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**Department of Education
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Education and Training Inspectorate

A Survey of

**the Science and Technology Area of Study
in a Sample of Northern Ireland
Primary Schools 2000-2001:**

**Inspection and Improvement
2001-2002**

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FOREWORD

As part of the survey of science and technology in a sample of Northern Ireland primary schools (2000-2001), the Inspectorate gave a commitment that the members of the survey team would return to a sample of the schools surveyed.

The commitment was duly honoured during the third term of the 2001-2002 academic year, and the report which follows describes the nature, purposes, scope and findings of the return visits. In particular, the report: describes the positive effect of the original survey visits in setting an agenda for improvement in science and technology in individual schools; highlights the value of self-evaluation by schools as a means of bringing about improvement; and indicates the importance of the Inspectorate working closely with schools and the Curriculum Advisory and Support Service (CASS) in bringing about improvement in learning and teaching and the standards achieved.

These findings are very encouraging to all concerned – the Inspectorate, schools and CASS. They serve to reinforce the importance of professional dialogue and co-operation, and self-evaluation as key factors in bringing about improvement in learning and teaching, and in raising the standards the children achieve. Consequently, this way of working serves as a model of good practice, worthy of further development and exploitation by the Inspectorate, schools, CASS and others.

Marion J Matchett.

Marion J Matchett
Chief Inspector

1. INTRODUCTION

The survey report, published in 2001, was prepared to help primary schools, the Curriculum Advisory and Support Service (CASS), and the Department of Education (DE) to identify and address priorities for action in the science and technology area of study. As part of the Inspectorate's commitment to promoting improvement, members of the survey team returned to a sample of the survey schools during the third term of the 2001/2002 academic year, in order to review the progress made following the publication of the survey report.

The purposes of the follow-up to the survey were to:

- i. establish the extent to which the original survey visits had helped to set an agenda for improvement in each of the schools and had, therefore, acted as a catalyst to improvement;
- ii. gauge the extent of improvements brought about in the intervening period by the work of the schools supported by CASS; and
- iii. determine, in particular, the improvements in learning and teaching, and in the standards across and within the science and technology area of study.

A number of qualitative terms are used throughout the report to present the findings. These terms should be interpreted as follows:

Almost/nearly all	more than 90%
Most	75%-90%
A majority	50%-74%
A significant minority	30%-49%
A minority	10%-29%
Very few/a small number	less than 10%

2. SUMMARY OF MAIN FINDINGS

2.1 The original survey visits by the Inspectorate had set a clear agenda for improvement within individual schools, and the published report had recognised much good practice within the schools involved.

2.2 Significant improvements in learning and teaching and in the quality of the children's work were noted in the year following the survey, by the staff in the schools and by the Inspectorate.

2.3 The CASS officers had made a significant contribution to bringing about improvement in science and technology in the schools, and to raising the profile of the science and technology area of study within them.

2.4 Effective working relationships were established between the CASS officers and the Inspectorate over the period of the survey, during the follow-up activity, and during the dissemination of the main findings.

2.5 The principals and teachers in the vast majority of the survey schools responded positively to the findings of the survey and, in the main, they engaged enthusiastically in the follow-up work and had worked hard to bring about improvement.

2.6 The work undertaken during the survey and the subsequent follow-up activity contributed to an overall improvement in the quality of the children's experiences in science and technology.

2.7 The work of the Inspectorate in planning and carrying out the survey, and in working co-operatively with CASS, achieved notable success as an inspection and improvement exercise.

2.8 The dissemination of the findings to a wider audience was a significant factor in influencing improvement in an area of study which had not been given particular priority in recent years, due to the current emphasis within school improvement on literacy, numeracy, and information and communication technology (ICT).

2.9 The schools and CASS face constraints in effecting improvement in science and technology. The constraints include the conflicting demands for time to review the various aspects of the curriculum, the sometimes limited availability of specialist CASS support, and the lack of teacher expertise in the assessment of skill development in science and technology. These constraints need to be overcome if continued development in the science and technology area of study is to be maintained.

3. BACKGROUND TO THE KEY FINDINGS OF THE FOLLOW-UP TO THE PRIMARY SCIENCE AND TECHNOLOGY SURVEY 2001-2002

3.1 In preparation for the follow-up work, all of the schools visited during the survey were asked to complete a questionnaire about those aspects of the survey which had enabled them to bring about improvement. Approximately two-thirds of the schools completed the questionnaire. One-third of the schools in the original survey were then identified in a random sample and re-visited by members of the survey team, in order to evaluate the progress made following the survey; follow-up reports were issued to all of these schools.

3.2 KEY FINDINGS BASED ON SELF-EVALUATION BY THE SURVEY SCHOOLS

3.2.1 All of the survey schools were asked by the Inspectorate to complete a written evaluation of the progress which they felt they had made as a result of the survey and, as indicated in paragraph 3.1, approximately two-thirds of the survey schools responded to the written questionnaire. All of the responses received indicated that the survey visits had been helpful in setting an agenda for improvement in the work in science and technology, and all confirmed that the discussions with the inspectors had been of professional value to the staff. In the vast majority of the responses there was a clear indication that, in the view of the principals, the work in the area of study had improved as a result of the survey visits. A number of principals recorded their appreciation that the good work within the area of study had been recognised and acknowledged by the inspectors, and indicated that teachers were encouraged by the comments made about their work. In most instances, the survey findings reported to individual schools confirmed the high standards of teaching and learning in science and technology.

3.2.2 In their responses to the written questionnaires, the schools indicated improvement in key areas of their work; many of these were similar to those noted by the Inspectorate during the follow-up visits to the schools. The most significant improvements identified by the schools included:

- improved planning for the development of skills particularly in relation to Attainment Target 1 (AT1);
- increased opportunities for the children to engage in investigative work;
- the introduction of recording strategies which enabled the children to record independently and to develop their own initiative;
- a greater awareness of the need for a balance between theoretical and practical work in key stage (KS) 2;
- the revision of whole-school planning to take account of the issues raised;
- more effective development of the children's competence in ICT within science and technology;
- more attention given to technology and design within the science and technology programme;
- more opportunities given to the children for independent writing and for oral work;
- the provision of additional books and resources to extend the children's learning in science and technology;
- the development of new approaches to monitor the children's progress and standards in the area of study;
- improved links between science and technology and other areas of the curriculum; and
- the professional development and improved confidence of the teachers;

3.3 KEY FINDINGS OF THE INSPECTORATE DURING THE FOLLOW-UP TO THE SURVEY

3.3.1 During the follow-up visits, it was found that the vast majority of the schools had taken account of the issues raised during the survey, and had made significant progress in dealing with the areas identified for improvement. A very few schools had been unable to address the issues raised during the survey as they had been dealing with other curricular priorities, or there had been changes in senior staff. In all of these schools, however, science and technology had been placed within the school development plan to be addressed at a future date.

3.3.2 During the follow-up visits, the inspectors were encouraged by the willingness of principals and teachers to discuss the positive effect of the survey, and by the work which had been undertaken to address the associated issues within the schools. The professional dialogue between the Inspectorate, the staff in schools and members of CASS was a key, influential feature of the work undertaken during the survey. The improvements noted by the Inspectorate correspond closely with those noted by the schools through the process of self-evaluation. The most significant improvements identified by the Inspectorate in almost all of the schools included:

- improved independent writing and recording skills in science and technology lessons;
- the children displaying more independence and willingness to take initiative;
- more effective progression and coherence in the development of the children's investigative and experimental skills;
- better use of ICT to support and enhance learning and teaching in science and technology;
- improved links between the work in science and technology and other areas of the curriculum; and
- the more effective identification by teachers of the intended learning outcomes in science and technology lessons.

3.3.3 The following improvements were noted by the Inspectorate in most of the schools:

- more effective monitoring of the science and technology programmes and of the standards of the children's work;
- a more appropriate balance between theoretical and practical work in the children's learning experiences in years 6 and 7;
- more regular opportunities for the children to undertake work in technology and design, thereby enhance their skills of designing and making;

4. CASE STUDIES (SCHOOLS)

4.1 The following case studies from schools are quoted to indicate the value of the Inspectorate survey in helping to bring about improvement.

CASE STUDY 1: The extent of improvement in one school in response to issues identified during the survey.

The survey visit identified the following areas for improvement:

- **the co-ordination of the subject, including the monitoring and evaluation of the quality of teaching and learning and the standards achieved by the children;**
- **the progressive development of the children's independent writing skills in science and technology;**
- **the provision of opportunities for the children to develop their technology skills and knowledge**

The questionnaire response from the school (see below) indicates the extent of the work undertaken to address the issues raised.

'Science and technology co-ordinator appointed in June 2001. Scheme of work re-written to ensure continuity, progression, independent writing opportunities, technology and investigations. Whole day course organised to familiarise staff with developments and new half-termly notes. Advice and ideas given to increase independent writing in science and technology; practical technology workshop to enable staff to experience the technology challenges their year levels could undertake. Advice given on the organisation of classroom during technology and science investigations. Children's science books moderated termly and evidence of many of these issues being addressed positively at each year level.'

'Independent writing - There is evidence of the use of writing frames but also awareness that not all children require or benefit from a writing frame and instead benefit from organising their own writing independently.'

'Technology - One challenge per term at each year level has been achieved this year. Technology activities have been well implemented and classroom organisational issues resolved. Children thoroughly enjoyed this aspect of applied science and the staff are working towards making these activities more open ended.'

'Investigations - each class has been set the target of completing one investigation per term. Teachers have experienced some difficulty encouraging children to develop their own ideas independent of them. This is, to some extent, due to lack of experience of this type of activity. ELB science support requested.'

'Science Year funding accessed (£500) for a Technology Challenge Day for the whole school in the summer term.'

'Co-ordinator has become a member of the ELB Science Panel.'

Following a general inspection of the school in January 2002, the comments below were included in the inspection report:

'There is much good work in the science and technology area of study; the science co-ordinator and the teachers have made effective use of the findings of a science survey conducted by the Education and Training Inspectorate (the Inspectorate) in the previous academic year. There is a good balance between practical and theoretical work; the children enjoy the first hand experiences of scientific phenomena and are provided with good opportunities to record their work in their own words. Much of the written work produced by the children is of high quality. Open-ended investigative work that allows the children to explore their own ideas and develop independent learning skills is also being introduced in a systematic and progressive manner and there are appropriate opportunities for learning in technology and design.'

4.2 In a significant minority of the survey schools, no significant areas were identified for improvement. In the questionnaire returns, however, it was evident that, even in these schools, the science and technology area of study had been reviewed and developed as a result of the survey.

CASE STUDY 2: A school where no significant issues had been identified during the survey.

The principal wrote in the questionnaire return:

'The report of the survey stated that there were no significant areas identified as being in need of improvement, however, the survey did raise some issues regarding the implementation of the school's policy and these are being addressed in the following ways:

- *the scheme of work has been reviewed and re-organised to ensure that topics are taught to a level suited to the children's ability and work is appropriately challenging;*
- *ICT and science are being developed through NOF ICT training.'*

5. RESPONSE FROM THE CURRICULUM ADVISORY AND SUPPORT SERVICE (CASS)

5.1 Most of the schools had requested, and received, some help from CASS officers and, in a number of instances, the good quality of this support had been a significant feature in helping the schools to bring about improvement in response to the survey findings. The work undertaken by the CASS in one Education and Library Board (ELB) area is set out below as a case study, in order to show the importance of well-targeted support in helping to bring about improvement.

CASE STUDY OF SUPPORT PROVIDED BY CASS IN ONE ELB AREA

In one ELB area the CASS science support staff made a particular and determined effort to help the survey schools address the issues raised and to provide appropriate support. This dedicated support made a significant contribution to the progress which the schools were able to make in the year following the survey.

One principal in the area wrote as part of her evaluation of the outcomes of the survey:

'The principal and science co-ordinator have liaised closely with CASS support to facilitate the staff development of technology. An action plan has been drawn up and implementation of such will be carried out and completed by the summer term (2002). A feature of the support has been team teaching and staff in-service training. Any resource implications will be addressed before the end of term.'

In the view of the Inspectorate, advice provided by CASS support officers following the initial survey visits has been excellent. The CASS officer visited each school after the survey, provided appropriate advice and school-based support.

It is a notable feature of the work of the ELB officers that they have adopted a 'quality assurance approach' to assessing the impact of their work and that, in their view, the children's work contains the actual first-hand evidence for improving standards. The Inspectorate working in the ELB area reported as follows:

'The CASS officers have provided excellent support to schools following the Survey on Primary Science and Technology. In providing advice which was well-focused on the priorities identified, they adopted a range of self-evaluative approaches to assess effectively the impact of their support on classroom practice.'

It has also been noted by inspectors working in the ELB area that there has been a 'spill over' effect into a number of other schools in the board area and that the survey has had significant impact on improving work in primary science and technology.

5.2 In all of the other ELB areas, the profile of primary science and technology has been raised as a result of the survey and, in general, most of the survey schools had effective support from CASS. Throughout the period of the survey, and during the follow-up, the CASS officers from all of the ELBs were supportive of the schools, and worked co-operatively with the Inspectorate in order to bring about improvement. In some ELB areas, however, there is insufficient specialist support available to the schools to help them with curriculum and staff development in science and technology.

6. DISSEMINATION OF THE FINDINGS OF THE SURVEY AND IMPLICATIONS FOR PROMOTING IMPROVEMENT

6.1 Following the publication of the survey report in 2001, a series of afternoon meetings was arranged across Northern Ireland in order to disseminate the findings of the survey report; the meetings were organised jointly by the members of the survey team, and CASS officers from each of the five ELBs. The purpose of the meetings was to raise awareness in all of the primary schools across Northern Ireland of the quality of science and technology education as recorded in the survey report, and to help schools to move forward on the areas for improvement identified.

6.2 The meetings took the form of a presentation by members of the Inspectorate on the findings of the survey. This was followed by a presentation by the CASS officers, indicating how schools might address some of the issues in the report; an open forum then allowed for questions and answers. The presentations were prepared jointly by the Inspectorate and CASS, and were on the theme of 'Making a Difference.'

6.3 The strengths of the approach adopted in relation to the dissemination of the survey findings are set out below:

- i. The joint work between the Inspectorate and CASS was useful in that ideas were shared about the needs of schools in relation to the findings of the survey report, and it was important for the teachers to be aware that the Inspectorate and CASS were working together to promote improvement for the benefit of the children and the schools.
- ii. At a practical level, the planning and delivery of the series of meetings, allowed the Inspectorate and the CASS officers to establish an effective network of contacts amongst those directly involved with the area of study.
- iii. The dissemination of the findings in a series of open meetings helped to raise awareness of the importance of the issues identified, and also gave the opportunity for the Inspectorate to give public recognition to the very good work in science and technology observed during the survey.
- iv. The dissemination meetings helped to strengthen the inter-board approach to addressing issues in science and technology;

6.4 During the survey and the follow-up work the inspectors became aware that the primary schools in Northern Ireland face a number of constraints in bringing about improvement in the science and technology area of study. The following points were noted.

- i. There is particular pressure in primary schools in dealing with the demands of school improvement initiatives in literacy, numeracy and ICT; consequently, there is often too little time to devote to other areas of the curriculum.

- ii. Schools in two Education and Library Board areas have had very limited specialist CASS support in science and technology in recent years due to priorities in other curriculum areas; the survey has indicated that there is an ongoing need for CASS support for primary schools in science and technology.
- iii. There are concerns in the primary schools about the assessment of skill development in science and technology; primary teachers have not had the opportunity to reflect adequately on this important aspect of the work, nor to engage in in-service training which would help them to assess, more effectively, skill development in the area of study.

7. CONCLUSION

7.1 The follow-up visits to the schools and the dissemination exercise have enabled the inspection team to use the findings of the original survey report to good effect to help promote improvement. The visits have also enabled the inspectors to become more aware of issues facing the schools as they respond to the areas for improvement identified in the survey report.

7.2 In their efforts to promote improvement, the work of the survey team has contributed much to raising the profile of the science and technology area of study in the primary sector; they have worked with individual schools to help identify areas for improvement and by working in co-operation with CASS officers have disseminated the findings of the survey to a wider audience of interested professionals. It is encouraging for the members of the survey team to note the significant improvements in the work across the vast majority of the schools and to hear the encouraging remarks of the teachers about the enhanced provision for the children.

7.3 The members of the survey team also recognise the significant contribution of the principals, science and technology co-ordinators, class teachers and CASS officers and their determined efforts to bringing about improvement. The most important outcomes of all, however, are the enhanced enjoyment and enthusiasm of the children for learning in science and technology, and the improved standards of their work.

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