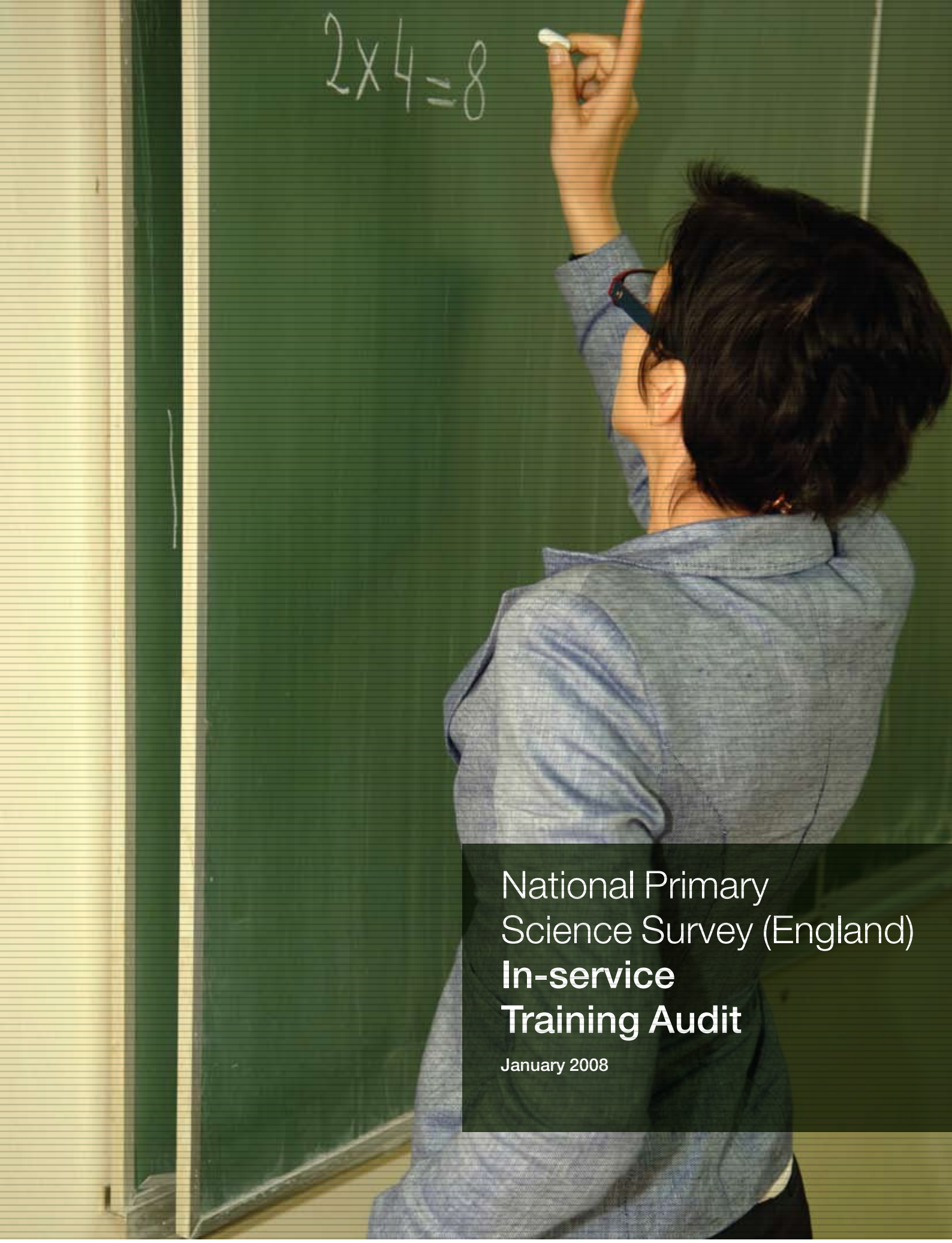

National Primary Science Survey (England)
In-service Training Audit

January 2008

BISHOP GROSSETESTE UNIVERSITY COLLEGE LINCOLN
our tradition - your future

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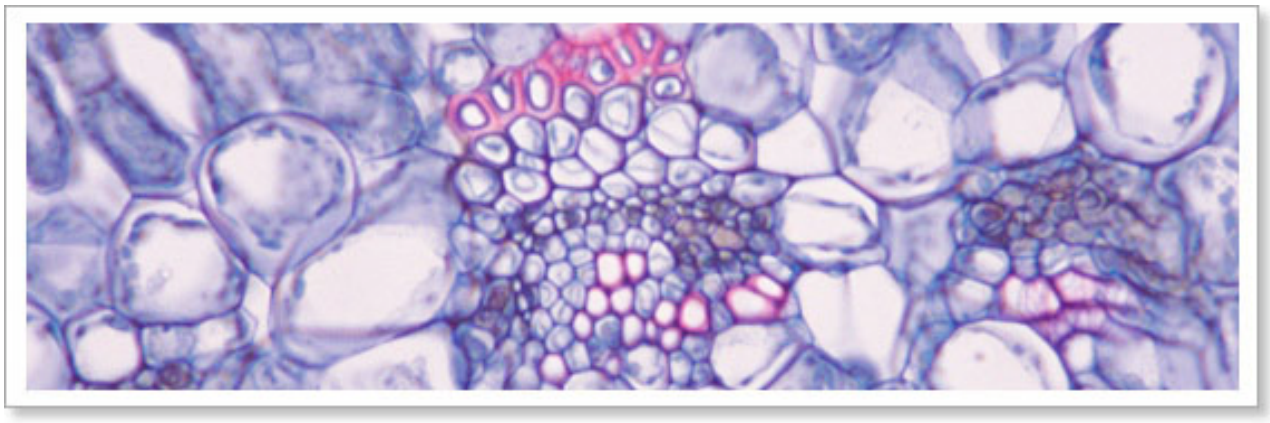
National Primary Science Survey (England)



In-service Training Audit
A Report Prepared for the Wellcome Trust

Rebecca C. Hopkin and John G. Sharp

January 2008

Foreword

The preliminary report of the National Primary Science Survey (England), or NPSS, presented information concerning self-perceptions of National Curriculum science from primary head teachers, science co-ordinators and class teachers across a number of geographically diverse regions of the country. The aim of the report was to identify for discussion or further research any matters of interest arising from the survey, to contribute to the development of science education provision and policy as a whole, and to inform science education debate at the highest level. The project itself, while directed from and funded by the School of Culture, Education and Innovation at Bishop Grosseteste University College Lincoln, was a collaborative venture involving science educators and the Initial Teacher Training partnership clusters attached to five other major Higher Education Institutions. This NPSS In-service Training Audit was commissioned by the Wellcome Trust and presents a comprehensive and more detailed analysis of the NPSS data pertaining specifically to in-service training issues.

The NPSS project team:

John G. Sharp (Director), Bishop Grosseteste University College Lincoln
Rebecca C. Hopkin (Researcher), Bishop Grosseteste University College Lincoln
Sarah James, University of Hull
Graham Peacock, Sheffield Hallam University
Lois Kelly, Liverpool Hope University
Dan Davis, Bath Spa University
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For further information about the NPSS, visit the NPSS home page at www.bishopg.ac.uk and follow the links to Research and Current Projects.

Contents

Introduction

The National Primary Science Survey (England), or NPSS, directed from and funded by the School of Culture, Education and Innovation at Bishop Grosseteste University College Lincoln, was undertaken to replicate, in part, update and extend similar work conducted by the Leverhulme Primary Project team based at the University of Exeter between 1989 and 1993 (Wragg *et al.* 1989; Bennett *et al.* 1992; Carré and Carter 1990, 1993), the work of Pell and Jarvis (2003) and the Primary Horizons Project supported by the Wellcome Trust (Murphy *et al.* 2005). Extension was achieved using a modified science implementation instrument developed by Dr Brian Lewthwaite at the University of Manitoba in Canada (Lewthwaite 2005; Lewthwaite and Fisher 2004, 2005).

During the data collection phase, which ran from September 2006 to June 2007, 600 primary schools were sampled at random across the Initial Teacher Training partnership clusters of six participating Higher Education Institutions. These included Bishop Grosseteste University College Lincoln, the University of Hull, Sheffield Hallam University, Liverpool Hope University, Bath Spa University and the University of Exeter. Selected partnership schools were each provided with a pack of 5 NPSS questionnaires in anticipation that the head teacher, science co-ordinator and at least one class teacher would respond. Overall, 303 fully completed questionnaires were returned from 206 schools (34.3% school response rate and 16.8% participant response rate). Response rates varied by region, with the Lincoln cluster providing 97 completed questionnaires from 65 schools (highest) and the Bath cluster 23 completed questionnaires from 14 schools (lowest). Quantitative data obtained on nominal and ordinal scales from the questionnaires were analysed using nonparametric statistical techniques, the construction and interrogation of an extensive SPSS (v.15) database taking place between July and August 2007. Qualitative data obtained from the questionnaires were reduced using a simple form of content analysis.

While findings from the NPSS were considered encouraging, with respondents' self-perceived preparation to teach primary science and the capacity of schools to implement and deliver the primary science curriculum both appearing to be in a general state of 'good health', overall analysis and analysis by gender, role in school, teaching experience, school size, science as a curriculum specialism and geographical region drew attention to matters of importance, 'old' and 'new'.

One particular matter of importance identified in the findings of the NPSS surrounded the uptake, availability and accessibility of science in-service training. This NPSS In-service Training Audit, commissioned by the Wellcome Trust, presents a more comprehensive and detailed picture of the NPSS data pertaining specifically to this matter alone. Overall analysis, together with analysis by gender, role in school, teaching experience, school size, science as a curriculum specialism and geographical region, highlight several in-service features which require careful consideration.

Key Findings

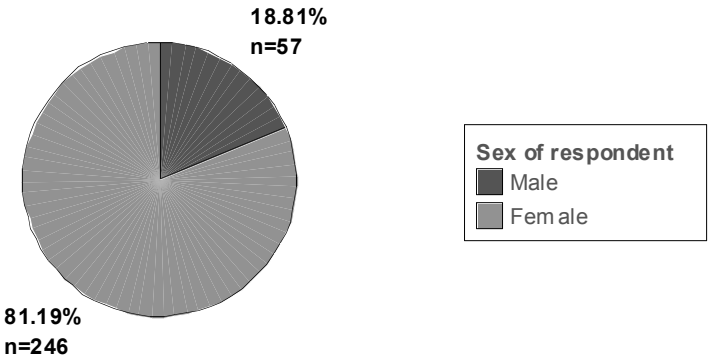
Within the limitations of the overall methodology and sample, key findings from the NPSS In-service Audit are presented as follows:

- Low overall uptake of science in-service training amongst respondents, particularly so at regional Science Learning Centres.
- An absence of consistency and coherency in the provision and uptake of science in-service training.
- Lack of provision or uptake of in-service training directly addressing scientific subject knowledge.
- A disproportionately high uptake of science in-service training amongst science co-ordinators and low uptake amongst class teachers.
- A disproportionately high uptake of science in-service training amongst long-serving respondents, with over 10 years' teaching experience.
- Geographical variation in the content of science in-service training and in the uptake of regional Science Learning Centre in-service training provision.
- Demand amongst respondents for the continued and improved provision of science in-service training.

Section 1: Personal Details of the NPSS Participants

(i) Are you male or female?

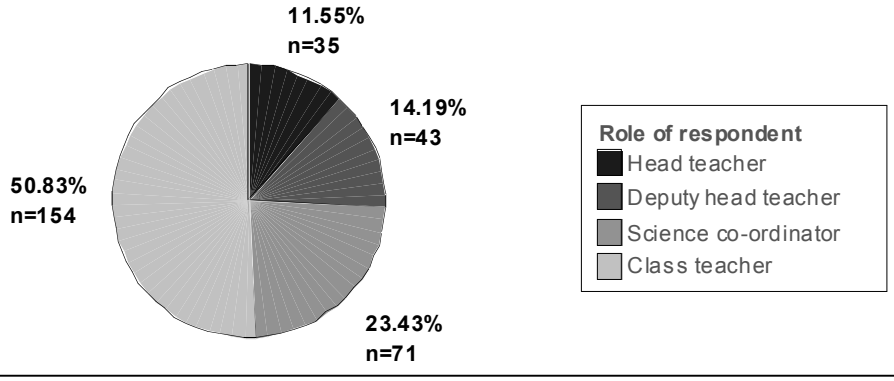
Figure 1.1 Pie chart displaying gender distribution (n=303).



Of the 303 respondents, 57 (18.81%) were male and 246 (81.19%) were female.

(ii) Who are you?

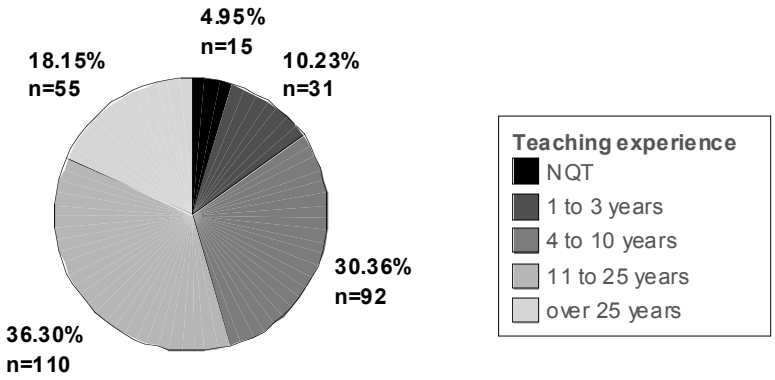
Figure 1.2 Pie chart displaying role distribution (n=303).



Of the 303 respondents, 35 (11.55%) were head teachers, 43 (14.19%) were deputy head teachers, 71 (23.43%) were science co-ordinators and 154 (50.83%) were class teachers. For the purpose of statistical calculation, these were reduced to three categories: all head teachers including non-teaching deputies (n=37, 12.21%), science co-ordinators including science co-ordinating deputies (n=82, 27.06%) and class teachers including teaching deputies (n=184, 60.73%).

(iii) How long have you been teaching?

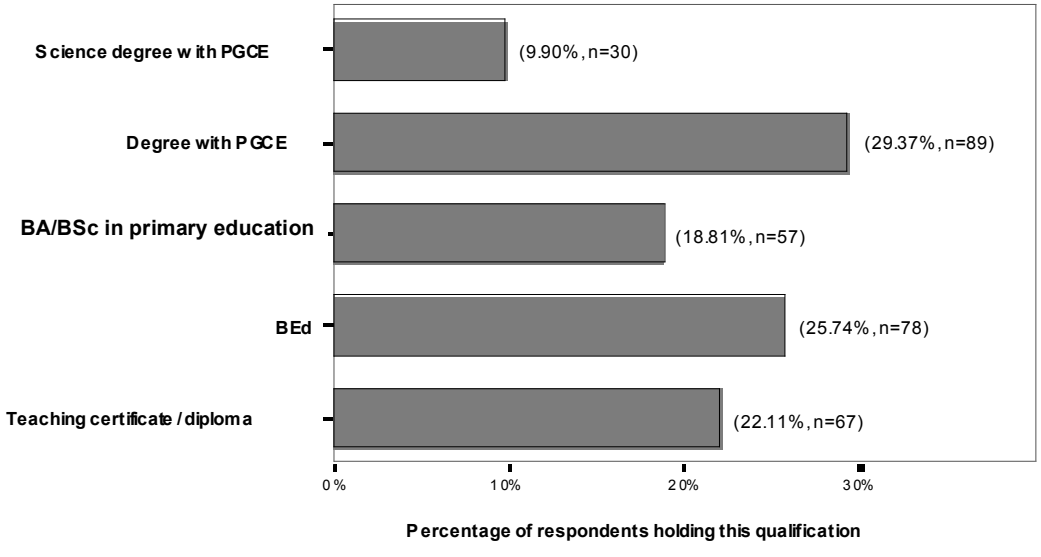
Figure 1.3 Pie chart displaying teaching experience distribution (n=303).



Of the 303 respondents, 15 (4.95%) were newly qualified teachers, 31 (10.23%) had 1 to 3 years of teaching experience, 92 (30.36%) had 4 to 10 years of teaching experience, 110 (36.30%) had 11 to 25 years of teaching experience and 55 (18.15%) had over 25 years of teaching experience. For the purpose of statistical calculation, these were reduced to two categories: teachers with 0 to 10 years' teaching experience (n=149, 49.17%) and teachers with over 10 years' teaching experience (n=154, 50.83%). These categories acknowledge the substantial changes brought about to the initial training and education of teachers in primary science implemented in 1998.

(iv) What teaching qualification(s) do you currently hold?

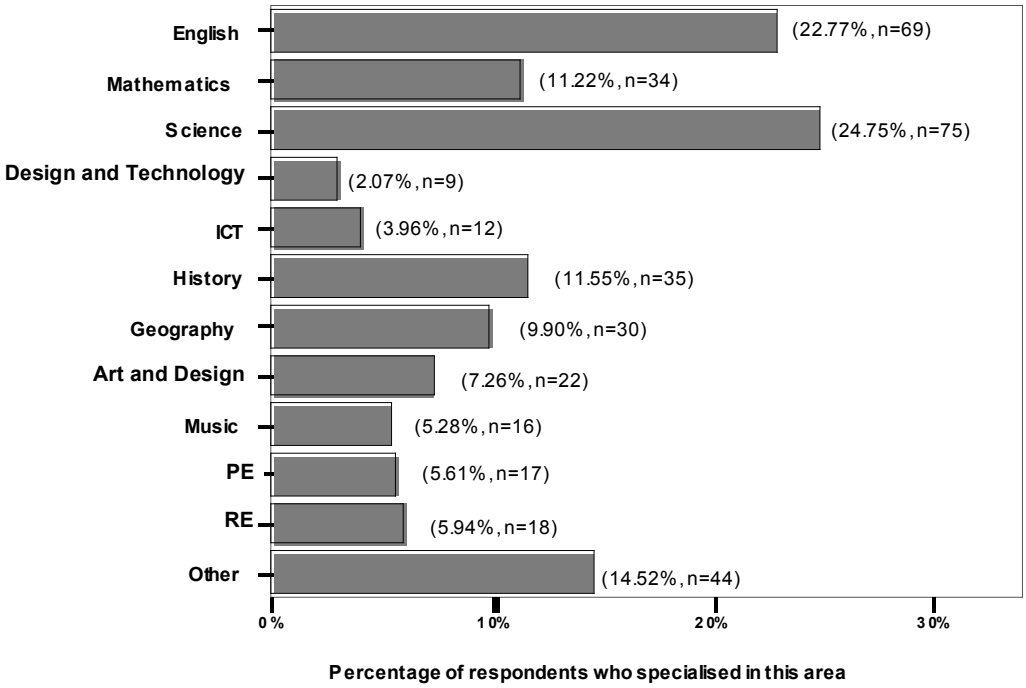
Figure 1.4 Bar chart displaying teaching qualifications of respondents.



Between them, the 303 respondents presented 321 teaching qualifications. 30 (9.90%) held a science degree with PGCE (including one science degree with GTP), 89 (29.37%) held a degree with PGCE (including one degree with GTP), 57 (18.81%) held a BA or BSc in primary education, 78 (25.74%) held a BEd and 67 (21.11%) held a teaching certificate or diploma. 38 (10.6%) respondents indicated that they held other additional qualifications including NPQH (n=12, 3.96%), MEd (n=6, 1.98%) and PhD (n=1, 0.33%).

(v) Which main curriculum area(s) did you specialise in when training?

Figure 1.5 Bar chart displaying areas of curriculum specialism of respondents.

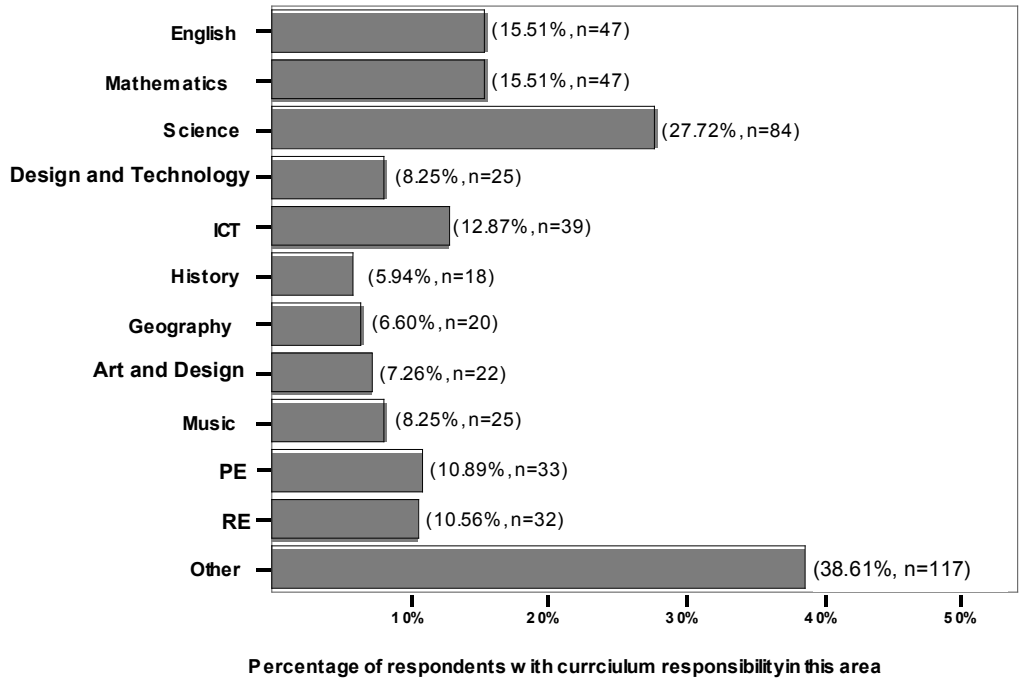


Many respondents indicated that they specialised in more than one curriculum area when training. 69 (22.77%) specialised in English, 34 (11.22%) in mathematics, 75 (24.75%) in science, 9 (2.07%) in design and technology, 12 (3.96%) in ICT, 35 (11.55%) in history, 30 (9.90%) in geography, 22 (7.26%) in art and design, 16 (5.28%) in music, 17 (5.61%) in PE and 18 (5.94%) in RE. 44 (14.52%) respondents indicated that they specialised in areas other than those provided, including, for example, drama (n=3, 0.99%) and French (n=2, 0.66%). 15 (4.95%) indicated that they had not specialised at all. The number of respondents who indicated that they

specialised in science when training greatly exceeded the number who indicated that they held a science degree.

(vi) Which curriculum area(s) are you currently and mainly responsible for across the school?

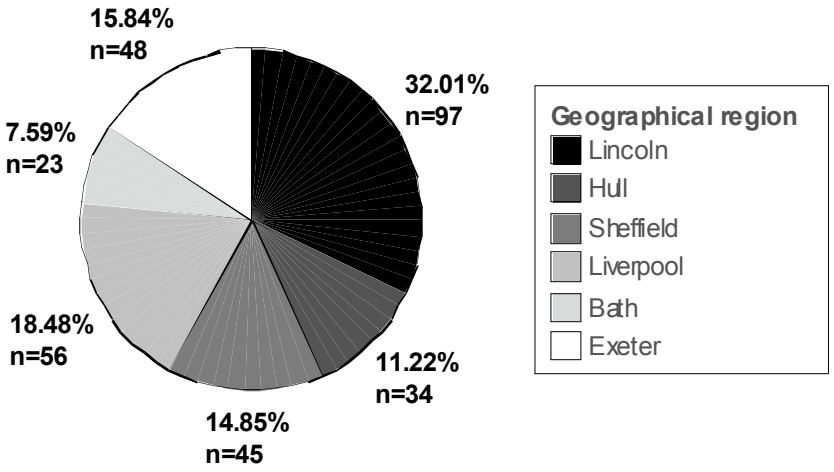
Figure 1.6 Bar chart displaying areas of curriculum responsibility of respondents.



Many respondents indicated that they were responsible for more than one curriculum area. 47 (15.51%) held responsibility for English, 47 (15.51%) for mathematics, 84 (27.72%) for science, 25 (8.25%) for design and technology, 39 (12.87%) for ICT, 18 (5.94%) for history, 20 (6.60%) for geography, 22 (7.26%) for art and design, 25 (8.25%) for music, 33 (10.89%) for PE and 32 (10.56%) for RE. 117 (38.61%) respondents indicated that they were responsible for areas other than those provided, including, for example, PSHE and citizenship (n=34, 11.22%), SEN (n=16, 5.28%), modern foreign languages (n=10, 3.30%), gifted and talented (n=8, 2.64%), the Foundation Stage (n=4, 1.32%) and dance (n=1, 0.33%). 20 (6.60%) indicated that they held no curriculum responsibility at all. The number of respondents who indicated that they were science co-ordinators slightly exceeded the number of respondents who indicated that they had specialised in science when training.

(vii) Which geographical region do you represent?

Figure 1.7 Pie chart displaying geographical distribution (n=303).

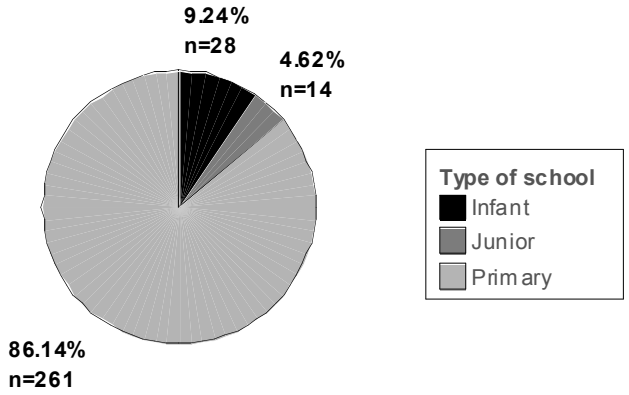


Of the 303 respondents, 97 (32.01%) were located in the Lincoln cluster, 34 (11.22%) the Hull cluster, 45 (14.85%) the Sheffield cluster, 56 (18.48%) the Liverpool cluster, 23 (7.59%) the Bath cluster, and 48 (15.84%) the Exeter cluster.

Section 2: School Details of the NPSS Participants

(viii) Which type of school do you work in?

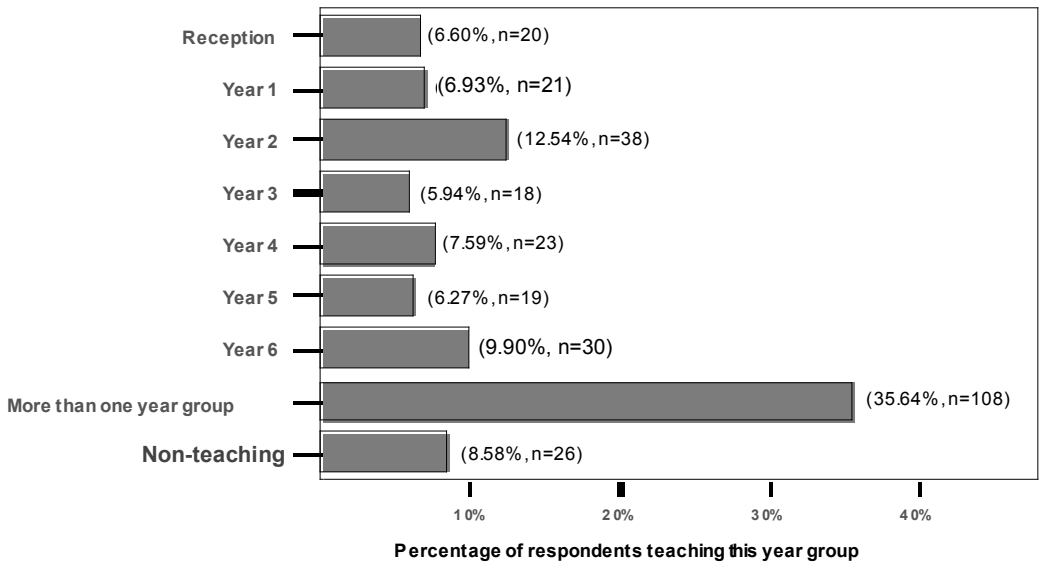
Figure 2.1 Pie chart displaying distribution of school type (n=303).



Of the 303 respondents, 28 (9.24%) worked in infant schools, 14 (4.62%) in junior schools and 261 (86.14%) in primary schools. 5 (1.65%) of these schools were Church of England schools, 1 (0.33%) was a Roman Catholic school and 4 (1.32%) were special schools teaching the National Curriculum at Key Stages 1 and 2.

(ix) Which year group do you currently teach?

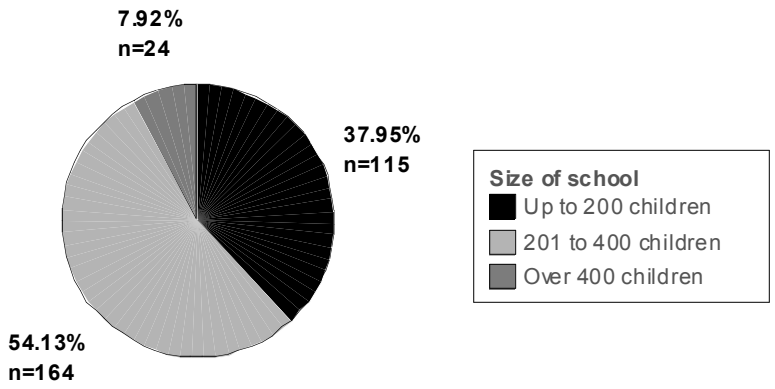
Figure 2.2 Bar chart displaying year group taught by respondents (n=303).



Of the 303 respondents, 20 (6.60%) taught reception, 21 (6.93%) Year 1, 38 (12.54%) Year 2, 18 (5.94%) Year 3, 23 (7.59%) Year 4, 19 (6.27%) Year 5 and 30 (9.9%) Year 6. 108 (35.64%) respondents indicated that they taught more than one year group, including, for example, 11 (3.63%) mixed reception and Year 1 classes, 16 (5.28%) mixed Year 1 and 2 classes, 20 (6.60%) mixed Year 3 and 4 classes and 22 (7.26%) mixed Year 5 and 6 classes. 26 (8.58%) respondents were non-teaching head teachers (including 2 non-teaching deputies).

(x) How big is your school?

Figure 2.3 Pie chart displaying school size distribution (n=303).



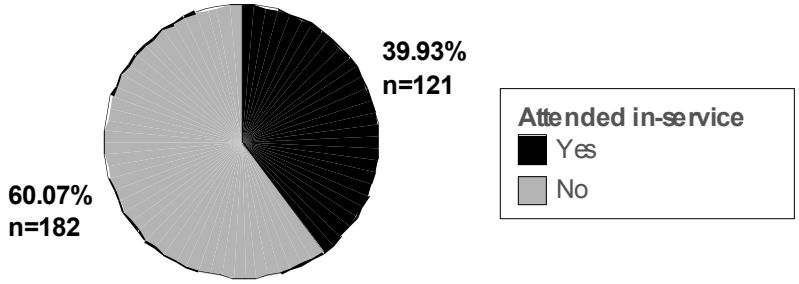
Of the 303 respondents, 115 (37.95%) worked in schools with up to 200 children (small), 164 (54.13%) in schools with 201 to 400 children (intermediate) and 24 (7.92%) in schools with over 400 children (large). For the purpose of statistical calculation, these were reduced to two categories: schools with up to 200 children (n=115, 37.95%) and schools with over 200 children (n=188, 62.05%).

Section 3: In-service Training

(xi) Have you taken advantage of any in-service provision in science organised by your school or local authority within the last 3 years?

(a) Overall

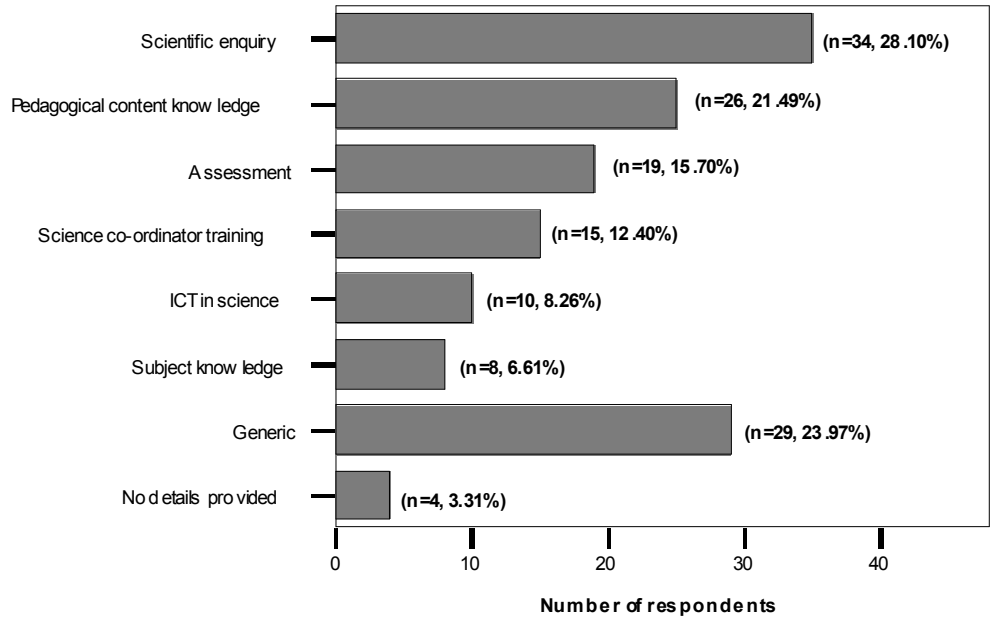
Figure 3.1 Pie chart displaying attendance at school or local authority science in-service training during the last 3 years (n=303).



Of the 303 respondents, 121 (39.93%) had attended science in-service training organised by their school or local authority in the past 3 years but 182 (60.07%) respondents had not.

(b) Qualitative responses

Figure 3.2 Bar chart displaying areas of school or local authority training attended by respondents.



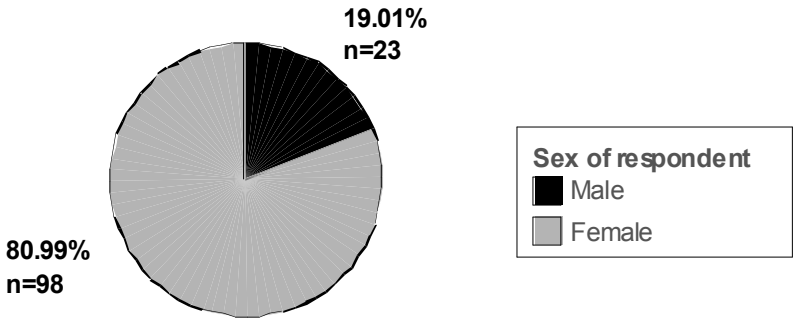
Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, often on more than one occasion, 117 (96.69%) provided additional qualitative details (Appendix 1-a). Content analysis revealed at least eight immediately obvious categories into which all in-service training could be grouped including one for the 4 (3.31%) respondents that gave no specific information. Within most categories, however, the exact nature of the in-service undertaken was often quite diverse. The most common area of science in-service training undertaken, by 34 (28.10%) respondents, involved scientific enquiry. 26 (21.49%) respondents indicated that they had undertaken training in pedagogical content knowledge, including teaching science to gifted and talented children (n=5, 4.13%), preparation for science national tests (n=5, 4.13%), speaking and listening in science (n=3, 2.48%), science in industry (n=3, 2.48%) and concept cartoons (n=2, 1.65%). 19 (15.70%) respondents indicated that they had undertaken training in science assessment, 15 (12.40%) science co-ordinator training, 10 (8.26%) training in the application of ICT in science and 8 (6.61%) training in scientific subject knowledge. The qualitative responses of 29 (23.97%) respondents indicated that they had undertaken science in-service training which could only be described as generic.

Of the 182 respondents who had not attended any science in-service training organised by their school or local authority, 10 (5.49%) stated that they had not been offered the opportunity (Appendix 1-b). Other comments included:

> *"Usually only subject leaders are released to attend."*
> *"… I think science isn't highlighted as much as it was in the past."*
> *"There hasn't been any for early years."*
> *"Very little provided, not a priority!"*

(c) Analysis by gender

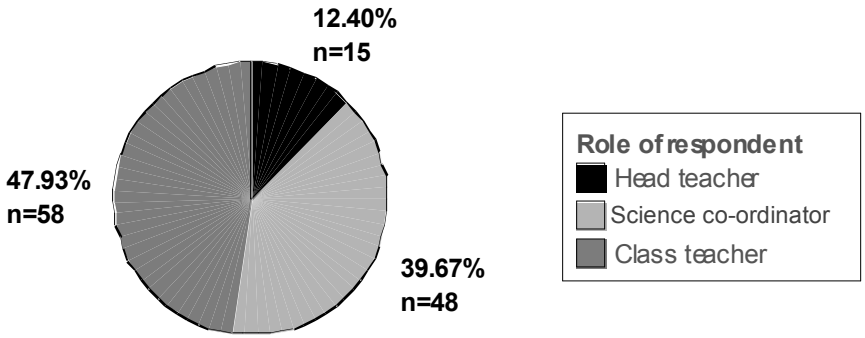
Figure 3.3 Pie chart displaying gender distribution of respondents who had attended school or local authority science in-service training (n=121).



Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, 23 (19.01%) were male and 98 (80.99%) were female. A chi-square goodness-of-fit test indicated that there was no significant difference in the gender distribution of respondents who had attended school or local authority training as compared with the gender distribution of the NPSS sample (χ^2=0.003, *df*=1, *p*=0.953).

(d) Analysis by role in school

Figure 3.4 Pie chart displaying role distribution of participants who had attended school or local authority science in-service training (n=121).

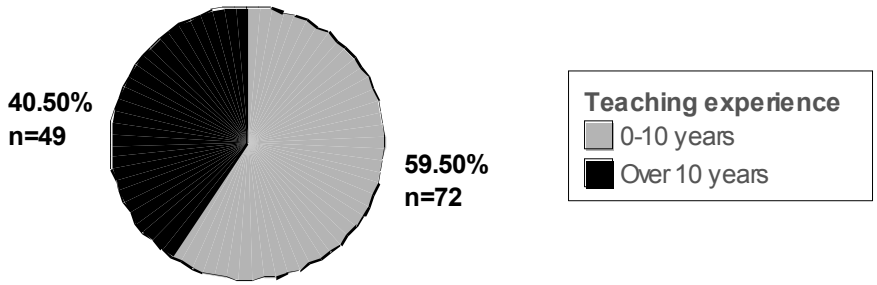


Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, 15 (12.40%) were head teachers, 48 (39.67%) science co-ordinators and 58 (47.93%) class teachers. A chi-square goodness-of-fit test indicated that there was a significant difference in the role distribution of respondents who had attended school or local authority training,

favouring science co-ordinators, as compared with the role distribution of the NPSS sample (χ^2=10.307, *df*=2, *p*=0.006).

(e) Analysis by teaching experience

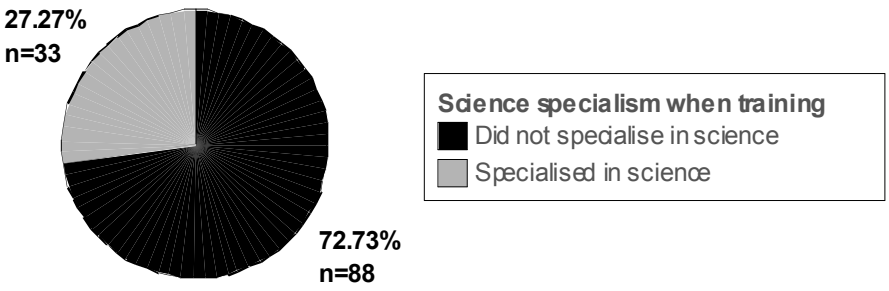
Figure 3.5 Pie chart displaying teaching experience distribution of participants who had attended school or local authority science in-service training (n=121).



Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, 72 (59.50%) had 0 to 10 years' teaching experience and 49 (40.50%) had over 10 years' teaching experience. A chi-square goodness-of-fit test indicated that there was a significant difference in the teaching experience distribution of respondents who had attended school or local authority training, favouring more recently trained respondents, as compared with the teaching experience distribution of the NPSS sample (χ^2=5.140, *df*=1, *p*=0.023).

(f) Analysis by science specialism

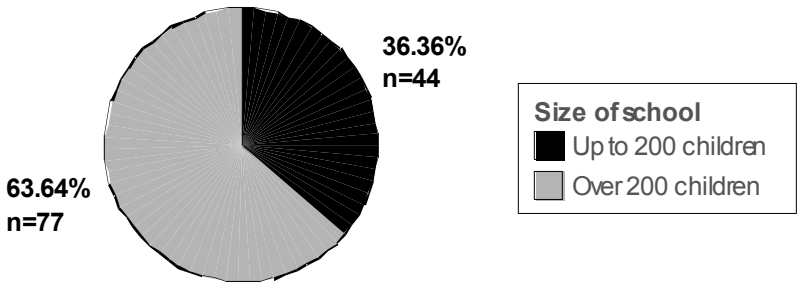
Figure 3.6 Pie chart displaying science specialism distribution of participants who had attended school or local authority science in-service training (n=121).



Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, 88 (72.73%) had specialised in science during training and 33 (27.27%) had not. A chi-square goodness-of-fit test indicated that there was no significant difference in the science specialism distribution of respondents who had attended school or local authority training as compared with the science specialism distribution of the NPSS sample (χ^2=0.397, *df*=1, *p*=0.529).

(g) Analysis by school size

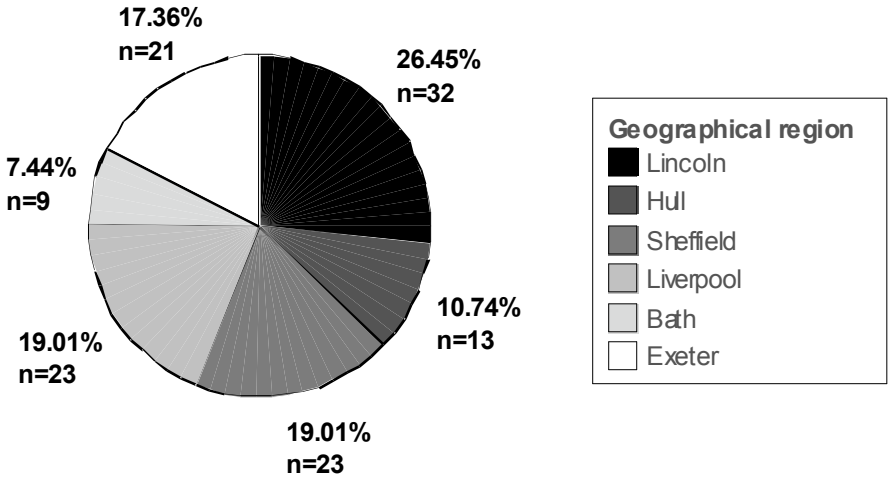
Figure 3.7 Pie chart displaying school size distribution for participants who had attended school or local authority science in-service training (n=121).



Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, 44 (36.36%) worked in schools with up to 200 children and 77 (63.64%) worked in schools with over 200 children. A chi-square goodness-of-fit test indicated that there was no significant difference in the school size distribution for respondents who had attended school or local authority training as compared with the school size distribution of the NPSS sample (χ^2=0.079, *df*=1, *p*=0.779).

(h) Analysis by geographical region

Figure 3.8 Pie chart displaying geographical distribution of participants who had attended school or local authority science in-service training (n=121).

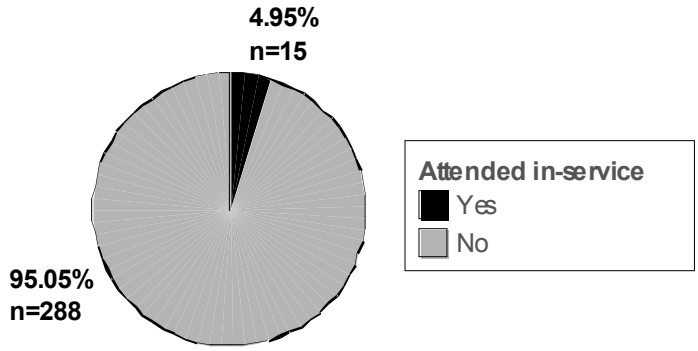


Of the 121 respondents who had attended science in-service training organised by their school or local authority in the past 3 years, 32 (26.45%) were located in the Lincoln cluster, 13 (10.74%) the Hull cluster, 23 (19.01%) the Sheffield cluster, 23 (19.01%) the Liverpool cluster, 9 (7.44%) the Bath cluster and 21 (17.36%) the Exeter cluster. A chi-square goodness-of-fit test indicated that there was no significant difference in the geographical distribution of respondents who had attended school or local authority training as compared with the geographical distribution of the NPSS sample (χ^2=2.766, *df*=5, *p*=0.736).

(xii) Have you taken advantage of any in-service provision in science organised by your regional Science Learning Centre?

(a) Overall

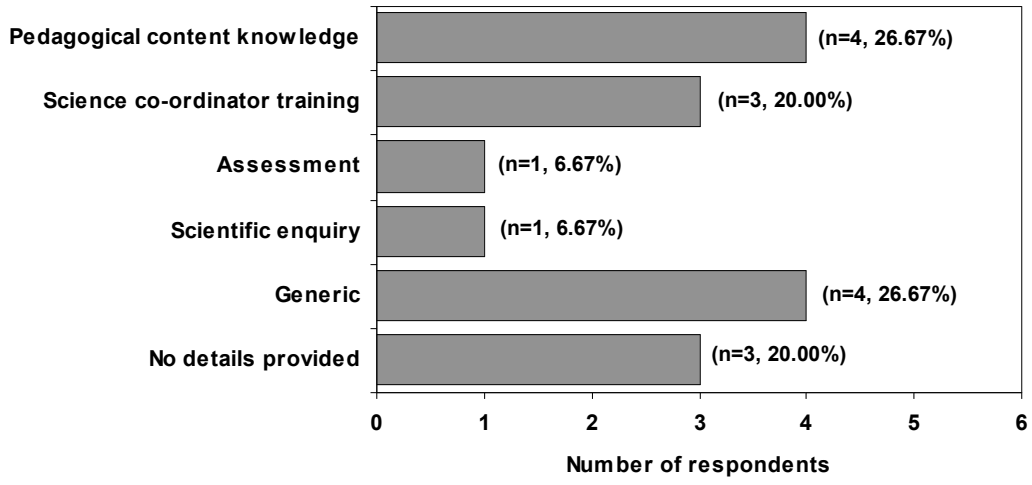
Figure 3.9 Pie chart displaying attendance at regional Science Learning Centre science in-service training (n=303).



Of the 303 respondents, the overwhelming majority (n=288, 95.05%) indicated that they had not attended any in-service training at their regional Science Learning Centre. Only 15 (4.95%) had.

(b) Qualitative responses

Figure 3.10 Bar chart displaying areas of in-service training attended by respondents at their regional Science Learning Centre.



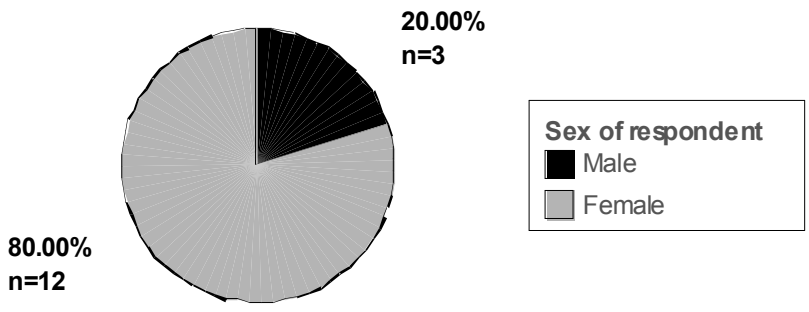
Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, 12 (80%) provided additional qualitative details of this training (Appendix 2-a). One respondent indicated that they had attended more than one regional Science Learning Centre in-service training session. Content analysis revealed at least six immediately obvious categories into which all in-service training could be grouped, including one for the 3 (20.00%) respondents that gave no specific details. 4 (26.67%) respondents indicated that they had undertaken training in pedagogical content knowledge, 3 (20.00%) science co-ordinator training, 1 (6.67%) training in science assessment and 1 (6.67%) training in scientific enquiry. 4 (26.67%) respondents indicated that they had undertaken generic science in-service training but did not elaborate on any specific focus.

Of the 288 respondents who had not attended in-service training at their regional Science Learning Centre, 28 (9.72%) provided additional qualitative responses indicating why (Appendix 2-b). 21 (7.29%) respondents were entirely unaware of their regional Science Learning Centre's existence, 5 (1.74%) stated that the training was too expensive, 1 (0.35%) pointed out that the travelling distance was too far and 1 (0.35%) wrote that there had been no opportunity for them to attend the training. Comments included:

"I don't know where or what the regional Science Learning Centre is."
"I have no details of training at a regional Science Learning Centre."
"Training is too expensive for our small school."
"Don't have one."
"Too far away from home."

(c) Analysis by gender

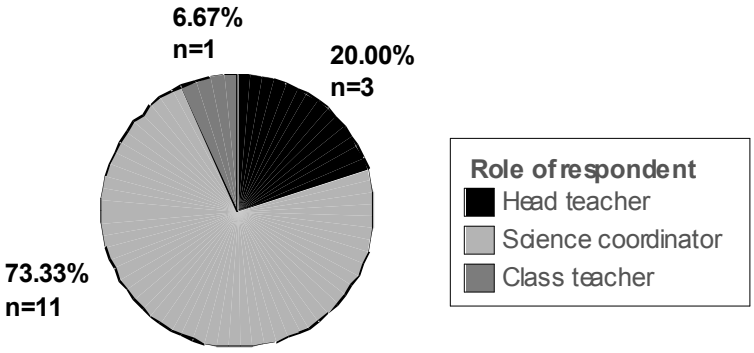
Figure 3.11 Pie chart displaying gender distribution of participants who had attended regional Science Learning Centre in-service training (n=15).



Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, 3 (20.00%) were male and 12 (80.00%) were female, closely reflecting the gender distribution of the NPSS sample.

(d) Analysis by role in school

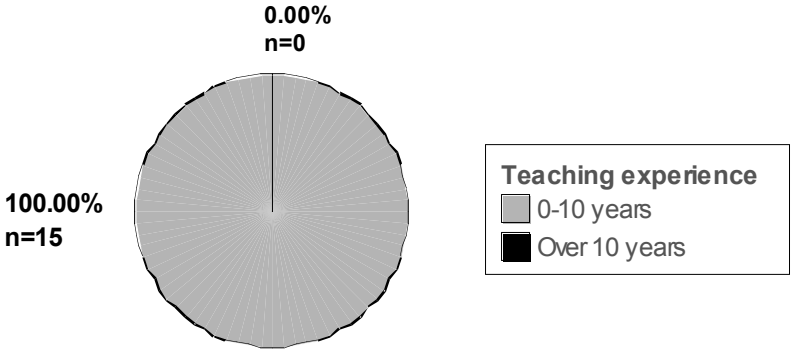
Figure 3.12 Pie chart displaying role distribution of participants who had attended regional Science Learning Centre in-service training (n=15).



Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, 3 (20.00%) were head teachers, 11 (73.33%) were science co-ordinators and 1 (6.67%) was a class teacher. A disproportionately high number of science co-ordinators and low number of class teachers had attended regional Science Learning Centre science in-service training, as compared with the role distribution of the NPSS sample.

(e) Analysis by teaching experience

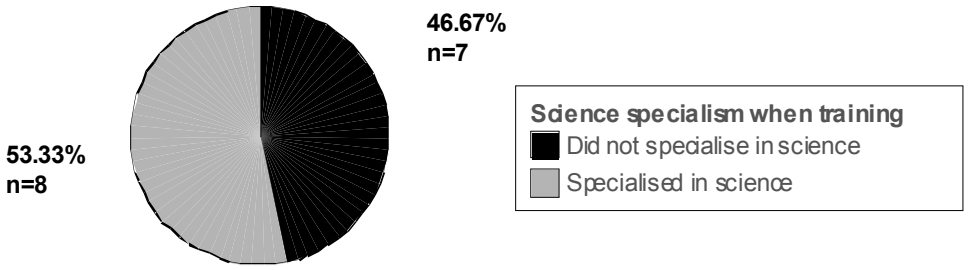
Figure 3.13 Pie chart displaying teaching experience distribution of participants who had attended regional Science Learning Centre in-service training (n=15).



Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, all 15 (100.00%) had 0 to 10 years' teaching experience and 0 (0.00%) had over 10 years' teaching experience. A disproportionately high number of respondents with 0 to 10 years' teaching experience had attended regional Science Learning Centre science in-service training, as compared with the teaching experience distribution of the NPSS sample.

(f) Analysis by science specialism

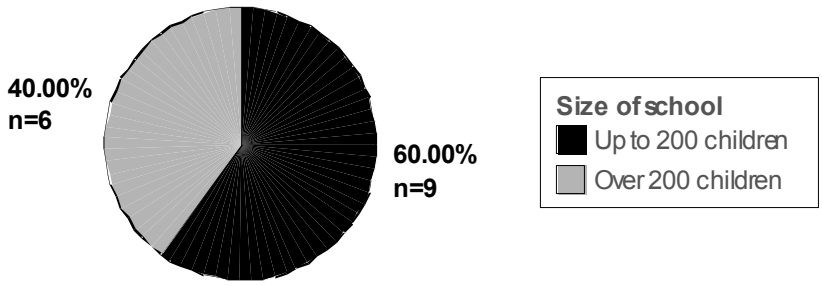
Figure 3.14 Pie chart displaying science specialism distribution of participants who had attended regional Science Learning Centre in-service training (n=15).



Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, 7 (46.67%) had specialised in science during training and 8 (53.33%) had not. A disproportionately high number of science specialists and low number of non-science specialists had attended regional Science Learning Centre science in-service training, as compared with the science specialism distribution of the NPSS sample.

(g) Analysis by school size

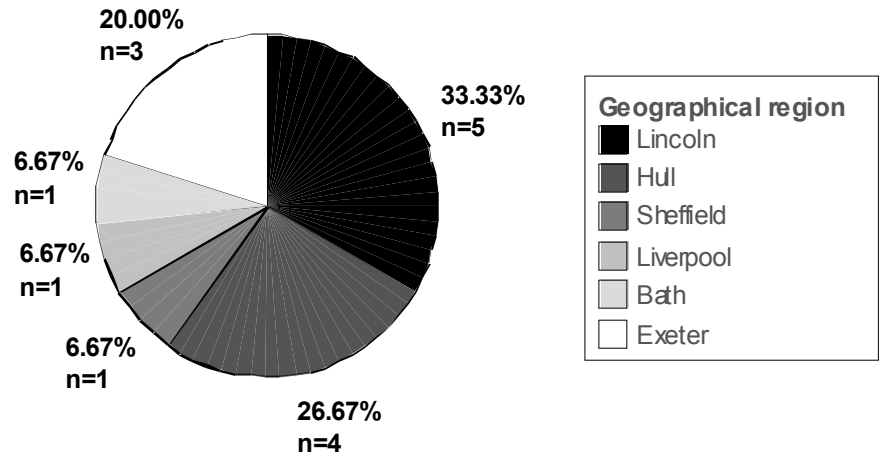
Figure 3.15 Pie chart displaying school size distribution for participants who had attended regional Science Learning Centre in-service training (n=15).



Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, 9 (60.00%) worked in schools with up to 200 children and 6 (40.00%) worked in schools with over 200 children. A disproportionately high number of respondents from schools with up to 200 children and low number of respondents from schools with over 200 children had attended regional Science Learning Centre science in-service training, as compared with the school size distribution for the NPSS sample.

(h) Analysis by geographical region

Figure 3.16 Pie chart displaying geographical distribution of participants who had attended regional Science Learning Centre in-service training (n=15).



Of the 15 respondents who had attended in-service training at their regional Science Learning Centre, 5 (33.33%) were located in the Lincoln cluster, 4 (26.67%) the Hull cluster, 1 (6.67%) the Sheffield cluster, 1 (6.67%) the Liverpool cluster, 1 (6.67%) the Bath cluster and 3 (20.00%) the Exeter cluster. A disproportionately high number of respondents in the Hull cluster and low numbers in the Sheffield and Liverpool clusters had attended regional Science Learning Centre science in-service training, as compared with the geographical distribution of the NPSS sample.

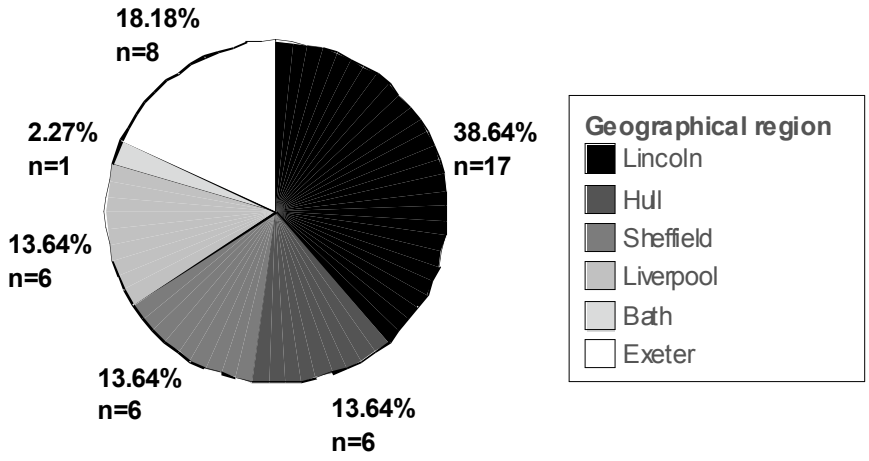
(xiii) What would you do to improve the quality of science education provision?

(a) At your school

Of the 303 respondents in the NPSS sample, 245 (80.86%) offered a response indicating how they felt the quality of science education provision could be improved within their school. Areas for improvement fell into five main categories (in order of priority): resources, training, pedagogical practices, time and curriculum content. A total of 44 (14.52%) respondents indicated that the improved provision of science in-service training within their school was of fundamental importance (Appendix 3-a). Comments included:

"Ensure staff are adequately trained in all areas."
"INSET training on outlined areas of weakness (identified by school)."
"Provide more local courses and INSET to improve confidence and knowledge."
"Offer more science training to make staff aware of new developments."
"Provide money for more training for less confident staff."
"Find course available for staff training not just co-ordinator."
"Greater opportunities for in-service training – extended courses (like the older golden days of teaching)."
"We would value input and support from an advisor from within our county."
"Retrain, offer courses, have time to team-teach in order to support staff who have near zero confidence in their knowledge, ability and wish to teach primary science."
"As science co-ordinator I have been on many courses. There is little or no time for feedback or evaluation and implementation. This needs to be done, to get the best value from the course."

Figure 3.17 Pie chart displaying the geographical distribution of respondents who highlighted in-service training as a key area for school improvement (n=44).



Of the 44 respondents who highlighted in-service training as a key area for improvement within their school, 17 (38.64%) were located in the Lincoln geographical cluster, 6 (13.64%) the Hull cluster, 6 (13.64%) the Sheffield cluster, 6 (13.64%) the Liverpool cluster, 1 (2.27%) the Bath cluster and 8 (18.18%) the Exeter cluster. A disproportionately high number of respondents in the Lincoln cluster and low number in the Bath cluster highlighted in-service training as a key area for school improvement, as compared with the geographical distribution of the NPSS sample.

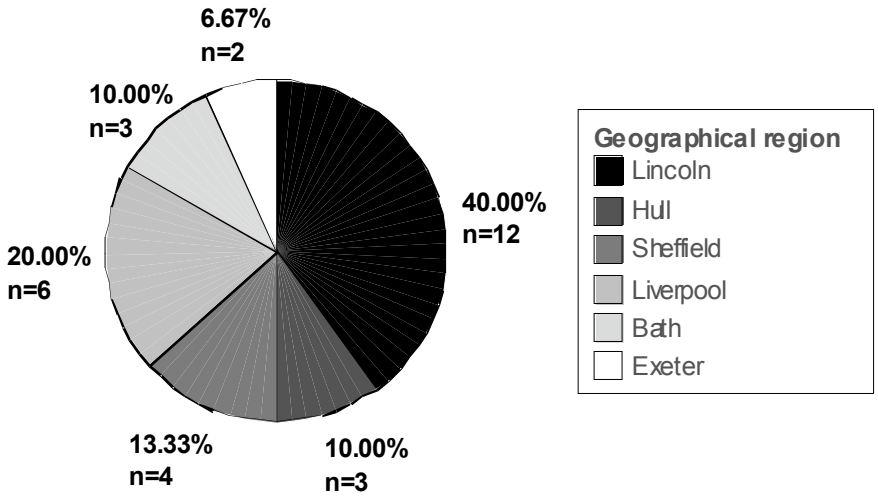
(b) Nationally

Of the 303 respondents in the NPSS sample, 172 (56.77%) offered a response indicating how they felt the quality of science education provision could be improved nationally. Areas for improvement fell into eight main categories (in order of priority): training, pedagogical practices, funding, national testing, National Curriculum content, the status of science, resources and time. A total of 30 (9.90%) respondents indicated that the improved provision of national science in-service training was of fundamental importance (Appendix 3-b). Comments included:

"Regular, free, in-service provision within schools to keep knowledge up to date."
"Train teachers in delivering science in a more exciting/creative way."
"Provide more courses for co-ordinators."
"Further training for all teachers and teaching assistants."
"Lower the cost of training at SLCs for all teachers."

"Train science co-ordinators so they are more confident. Encourage science specialists into primary education."
"Teachers should be trained to assess the children on their scientific ability in enquiry and investigation. Teachers are trained for the Year 2 science SATs, why not Year 6 teachers."

Figure 3.18 Pie chart displaying the geographical distribution of respondents who highlighted in-service training as a key area for national improvement (n=44).



Of the 30 respondents who highlighted in-service training as a key area for national improvement, 12 (40.00%) were located in the Lincoln cluster, 3 (10.00%) the Hull cluster, 4 (13.33%) the Sheffield cluster, 6 (20.00%) the Liverpool cluster, 3 (10.00%) the Bath cluster and 2 (6.67%) the Exeter cluster. A disproportionately high number of respondents in the Lincoln cluster and low number in the Exeter cluster highlighted in-service training as a key area for school improvement, as compared with the geographical distribution of the NPSS sample.

Section 4: Matters Arising

Within the limitations of the overall design, methodology, sample and sub-sample size and means of data analysis employed, findings from the NPSS In-service Audit revealed several features which require careful consideration and attention. Some of the more important are presented as follows.

- The overall uptake of science in-service training among respondents over the last 3 years was less than might have been hoped for, particularly so at regional Science Learning Centres. The overall uptake of in-service training remains problematic with respondents alluding to issues over awareness, accessibility and affordability.
- Content analysis for the 121 (39.93%) respondents who had attended in-service training organised by their school or local authority in the past three years revealed at least eight immediately obvious categories into which all in-service training could be grouped (including one category for the respondents that gave no specific details). Fewer, but broadly similar, categories were identified for the 15 (4.95%) respondents who had attended in-service training at a regional Science Learning Centre. The most frequent area of science in-service training undertaken by most respondents across all regions was scientific enquiry, the least, subject knowledge (see Table 4.1). Within all categories, however, the nature of in-service provision or uptake was actually quite diverse with some clearly opportunistic rather than planned. The apparent lack of consistency and coherency in the provision or uptake of training, in the absence of any clearly articulated regional or national strategy, is perhaps problematic with the 'push-pull' economics of supply and demand certainly requiring investigation.
- The prevalence of provision or uptake in scientific enquiry followed closely by pedagogical content knowledge is a positive finding. However, the lack of provision or uptake in subject knowledge is worrying. How scientific enquiry, pedagogical content knowledge and subject knowledge might best be integrated, their integration being widely acknowledged as enhancing

curricular expertise which in turn leads to effective science teaching and learning, has never been fully resolved. Context and meaning for subject knowledge and its importance and relevance in training remains problematic.

Content area	Table 4.1 Percentage of respondents (proportionate to the total in-service attendance within each geographical region)					
	Lincoln	Hull	Sheffield	Liverpool	Bath	Exeter
Scientific enquiry	25.00% (n=8)	23.08% (n=3)	28.57% (n=8)	19.23% (n=5)	40.00% (n=4)	28.57% (n=6)
Pedagogical content knowledge	31.25% (n=10)	30.76% (n=4)	25.00% (n=7)	15.38% (n=4)	0.00% (n=0)	4.76% (n=1)
Assessment	25.00% (n=8)	3.13% (n=1)	3.57% (n=1)	19.23% (n=5)	10.00% (n=1)	14.29% (n=3)
Science co-ordinator training	12.50% (n=4)	15.38% (n=2)	0.00% (n=0)	15.38% (n=4)	30.00% (n=3)	9.52% (n=2)
ICT in science	15.63% (n=5)	3.13% (n=1)	7.14% (n=2)	3.85% (n=1)	0.00% (n=0)	4.76% (n=1)
Subject knowledge	0.00% (n=0)	0.00% (n=0)	21.43% (n=6)	0.00% (n=0)	10.00% (n=1)	4.76% (n=1)
Generic	16.28% (n=7)	21.43% (n=3)	14.29% (n=4)	26.92% (n=7)	10.00% (n=1)	33.33% (n=7)
No details provided	0.00% (n=0)	14.29% (n=2)	0.00% (n=0)	0.00% (n=0)	0.00% (n=0)	9.52% (n=2)

- Science in-service training uptake was disproportionately high amongst science co-ordinators and low amongst class teachers. The accessibility of science in-service training for class teachers may be problematic.
- Science in-service training uptake was disproportionately high amongst recently qualified respondents, with 0 to 10 years' teaching experience, and low amongst long-serving respondents, with over 10 years' teaching experience. The uptake of science in-service training by long-serving teachers may be problematic.
- Geographical variation was evident in the numbers of respondents taking advantage of science in-service provision at regional Science Learning Centres. Variation by geographical region was also evident in the content of

science in-service training provision (see Table 4.1). Equal provision and accessibility of science in-service training, across all geographic regions, may be problematic.

- Many respondents felt that science education could be improved, at both school and national levels, through the provision of science in-service training. Without continued in-service training in primary science, any overall improvement in science education may prove problematic.
- Beyond a general recognition of the value and benefit of in-service training to all teachers, the short, medium and long term effectiveness of in-service training, for the individuals involved as well as the schools which they represent, including when taking in-service might be most productive in a teacher's career, was by no means clear. The effectiveness and targeting of in-service training requires investigation (this would also serve to test or develop much needed empirical and theoretical models of in-service training within which an in-service framework might be properly evaluated).

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Appendix 1: School or Local Authority Science In-service Training Raw Data

(a) Details of in-service training

Area of training	Geographical region	Respondent comment
Scientific enquiry	Lincoln	Inset – scientific enquiry skills – science (LEA) advisor and science co-ordinator facilitated in school.
Scientific enquiry	Lincoln	Nicola Beverly gave support i.e. AT1 and expected levels of recording plus some fun games/mini experiments to encourage interest in science.
Scientific enquiry	Lincoln	Whole school inset on Science 1 skills.
Scientific enquiry	Lincoln	Scientific enquiry.
Scientific enquiry	Lincoln	Attended AT1 in-service training at Nottingham university.
Scientific enquiry	Lincoln	I've been on four courses about teaching: i) Scientific enquiry ii) Gifted and talented iii) Health and safety iv) Assessment at KS1.
Scientific enquiry	Lincoln	AT1 insets.
Scientific enquiry	Lincoln	Investigations, links with ICT and D&T.
Scientific enquiry	Hull	DIPs project. Inset (whole staff) by LA advisor on scientific enquiry.
Scientific enquiry	Hull	In school AT1 training.
Scientific enquiry	Hull	I am about to attend LEA course on L5 science and performance data. Have had staff training in scientific enquiry by 'challenging children in industry' project. About to attend a BBC course on using digital images in science.
Scientific enquiry	Bath	Assessment in science inset, also scientific enquiry – run by me and the head.
Scientific enquiry	Bath	AT1 relating to SATs results. Particularly poor in school. Looking at progression through the whole school.
Scientific enquiry	Bath	In school – scientific enquiry progression sheets.

Scientific enquiry	Bath	In house INSET on Sc1.
Scientific enquiry	Liverpool	Our school has a science AST, staff meetings have focussed on scientific enquiry.
Scientific enquiry	Liverpool	Scientific investigations for KS1 and 2.
Scientific enquiry	Liverpool	Scientific enquiry KS2. SATs preparation.
Scientific enquiry	Liverpool	Lancashire 'Learning Excellence' team provided two inset sessions on AT1.
Scientific enquiry	Liverpool	Teachers have been sent to AT1 courses and cascaded back to staff.
Scientific enquiry	Sheffield	Sc enquiry, sound and light, forces and materials.
Scientific enquiry	Sheffield	Investigations at Key Stage 1.
Scientific enquiry	Sheffield	Events focussed on Sc1.
Scientific enquiry	Sheffield	Scientific enquiry courses, knowledge and understanding (electricity, earth and beyond).
Scientific enquiry	Sheffield	Scientific investigation for the more able.
Scientific enquiry	Sheffield	Investigations for Key Stage 2. Investigations for more able pupils. ICT for science.
Scientific enquiry	Sheffield	LEA advisor – advice on investigations.
Scientific enquiry	Sheffield	KS2 science investigations for the more able.
Scientific enquiry	Exeter	Science week organised by science coordinator; changes in science assessment; use of AT1 across all science areas.
Scientific enquiry	Exeter	In-service training on scientific enquiry.
Scientific enquiry	Exeter	AQA science course on Sc1 and other topics aimed specifically at teaching Year 6 SATs classes.
Scientific enquiry	Exeter	Sc1 scientific enquiry. Also I have been on a few courses e.g. progression of skills.
Scientific enquiry	Exeter	INSET run by science leader covering scientific enquiry.

Scientific enquiry	Exeter	Whole school training in AT1 planning and delivery.
Pedagogical content knowledge	Lincoln	Our cluster high school provides regular science activities to our school – lessons/revision sessions/other activities.
Pedagogical content knowledge	Lincoln	A 'mad science' club.
Pedagogical content knowledge	Lincoln	Science co-ordinators course, science assessment and Freiston Centre training day for all staff.
Pedagogical content knowledge	Lincoln	William Farr science boxes.
Pedagogical content knowledge	Lincoln	An after-school session on science assessment led by an AST – very helpful. Concept cartoons – use of these to stimulate scientific thought and questioning.
Pedagogical content knowledge	Lincoln	Courses: Identifying misconceptions in science, using the environment.
Pedagogical content knowledge	Lincoln	I've been on four courses about teaching: i) Scientific enquiry ii) Gifted and talented iii) Health and safety iv) Assessment at KS1.
Pedagogical content knowledge	Lincoln	Investigations, links with ICT and D&T.
Pedagogical content knowledge	Lincoln	Subject leader attending CfBT courses, consultant visit to school to discuss intervention teaching of science to Year 6.
Pedagogical content knowledge	Lincoln	Concept cartoon training.
Pedagogical content knowledge	Hull	Discussion in Primary Science (DIPS) project.
Pedagogical content knowledge	Hull	DIPs project. Inset (whole staff) by LA advisor on scientific enquiry.
Pedagogical content knowledge	Hull	Science industry days Y5/6.
Pedagogical content knowledge	Hull	Enhance speaking/listening in science.
Pedagogical content knowledge	Liverpool	Scientific enquiry KS2. SATs preparation.
Pedagogical content knowledge	Liverpool	Science in industry and assessing science in KS1.
Pedagogical content knowledge	Liverpool	We have an excellent relationship with a number of external organisations.
Pedagogical content knowledge	Liverpool	Teaching to raise children from L4 to L5.

Pedagogical content knowledge	Sheffield	Science days. INSET day, Y6 preparation for SATs.
Pedagogical content knowledge	Sheffield	Thinking skills in science.
Pedagogical content knowledge	Sheffield	Courses on forces, materials and light. A course on creativity within the science curriculum.
Pedagogical content knowledge	Sheffield	Primary science for teaching gifted and talented.
Pedagogical content knowledge	Sheffield	ICT in the science curriculum and digital cameras and microscopes. Teaching gifted and talented children.
Pedagogical content knowledge	Sheffield	Teaching gifted and talented June 2007.
Pedagogical content knowledge	Sheffield	Gifted and talented course.
Pedagogical content knowledge	Exeter	AQA science course on Sc1 and other topics aimed specifically at teaching Year 6 SATs classes.
Assessment	Lincoln	Various courses especially relating to the use of IT in science, and in house meetings on assessment.
Assessment	Lincoln	Science co-ordinators course, science assessment and Freiston Centre training day for all staff.
Assessment	Lincoln	P levels in science, ICT and science.
Assessment	Lincoln	An after-school session on science assessment led by an AST – very helpful. Concept cartoons – use of these to stimulate scientific thought and questioning.
Assessment	Lincoln	Implementing the science assessment toolkit for Key Stages 1 and 2.
Assessment	Lincoln	I've been on four courses about teaching: i) Scientific enquiry ii) Gifted and talented iii) Health and safety iv) Assessment at KS1.
Assessment	Lincoln	In house support for assessment for learning.
Assessment	Lincoln	School – AfL in science.
Assessment	Hull	I am about to attend LEA course on L5 science and performance data. Have had staff training in scientific enquiry by 'challenging children in industry' project. About to attend a BBC course on using digital images in science.
Assessment	Bath	Assessment in science inset, also scientific enquiry – run by me and the head.

Assessment	Liverpool	Staff meeting training led by science co-ordinator following in-service training by LA on assessment and moderation.
Assessment	Liverpool	Science co-ordinator training and feedback to staff. Staff meetings to moderate science work and assessments. If 'practical' science – directly related to teaching science in KS1 classrooms – was available through our LA, we would take advantage of it!
Assessment	Liverpool	KS1 moderation and SATs meetings regarding science.
Assessment	Liverpool	INSET in science assessment toolbox.
Assessment	Liverpool	Science in industry and assessing science in KS1.
Assessment	Sheffield	K. Schienkonig – staff meeting: assessment and progression.
Assessment	Exeter	Science week organised by science co-ordinator; changes in science assessment; use of AT1 across all science areas.
Assessment	Exeter	For KS1 SATs.
Assessment	Exeter	Assessing science.
Science co-ordinator training	Lincoln	Science co-ordinators course, science assessment and Freiston Centre training day for all staff.
Science co-ordinator training	Lincoln	Science co-ordinator meetings.
Science co-ordinator training	Lincoln	Science co-ordinator courses, shared materials in school.
Science co-ordinator training	Lincoln	Subject leader attending CfBT courses, consultant visit to school to discuss intervention teaching of science to Year 6.
Science co-ordinator training	Hull	INSET, co-ordinator training.
Science co-ordinator training	Hull	18 day science co-ordinators qualification provided by university.
Science co-ordinator training	Bath	Co-ordinator meetings with teachers form other schools.
Science co-ordinator training	Bath	Science leader course at Bath Spa in 2005, Cluster 5 meetings.
Science co-ordinator training	Bath	Best practice forum, science and subject leadership – Bath Spa University.

Science co-ordinator training	Liverpool	Science co-ordinator meetings throughout the year provided by Halton LEA.
Science co-ordinator training	Liverpool	Science co-ordinator training and feedback to staff. Staff meetings to moderate science work and assessments. If 'practical' science – directly related to teaching science in KS1 classrooms – was available through our LA, we would take advantage of it!
Science co-ordinator training	Liverpool	Training for science co-ordinators.
Science co-ordinator training	Liverpool	Science co-ordinator training.
Science co-ordinator training	Exeter	Conference for co-ordinators.
Science co-ordinator training	Exeter	The science advisor came in and chatted with me as to where we needed to be with our science and helping me to plan and deliver INSET.
ICT in science	Lincoln	Various courses especially relating to the use of IT in science, and in house meetings on assessment.
ICT in science	Lincoln	P levels in science, ICT and science.
ICT in science	Lincoln	ICT in the science curriculum.
ICT in science	Lincoln	Science and ICT.
ICT in science	Lincoln	Investigations, links with ICT and D&T.
ICT in science	Hull	I am about to attend LEA course on L5 science and performance data. Have had staff training in scientific enquiry by 'challenging children in industry' project. About to attend a BBC course on using digital images in science.
ICT in science	Liverpool	Training for using the Intel microscope – which I then delivered in school.
ICT in science	Sheffield	ICT in the science curriculum and digital cameras and microscopes. Teaching gifted and talented children.
ICT in science	Sheffield	Investigations for Key Stage 2. Investigations for more able pupils. ICT for science.
ICT in science	Exeter	ICT in science.
Subject knowledge	Sheffield	Improving scientific knowledge, one day.
Subject knowledge	Sheffield	Improving scientific knowledge, one day course.

Subject knowledge	Sheffield	Improving scientific knowledge course: materials and forces.
Subject knowledge	Sheffield	Science enquiry, sound and light, forces and materials.
Subject knowledge	Sheffield	Courses on forces, materials and light. A course on creativity within the science curriculum.
Subject knowledge	Sheffield	Scientific enquiry courses, knowledge and understanding (electricity, earth and beyond).
Subject knowledge	Exeter	Regular INSET linked to year group curriculum coverage – appropriate courses have included Y1 green plants – teacher training at Rosemoor RHS gardens.
Subject knowledge	Bath	Solar energy and renewable energy course.
Generic	Lincoln	Attended a one day science training course for supply teachers, June 2006, CfBT.
Generic	Lincoln	We have had some training from the science co-ordinator.
Generic	Lincoln	Links with local grammar school AST and science technology status.
Generic	Lincoln	CfBT provision.
Generic	Hull	Inset led by science coordinator.
Generic	Hull	Science visitor to develop an area of science for all staff.
Generic	Hull	School based inset.
Generic	Bath	The science coordinator has attended best practice forums and other workshops and these have been disseminated in INSET or during staff meetings,
Generic	Liverpool	Science courses and science conference.
Generic	Liverpool	INSET day on science (2004).
Generic	Liverpool	All in service training is carried out by the science coordinator.
Generic	Liverpool	Staff meeting/inset delivered by our science co-ordinator who is also AST.
Generic	Liverpool	I ran the science training as science AST.

Generic	Liverpool	Local authority courses.
Generic	Liverpool	Aim higher in science x two half days. Nothing else available.
Generic	Sheffield	Science advisor – involved in scrutiny of work across the whole school.
Generic	Sheffield	Have attended in service – courses by LEA. Regional annual science meetings at Woolley Hall for several years.
Generic	Sheffield	Science focus – 3 years ago. Developed by science coordinator.
Generic	Sheffield	Science day at Sheffield university.
Generic	Exeter	Science conference.
Generic	Exeter	Teacher with responsibility provides inset.
Generic	Exeter	We have a once a year science review – wide-ranging – that I attend.
Generic	Exeter	Tom Robson has provided INSET (there is no science primary team in Dorset!).
Generic	Exeter	Sc1 scientific enquiry. Also I have been on a few courses e.g. progression of skills.
Generic	Exeter	School inset sessions.
Generic	Exeter	Some in-service training, not much really.
Generic	Lincoln	AQA science course for year 6 teachers.
Generic	Lincoln	Workshops with county AST on an occasional basis.
Generic	Lincoln	Courses offered by authority. At least three in last 3 years. We have bi-yearly science co-ordinator meetings with the advisor in our authority.

(b) Reasons for non-attendance

Reason for non-attendance	Geographical region	Respondent comment
No opportunity	Lincoln	Unaware of any, usually only subject leaders are released to attend.
No opportunity	Lincoln	Not had the opportunity to.
No opportunity	Lincoln	None provided: person responsible for science in authority did not provide any in-service training courses.
No opportunity	Lincoln	None provided – not that I am aware of.
No opportunity	Lincoln	Have not been offered any.
No opportunity	Hull	Very little provided, not a priority!
No opportunity	Liverpool	There hasn't been any for early years.
No opportunity	Sheffield	None has been available, no science consultants in Derbyshire.
No opportunity	Exeter	I attended many science courses up to about five years ago, but have recently been learning more about the foundation stage and PSHE. I think science isn't highlighted as much as it was in the past.
No opportunity	Exeter	Haven't seen any.

Appendix 2: Regional Science Learning Centre Science In-service Training Raw Data

(a) Details of in-service training

Area of training	Geographical region	Respondent comment
Pedagogical content knowledge	Lincoln	Special needs science day at Bishop Grosseteste in 2005.
Pedagogical content knowledge	Bath	Games in science 2007 in the Bristol centre.
Pedagogical content knowledge	Sheffield	Science assessment course at National science learning centre. Brain warmers @ JCB by Barry Gurter.
Pedagogical content knowledge	Exeter	Using the 'starlab' – an inflatable planetarium used in Somerset schools.
Science co-ordinator training	Hull	Attended meeting of science coordinators for discussion.
Science co-ordinator training	Hull	York science learning centre, staff training day, 3 day co-ordinator course.
Science co-ordinator training	Exeter	Co-ordinator conference (first one this year – disappointing, not as good as LEA provision).
Assessment	Sheffield	Science assessment course at National science learning centre. Brain warmers @ JCB by Barry Gurter.
Scientific enquiry	Hull	Scientific enquiry.
Generic	Lincoln	Following being in special measures.
Generic	Hull	20 day science course.
Generic	Liverpool	Hope University science course – have attended these.
Generic	Exeter	But not for a long time.

(b) Reasons for non-attendance

Reason for non-attendance	Geographical region	Respondent statement
Unaware of SLC	Lincoln	Unclear what/where is my 'regional science learning centre'.
Unaware of SLC	Lincoln	Do not know of such an organisation.
Unaware of SLC	Lincoln	I am not aware of a science learning centre.
Unaware of SLC	Lincoln	None available or applicable!
Unaware of SLC	Lincoln	I don't know where or what the regional science learning centre is.
Unaware of SLC	Lincoln	Is there a science learning centre?
Unaware of SLC	Hull	?What regional science learning centre?!
Unaware of SLC	Hull	Have no details.
Unaware of SLC	Liverpool	I am not aware of this provision.
Unaware of SLC	Liverpool	Don't know of its existence.
Unaware of SLC	Liverpool	We don't have a regional SLC.
Unaware of SLC	Liverpool	Don't have one.
Unaware of SLC	Liverpool	Not sure what this is.
Unaware of SLC	Sheffield	Don't think there is one.
Unaware of SLC	Sheffield	Didn't know there was one.
Unaware of SLC	Exeter	Unaware of any.
Unaware of SLC	Exeter	Didn't know we had one ☹

Unaware of SLC	Exeter	Not heard of it.
Unaware of SLC	Exeter	I wasn't aware we had one.
Unaware of SLC	Exeter	Didn't even know there was one.
Unaware of SLC	Exeter	Haven't been aware of any.
Funding	Lincoln	Lack of funds to attend courses.
Funding	Lincoln	Expense!
Funding	Lincoln	Budgetary restraints prevent funding.
Funding	Hull	Too expensive for our small schools.
Funding	Bath	Have not had the opportunity to attend courses (budget).
Distance	Sheffield	Too far away from home.
No opportunity	Bath	I have heard of this but never used it.

Appendix 3: Science In-service Training Improvements Raw Data

(a) School level

Area of improvement	Geographical region	What would you do to improve the quality of science education provision at your school?
In-service training	Lincoln	CPD opportunities for staff.
In-service training	Lincoln	More inset training.
In-service training	Lincoln	More inset training.
In-service training	Lincoln	Ensure staff are adequately trained in all areas.
In-service training	Lincoln	In-service training in a learning network linked to ASTs and/or college tutors.
In-service training	Lincoln	As we are such a small school we would need more FREE help and guidance from outside agencies.
In-service training	Lincoln	Greater opportunities for in-service training – extended courses (like the older golden days of teaching).
In-service training	Lincoln	Learn more about the contributions that scientists are making now all over the world, and who contributed to our knowledge in the past. Staff knowledge is good for the requirements of the National Curriculum however these requirements are simple and repetitive.
In-service training	Lincoln	As science co-ordinator I have been on many courses. There is little or no time given for feedback or evaluation and implementation. This needs to be done, to get the best value from the course.
In-service training	Lincoln	Have regular inset opportunities.
In-service training	Lincoln	In-service training.
In-service training	Lincoln	Find courses available for staff training not just coordinator.
In-service training	Lincoln	Need more in service training, particularly on AT1. Not provided by LA.
In-service training	Lincoln	Provide additional time in house for subject leaders to lead training.

In-service training	Lincoln	Arrange more training opportunities.
In-service training	Lincoln	Co-ordinator to suggest areas for development in teaching relevant to topics.
In-service training	Lincoln	More training time.
In-service training	Hull	Provision of INSET in relation to scientific enquiry.
In-service training	Hull	INSET training on outlined areas of weakness (identified by school).
In-service training	Hull	Give more training for NQTs.
In-service training	Hull	Provide more local courses and inset to improve confidence and knowledge.
In-service training	Hull	Have team meetings to share knowledge, resources etc.
In-service training	Hull	More inset both school and LA based.
In-service training	Sheffield	Allow more inset days with workshops and speakers.
In-service training	Sheffield	More in-service training.
In-service training	Sheffield	More inset.
In-service training	Sheffield	Provide some training in the areas of science that teachers feel weak in delivering – do an audit to determine this.
In-service training	Sheffield	Staff training.
In-service training	Sheffield	Provide money for more training for less confident staff.
In-service training	Liverpool	More in-service training.
In-service training	Liverpool	Offer more science training to make staff aware of new developments and resources.
In-service training	Liverpool	Provide more frequent in-service opportunities.
In-service training	Liverpool	Retrain, offer courses, have time to team-teach in order to support staff who have near zero confidence in their knowledge, ability and wish to teach science.

In-service training	Liverpool	Give more time to monitor the delivery of science throughout the key stages and give feedback.
In-service training	Liverpool	Provide increased opportunities for CPD and inset training.
In-service training	Bath	Ongoing review of teaching and learning – styles/use of current resources – sharing good practice.
In-service training	Exeter	More inset for staff.
In-service training	Exeter	More inset to improve scientific knowledge and teaching strategies. Science workshops for children and teachers.
In-service training	Exeter	More training and ideas for teaching science.
In-service training	Exeter	We would value input and support from an advisor from within our county.
In-service training	Exeter	Monitor science lessons.
In-service training	Exeter	Suggest ideas/lessons that went well to inform others.
In-service training	Exeter	More information on activities available for key stage 1 (bank of ideas).
In-service training	Exeter	To have an inset day on primary science.

(b) National level

Area of improvement	Geographical region	What would you do to improve the quality of science education provision nationally?
In-service training	Lincoln	A national training centre or refresher system (literacy and numeracy have been enlivened by the National Strategies).
In-service training	Lincoln	CPD provision.
In-service training	Lincoln	Teachers need more training offered about interesting ways to put across the science curriculum.
In-service training	Lincoln	Run local courses on the applications of science in everyday to raise awareness at primary and secondary level in preparation for the new demands of science GCSE.
In-service training	Lincoln	We need ideas for investigations.
In-service training	Lincoln	Teachers should be trained to assess the children on their scientific ability in enquiry and investigation. Teachers are trained for the Year 2 science SATs, why not Year 6 teachers?
In-service training	Lincoln	More in-school training for all staff: teachers, TAs etc.
In-service training	Lincoln	Provide more CPD opportunities for teachers to be more confident in scientific enquiry.
In-service training	Lincoln	Train teachers in delivering science in a more exciting/creative way.
In-service training	Lincoln	More practical, hands-on training both during and after teacher training.
In-service training	Lincoln	Support/in-service training given to schools: twilight sessions.
In-service training	Lincoln	Increased support and advice from skilled teachers with powerful/practical teaching skills.
In-service training	Hull	Provide more courses for co-ordinators.
In-service training	Hull	Lower the cost of training at SLCs for all teachers.
In-service training	Hull	Training fees reduced.
In-service training	Sheffield	Train science co-ordinators so they are more confident. Encourage science specialists into primary education.

In-service training	Sheffield	More in-service training.
In-service training	Sheffield	Further training for all teachers and T.As.
In-service training	Sheffield	Provide science consultants to support science in schools, in a similar way to literacy and numeracy consultants that we have now.
In-service training	Liverpool	Provision of training/in-service at LEA level.
In-service training	Liverpool	More in-service provision.
In-service training	Liverpool	More training for science co-ordinators.
In-service training	Liverpool	Offer courses for scientific enquiry as the basis for the enhancement of teacher confidence (on the IOM i.e. Nationally for us!)
In-service training	Liverpool	More area specific training to boost knowledge.
In-service training	Liverpool	More courses, related to different key stages.
In-service training	Bath	Provide more opportunities for classroom teachers to increase their knowledge from new ideas rather than science co-ordinators who have expertise already – they may not be given the time to hand on the new thinking or methods to staff within their own school.
In-service training	Bath	Regular in-service training. Increase profile of importance of science throughout the nation.
In-service training	Bath	Training for teachers – updating on current issues. Refreshing ideas/approaches etc.
In-service training	Exeter	Invest in high-profile, straightforward ITT and inset.
In-service training	Exeter	Regular, free, inservice provision within schools to keep knowledge up to date.