



# NFER Teacher Voice Omnibus

February 2008 Survey

## Science Enquiry

National Endowment for Science, Technology and the Arts (NESTA)

March 2008

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## Introduction

A series of questions were submitted by the National Endowment for Science, Technology and the Arts (NESTA) to NFER's Teacher Voice Omnibus Survey, February 2008. The questions covered two main themes:

- issues around science enquiry in the teaching of science in schools
- relevance of the current science curriculum to the modern world.

This report provides an analysis of the responses to these questions and the results are also presented by school phase (primary and secondary). The questions were asked of 580 primary science teachers and 123 secondary science teachers.

## Analysis of findings

### Context

Science enquiry is the experimental and practical work that is involved in the teaching of science. The DCSF states that scientific enquiry helps pupils to understand how scientific ideas are developed and how to develop for themselves a greater understanding of the applications of science. The DCSF also states that the skills a pupil develops through scientific enquiry will be of value for many everyday applications.

A national network of Science Learning Centres was set up in 2004 to support professional development in science teaching. These Centres support teachers to gain experience of modern science techniques and to develop new teaching approaches. Science Learning Centres are based on a belief that that these developments raise morale in the teaching profession and in turn inspire pupils by providing them with a stimulating and relevant science education.

The use of science enquiry in schools is of interest to NESTA, which aims to develop strategies that transform the UK's capacity for innovation. As such it is of value to NESTA to understand the extent to which science enquiry is an integral part of science education and if it is helping pupils to develop the skills to be the innovators of the future.

The survey questions aimed to evaluate the importance of scientific enquiry to teachers, particularly in relation to science learning, building skills, and improving

attainment and performance. Secondly, the survey questions asked about the barriers that may exist for teachers wishing to undertake more science enquiry in their teaching practice and the scope for such work within the current curriculum. Finally the survey questions asked for teachers' views on how relevant the current science curriculum is to the modern world.

## Overall findings

### Importance of science enquiry in science learning

The first question revealed that science teachers have a positive view of the importance of science enquiry: over two-thirds of all respondents felt that science enquiry was very important in science learning. A greater percentage of respondents from primary schools (84 per cent) felt that science enquiry should be in science learning compared to secondary school respondents (73 per cent) (Table 1).

Table 1. How important do you think science enquiry should be in science learning?			
	All	Primary	Secondary
Very important	83%	84%	73%
Quite important	16%	15%	24%
Neither important nor unimportant	1%	1%	3%
Not very important	0%	0%	0%
Not important at all	0%	0%	0%
Don't know	0%	0%	0%
Local Base (N)	732	580	122

*Due to rounding, percentages may not sum to 100*

*Source: NFER Omnibus Survey February/March 2008*

### Contribution of science enquiry learning to pupil performance and attainment

It was also evident from the survey findings that science teachers believe that science enquiry can significantly improve pupil outcomes. Over 80 per cent of all respondents felt that science enquiry could help to improve the performance and attainment of pupils. There was very little difference in the responses of primary and secondary teachers to this question (Table 2).

Table 2. Do you think science enquiry learning can help to improve the performance and attainment of your pupils?

	All	Primary	Secondary
Yes, significantly	83%	84%	77%
Yes, a little	16%	16%	21%
No	1%	0%	2%
Don't know	0%	0%	0%
<b>Local Base (N)</b>	<b>731</b>	<b>578</b>	<b>122</b>

*Due to rounding, percentages may not sum to 100*

*Source: NFER Omnibus Survey February/March 2008*

### Improvement of skills by means of science enquiry

Respondents were asked for their views asked about a range of pupil skills that could be enhanced through science enquiry. The skill that most respondents (over 90 per cent for all teachers and for both primary and secondary sub-samples) felt would be developed from scientific enquiry was problem solving. In addition, over 80 per cent of respondents from both primary and secondary schools felt that scientific enquiry would help to improve critical thinking and team working skills. At least a third of respondents felt that the other skills, including risk taking, innovation and self awareness, would be improved by science enquiry. There was very little difference in responses from primary and secondary teachers. The largest difference between school sectors was that more respondents from secondary schools (47 per cent) compared to those from primary schools (30 per cent) felt that self awareness would be improved through science enquiry (Table 3).

Table 3. Which, if any, of the following skills do you think science enquiry learning can help to improve?

	All	Primary	Secondary
Problem solving	96%	96%	94%
Risk taking	49%	50%	42%
Innovation skills	56%	57%	55%
Critical thinking	89%	88%	92%
Teamwork	87%	87%	88%
Self awareness	33%	30%	47%
None of the above	0%	0%	0%
<b>Local Base (N)</b>	<b>732</b>	<b>580</b>	<b>122</b>

*Due to rounding, percentages may not sum to 100*

*Source: NFER Omnibus Survey February/March 2008*

## Barriers to science enquiry work

A subsequent question asked respondents to identify, from a list of factors, the three most important barriers to science enquiry work. Table 4 shows that, for all teachers, the three most important barriers in descending order of importance were; lack of appropriate equipment and space, lack of time in current curriculum arrangements, and lack of teacher confidence. Lack of resources for supplies and health and safety concerns were also found to be important barriers to science enquiry work.

Table 4 also demonstrates that there were differences in the responses of primary and secondary teachers to this question. In descending order of importance secondary school respondents felt that the main three barriers to science enquiry work were; lack of time in the current curriculum arrangements, lack of appropriate equipment and space then lack of resources for supplies. For primary school respondents the main barriers to science enquiry work in descending order of importance were; lack of appropriate equipment and space, lack of teacher confidence and lack of time in the current curriculum arrangements.

Table 4. Which, if any, of the following do you think are the three most important barriers to science enquiry work being undertaken in the classroom?

	All	Primary	Secondary
Lack of appropriate equipment/space	68%	72%	46%
Lack of resources for supplies	38%	40%	33%
Lack of laboratory technicians	8%	7%	10%
Lack of time in current curriculum arrangements	50%	46%	74%
Lack of prominence in current curriculum arrangements	15%	12%	24%
Lack of prominence in current assessment arrangements	8%	6%	17%
Concerns over health and safety	28%	28%	27%
Lack of health & safety advice and information	1%	1%	1%
Lack of specialist science teachers or coordinators	16%	17%	13%
Lack of teacher confidence	44%	48%	26%
None of the above	2%	1%	3%
<b>Local Base (N)</b>	<b>731</b>	<b>578</b>	<b>122</b>

*Due to rounding, percentages may not sum to 100*

*Source: NFER Omnibus Survey February/March 2008*

## Flexibility of the current curriculum and assessment requirements

Another question asked science teachers about the extent to which they felt that their classroom teaching was constrained by the current science curriculum and the demands of assessment. The majority of respondents from all schools were positive in that they felt that there was ‘some scope’ in the current curriculum and in assessment for experimental and practical work. There was very little difference in responses from primary and secondary teachers (Table 5). It is of interest to note that only around ten percent of respondents felt that there was ‘a lot of scope’ for experimental and practical work within the current curriculum.

Table 5. How much room for experiments and practical work do you think the current curriculum and assessment requirements allow teachers?

	All	Primary	Secondary
A lot of scope	11%	11%	11%
Some scope	61%	62%	54%
Little scope	20%	20%	21%
Very little scope	7%	5%	13%
Don't know	2%	2%	1%
Local Base (N)	728	576	122

*Due to rounding, percentages may not sum to 100*

*Source: NFER Omnibus Survey February/March 2008*

## Relevance of the current science curriculum to the modern world

Encouragingly, two-thirds of respondents (66 per cent) felt that the current science curriculum was ‘fairly relevant’ to the modern world, and another one in ten (11 per cent) felt that the curriculum was ‘highly relevant’. The figures in Table 6 indicate that there was little difference between the responses from primary and secondary teachers to this question.

Table 6. To what extent do you consider that the current science curriculum is relevant to the modern world?

	All	Primary	Secondary
Highly relevant	11%	11%	14%
Fairly relevant	66%	67%	62%
Slightly relevant	19%	18%	21%
Not relevant	1%	2%	2%
Don't know	3%	3%	1%
Local Base (N)	730	578	122

*Due to rounding, percentages may not sum to 100*

*Source: NFER Omnibus Survey February/March 2008*

## Conclusions and implications for the client

In conclusion, it can be seen that, overall, science teachers have predominantly positive views about the contribution of science enquiry to pupil skills and attainment, and in relation to the relevance of the current science curriculum to the modern world. Questionnaire responses show that the vast majority of respondents felt that science enquiry was important for science learning and in improving performance and attainment. NESTA should also be encouraged by the fact that respondents also felt that science enquiry could help to improve a range of skill types. It was found, overall, that teachers believed that the three skills most likely to be improved through science enquiry were problem solving, critical thinking and team work.

The most common barriers to science enquiry work were lack of appropriate equipment / space, lack of time in the current curriculum arrangements, lack of teacher confidence and lack of resources for supplies. Although this finding is unlikely to be new to NESTA, the survey findings do provide evidence that these are the main barriers to science enquiry work, and therefore it would be worth considering further strategies to help science teachers to overcome these barriers.

The majority of both primary and secondary school respondents felt that there was 'some' scope for experimental and practical work within the curriculum. Furthermore, respondents felt that the current science curriculum was relevant to the modern world.

## Supporting information

### How was the survey conducted?

The survey was completed in February and March 2008 by a panel of over 1,000 practising teachers from the maintained sector in England. The survey was conducted online and teachers were asked to complete the survey within a period lasting just over a week. At the end of the survey period all ‘open’ questions were coded by a team of experienced coders within the Foundation.

### What was the composition of the panel?

The panel included teachers from the full range of roles in primary and secondary schools, from headteachers to newly qualified class teachers. Forty two per cent (574)<sup>1</sup> of respondents were teaching in primary schools and 58 per cent (779)<sup>1</sup> were teaching in secondary schools.

### How representative of schools nationally were the schools corresponding to the teachers panel?

The achieved sample of teachers represented a good spread of school types and regional areas. However, there were found to be differences in representation of schools in the lowest quintile of achievement and the highest quintile in terms of eligibility for free school meals. To address this, weights were calculated using both achievement and free schools meals factors to create a more balanced sample. Due to the differences between the populations of primary schools and secondary schools, different weights were created for primary schools, secondary schools and then the whole sample overall. The weightings have been applied to all of the analysis referred to in this commentary and contained within the tables supplied in electronic format (via Pulsar Web).

Tables 1, 2 and 3 show the representation of the weighted achieved sample against the population.

Table 4 shows the representation of the weighted teacher sample by role in school.

<sup>1</sup> These figures are before weighting was applied

**Table 1 Representation of (weighted) primary schools compared to primary schools nationally**

		<b>National Population %</b>	<b>NFER Sample %</b>
Achievement Band (Overall performance)	Lowest band	18	25
	2nd lowest band	19	19
	Middle band	20	19
	2nd highest band	20	18
	Highest band	22	19
% eligible FSM (5 pt scale)	Lowest 20%	20	18
	2nd lowest 20%	20	18
	Middle 20%	20	19
	2nd highest 20%	20	21
	Highest 20%	20	23
Primary school type	Infant/First	17	10
	Primary/Combined	74	75
	Junior	9	15
	Middle/other type	1	0
Region	North	31	25
	Midlands	32	31
	South	37	45
Local Authority type	London Borough	11	10
	Metropolitan Authorities	22	18
	English Unitary Authorities	16	22
	Counties	51	50
<b>Number of schools</b>		<b>15872</b>	<b>421</b>

*Due to rounding, percentages may not sum to 100*  
*Source: NFER Omnibus Survey February/March 2008*

**Table 2 Representation of (weighted) secondary schools compared to secondary schools nationally**

		<b>National Population</b>	<b>NFER Sample</b>
		<b>%</b>	<b>%</b>
Achievement Band	Lowest band	20	26
	2nd lowest band	22	23
	Middle band	21	20
	2nd highest band	21	19
	Highest band	17	13
% eligible FSM (5 pt scale)	Lowest 20%	15	11
	2nd lowest 20%	26	21
	Middle 20%	26	25
	2nd highest 20%	21	27
	Highest 20%	13	16
Secondary school type	Middle	7	0
	Comprehensive to 16	37	31
	Comprehensive to 18	46	64
	Other Secondary schools	5	2
	Grammar	5	3
Region	North	29	34
	Midlands	34	24
	South	37	42
Local Authority type	London Borough	12	12
	Metropolitan Authorities	21	25
	English Unitary Authorities	16	25
	Counties	51	38
<b>Number of schools</b>		<b>3242</b>	<b>256</b>

*Due to rounding, percentages may not sum to 100  
Source: NFER Omnibus Survey February/March 2008*

**Table 3 Representation of all schools compared to all schools nationally**

		<b>National Population</b>	<b>NFER Sample</b>
		<b>%</b>	<b>%</b>
Achievement Band	Lowest band	19	25
	2nd lowest band	20	20
	Middle band	20	19
	2nd highest band	20	18
	Highest band	21	18
% eligible FSM (5 pt scale)	Lowest 20%	19	17
	2nd lowest 20%	21	19
	Middle 20%	21	19
	2nd highest 20%	20	22
	Highest 20%	19	23
Region	North	30	27
	Midlands	32	29
	South	37	45
Local Authority type	London Borough	11	12
	Metropolitan Authorities	22	19
	English Unitary Authorities	16	23
	Counties	51	46
<b>Number of schools</b>		<b>19114</b>	<b>677</b>

*Due to rounding, percentages may not sum to 100*  
*Source: NFER Omnibus Survey February/March 2008*

**Table 4 Comparison of the achieved (weighted) sample with the national population by grade of teacher**

Role	Primary schools		Secondary schools	
	population	weighted sample	population	Weighted sample
	%	%	%	%
Headteachers	11	9	2	<1
Deputy Headteachers	8	8	3	3
Assistant Headteachers	3	5	6	10
Class teachers and others	79	77	89	87

*Due to rounding, percentages may not sum to 100*

*Sources: NFER Omnibus Survey February/March 2008, DCSF 618g survey 2007 (LA maintained sector teachers) and School Census*

### **How accurately do the findings represent the national position?**

Precision is a measure of the extent to which the results of different samples agree with each other. If we drew a different sample of teachers would we get the same results? The more data that is available the more precise the findings. For all schools and a 50 per cent response the precision of that response is between 47.3 per cent and 52.7 per cent. For secondary schools the same precision is + and – 3.4 per cent and for primary schools it is + and – 4.1 per cent.

With the weightings applied to the data, we are confident that the omnibus sample is broadly representative of teachers nationally and provides a robust analysis of teachers' views.