research should be to ascertain the purpose of formative strategies used by Y6 teachers and the ways in which they support the development of pupils' knowledge and understanding of science at KS2.