Identifying good practice: a survey of post-16 science in colleges and schools

This report represents the findings from a survey of post-16 science provision in 18 colleges and schools where provision had been judged to be good or outstanding at their previous inspection. Between October 2006 and April 2007 five schools, nine sixth form colleges, one tertiary college and three general further education colleges were visited by inspectors. Examples of good practice are given and recommendations for improvements are made.

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Executive summary

Between October 2006 and April 2007, Her Majesty's Inspectors (HMI) and Additional Inspectors visited a sample of 18 colleges and schools to survey good practice in post-16 science education. The colleges and schools were selected because Ofsted had judged the science provision to be outstanding or good in the previous inspection.

Students' achievement and standards in science were outstanding in 12 of the schools and colleges visited. Pass rates were high and many students progressed to higher education. A wide variety of enrichment activities helped students to put science in a wider context and to clarify career decisions. However, few opportunities existed for students to take sciences at level 1 and level 2, and progression routes to level 3 science courses were unclear.

In eight of the institutions visited, the quality of teaching and learning was outstanding. The vast majority of science teachers were subject specialists, some with valuable industrial or vocational experience. Many had acted as external examiners, which benefited their students and colleagues. Practical work was used particularly effectively. Teachers established a good balance of investigation, theory and assessed written work, so that students experienced the laboratory techniques and analyses of their various disciplines while also being prepared well for external examinations. Assessment for learning was beginning to have an impact. Peer mentoring in some of the sixth form colleges and subject-based workshops visited was highly effective in helping students to improve. Year 13 mentors spoke very positively about supporting students in Year 12 and the unexpected benefits of immersing themselves in a topic to help someone else.

The vast majority of the science laboratories seen in the survey were modern and well equipped, and provided good environments for learning. Many of the laboratories and classrooms had electronic whiteboards and data projectors. Science teachers used information and communication technology (ICT) effectively in planning and teaching science; resources included PowerPoint, video clips and Web downloads. Some courses had extensive learning materials on CD-ROM or on the Web which students could access easily. However, students often had insufficient opportunities to use ICT themselves in lessons, with the exception of practical work in physics and electronics, where they regularly used data logging software to capture data and process information. Data logging equipment was used only occasionally in the practical work in chemistry or biology. Students regularly use ICT in private study or at home while completing science assignments and research.

The quality of leadership and management was outstanding in 11 colleges and schools in the survey. Science teams were very well led and their self-assessments were comprehensive and evaluative; course reviews were honest. However, schools were less self-critical than their college counterparts, in part because self-assessment had been established for longer in colleges.

Key findings

- These institutions had been identified as high performing: generally achievement and standards were outstanding and students' progress as measured by value added indicators was impressive.
- Students were confident and competent in practical work, using specialist scientific equipment both safely and effectively. Their understanding of errors both systematic and random was well developed. The quality of their written work and subject notes was often excellent.
- Learners produced well researched presentations and clearly enjoyed working in groups and discussing their developing understanding of scientific concepts.
- Successful science teachers worked well in curriculum teams, sharing common homework tasks and assessments but feeling free to innovate within agreed schemes of work. The results were often interesting and engaging lessons, with a good balance between practical work and theory, clear aims that were shared with the learners and activities that promoted high levels of understanding and rapid progress.
- Skilfully managed discussions allow science teachers informally to assess progress and to develop learners' confidence in articulating their ideas and explaining concepts. Group work and carousels of activities were often very effectively used to allow learners to work at their own pace and to allow teachers to spend time with individuals to provide encouragement and support.
- Individual learning plans for students were not sufficiently developed in a minority of the institutions and targets were not used well enough.
- Science teachers used ICT skilfully in their planning and teaching, but many students did not have enough opportunities to use ICT in lessons. An exception to this was practical work in physics and electronics, where students regularly used data logging software. However, in the other sciences, students used ICT mostly outside lessons.
- Science courses at level 1 and 2 were underdeveloped and progression routes to courses at level 3 were not clear. Unlike other subjects at level 3, the sciences do not have well established progression routes post 16 for those students who do not initially meet the level 3 entry requirements. The range of science courses was widest in sixth form colleges; vocational science courses, including forensic science, ophthalmology and dispensing pharmacy qualifications were available mainly in general further education (GFE) colleges.
- Leadership and management in science teams were highly effective. Teams were well led with a strong collective emphasis on improving the quality of teaching and learning, raising standards and providing student-centred approaches to tackling weaknesses. Lesson observation was well established and dissemination of good practice, including the influence of subject learning coaches, was developing. Self-assessment was comprehensive in most science teams, although better developed in colleges than in schools.

Recommendations

The survey identified many aspects of good practice in schools and colleges with outstanding provision in science. To improve the quality of provision further, the Department for Children, Schools and Families (DCSF), the Department for Innovation, Universities and Skills (DIUS) and the Quality Improvement Agency (QIA) should:

- take steps to disseminate further good practice in science so that all schools and colleges can learn from the best practice.

Colleges and schools should:

- disseminate the good practice identified in this report
- as appropriate, develop clear progression routes to level 3 sciences
- ensure that students have more opportunities to use ICT in science lessons.

Schools should:

- improve the quality of self-evaluation in science as an aid to identifying key strengths and weaknesses.

Learners' achievement

1. Achievement and standards were outstanding in 12 of the 18 institutions visited. Retention rates were well above the national average and pass rates were consistently very good. High grade pass rates (A and B grades) were often impressive. Success rates were therefore well above national averages and progress, as measured by value-added indicators, at or above that predicted from students' prior attainment. Students' progression to higher education, further education or employment was good.

2. Overall, science students made very good use of practical work and their written reports and calculations added significantly to their understanding and progress. They were confident and worked safely in practical sessions. They used electronic equipment with ease to make highly accurate measurements in the physical sciences and ophthalmics and talked sensibly about why they were using the equipment. In the majority of cases, they identified systematic and other errors correctly and took these into account. In chemistry, students were well aware of the potential hazards and took good appropriate precautions, for example, when refluxing.

3. Students produced well researched presentations across the sciences, for example to illustrate cell division, aspects of organic chemistry or to classify

aspects of human behaviour in psychology. Group work was popular and very successful with the students and they engaged readily with tasks that involved teamwork. In psychology, small group work in class was particularly successful and students made rapid progress by sharing information effectively, within groups and to the class as a whole. Discussions following presentations, or encouraged by teachers in other contexts, were often of a high standard and helped students of all abilities to make progress.

4. Most science students brought good numerical skills to their science studies. In physics and chemistry they manipulated equations and used very large and very small numbers with ease. In psychology and biology the students quickly understood the need for corroborative statistical analyses and used parametric and non-parametric tests well.

5. The quality of students' written work and subject notes was often impressive. Files of notes and completed exercises were routinely kept up to date and revealed considerable hard work, commitment and self-discipline. Many science students had a clear career focus and were using their science studies to progress to medicine, physiotherapy, veterinary science, physical sciences or engineering. These ambitions showed the same determination that was seen in the quality of their written notes.

Factors contributing to good quality provision

Teaching and learning

6. The quality of teaching and learning was outstanding in seven of the sixth form colleges and one tertiary college visited and good in the other schools and colleges. Students found many of the lessons interesting and they were enthusiastically engaged throughout.

7. Science teachers worked well in curriculum teams to plan their courses and to ensure that lessons and learning activities were interesting as well as relevant to the syllabus topics. The extent to which teachers taught to a common scheme of work varied, but there were often common homework tasks and assessments.

8. The teaching in the outstanding colleges had several common characteristics. The teachers were well qualified, experienced and had an infectious enthusiasm for their subjects. A well chosen mixture of interesting, relevant activities promoted high levels of understanding and rapid progress. Lesson plans were detailed and the aims and objectives were routinely made clear to the students. The teachers had high expectations which they communicated very well to their students. The lessons were carefully structured to develop students' understanding of difficult concepts and their familiarity with key vocabulary. The pace of lessons was brisk and no time was wasted. Skilful interventions by teachers kept students on task; extension work was provided for those who

completed tasks quickly and extra individual help was given to those who needed it.

9. The following examples illustrate some of the outstanding lessons observed.

> In an outstanding forensic science lesson in a general further education college, the teacher presented students with 'crime scenes' that had been set up in the laboratory. Using digital cameras, specimen tubes and their own observations, the students successfully prepared short evidence reports suitable for investigative police teams.
>
> An AS psychology lesson in a grammar school began when the teacher issued the students with a coloured sheet of paper. They were instructed to write various pieces of information on it and fold it carefully. Next, they were asked to form groups based on the month of their birth, the year of their birth and then to line up in alphabetical order based on their first name. After some minutes, it dawned on some of the students that they were engaged in irrelevant activities that illustrated conformity, the topic they were studying. With good humour they began to discuss the implications of their willingness to obey the teacher's instructions, especially as a second authority figure, the inspector, was present. The teacher skilfully managed the discussion, making sure that the students used the correct psychological terms and drew on their previous topic work. Students spent the last 20 minutes of the lesson completing short-answer questions successfully from the module tests that related to conformity.

10. Sometimes, teachers used a carousel of activities to maintain students' interest and enthusiasm which also gave the teachers time to work with individuals to help them make better progress.

> A carousel of activities, some written, some practical, and some involving ICT, was very successful in enabling students retaking GCSE biology to study the structure and function of the eye. For example, high quality optical ray boxes clearly showed the function of convex and concave lenses in compensating for short and long sight; good quality eye test cards illustrated both the blind spot and a variety of colour blindness conditions, and a number of computers were set up to show interesting and colourful optical illusions. Managers had warned the inspector that students in the 'GCSE repeat' classes in the college had shown poor behaviour and lack of engagement with topics. During this class, the students carried out the activities enthusiastically and completed their written records in good time. The activities were carefully chosen to stimulate the students' interest, to cover the relevant syllabus topic and to keep them involved and active for the whole lesson.

11. Practical work and demonstrations were used effectively to enable students to experience the techniques and analyses of their various disciplines. Science teachers established a good balance of practical investigations, theory work and assessed written work in their courses. As a result, students had a good grasp of laboratory technique while also being well prepared for public examinations.

> In a good AS chemistry lesson, the students confidently set up the apparatus for an acid-base titration. They completed the exercise accurately and efficiently. End points were clear and measured accurately and the students worked safely throughout. Equipment was put away quickly and there was still time to complete the relevant calculations. The teacher skilfully helped the students refine their manual skills in using burettes and pipettes and made sure that they all understood the final calculation and its implications.

12. Teachers in the outstanding schools and colleges were alert to the performance of individuals in their classes. They asked direct, probing questions and left time for the students to think before answering. The most successful teachers did not shirk from discussing the beauty and simplicity of the big generalisations and formulae in science and the ethical issues that inevitably emerged from the applications of science in the modern world. There were good opportunities for students to talk about their learning and to use newly acquired terminology and knowledge to reinforce their understanding. In addition, teachers spent time with students to make sure they were keeping up to date, to review their files and to go over misunderstandings they had noted in assignments they had marked.

13. Homework and written assignments were well organised and integrated effectively into the way topics were taught. Often, the science teachers were external examiners; they shared their considerable experience with their colleagues. The result was an appropriate emphasis on examination technique to help students prepare for their module tests and external examinations. Homework, tests, mock examinations and class work provided plenty of practice on previous examination papers. Extra questions were often available electronically or as booklets, and model answers and mark schemes were routinely attached. Students appreciated this emphasis on examination technique and valued highly the preparation they received.

14. In a small number of the lessons observed, weaknesses included too much talking by the teacher so that the students' interest was not engaged, some ineffective group work and insufficient development of independent study. On occasions, teachers asked poorly directed questions and left too little time for students to consider their responses.

15. In many AS and A-level courses, teachers assumed a common base of 'double science' rather than that students had studied GCSE separate sciences. This meant that an inclusive ethos was rapidly established. Nevertheless, students

who had studied separate sciences at GCSE level were perceived to be at an initial advantage. Students who started advanced courses with a GCSE double science background were at no disadvantage in the long run and the best teachers made sure that the full range of needs was met from the start.

The use of information and communication technology

16. The science teachers were generally adept at using ICT in planning and teaching. School and college hardware systems were generally robust and well developed and teachers used them confidently. In shared Intranet areas, teachers developed schemes of work, lesson plans, learning materials and assessments. Sharing resources and good practice at this level was well developed. In addition, many science laboratories and classrooms visited during the survey had electronic whiteboards and data projectors. Science teachers used PowerPoint, video clips and Web downloads skilfully which helped to ensure that lessons were interesting and relevant. Some courses had extensive course materials on CD-ROM or on the Web which students could access easily.

17. Video clips illustrating, for example, organic chemistry reactions; the properties of electromagnetic radiation; famous behaviour experiments and animations of cell division were all used very effectively to help students understand both the detail and the underlying concepts of topics. In the very best lessons seen during the survey, a careful balance was struck between ICT presentation, discussion, clarification of vocabulary and understanding, and the need to meet external assessment criteria. No single method of learning dominated and ICT was used as the servant of learning.

18. It was noticeable, however, that in eight of the 18 institutions visited, science teachers used ICT routinely in lessons and the students did not. An exception was in practical work in physics and electronics, where students regularly used data logging software to capture data and then to process the information gathered. However, in the other sciences, students mostly used ICT outside lesson time. Data logging equipment was used only occasionally in the practical work in chemistry or biology, even though, when used in titrations or to measure enthalpy changes or gas exchange, data logging is a very useful tool to help students record data accurately and then allow time to concentrate on what the data mean.

19. A successful feature of most of the lessons seen was the effective way in which science teachers passed on interesting and relevant Web addresses to their students. Students were confident users of ICT on a personal level and appreciated access to Web links and Intranet materials to help them with their studies. They regularly used the ICT resources in the libraries and on the Internet, as well as statistical software to help analyse large data sets.

In a school sixth form, chemistry students were required to give presentations on syllabus topics to their peers. One student, taking media studies as well as science A levels, demonstrated highly creative ICT skills. He presented a four minute animation of arresting visual images set to contemporary music which successfully illustrated the main features of chemical inhibitors. The animation was not only highly instructive but also aesthetically pleasing.

In a highly successful AS environmental science lesson in a sixth form college, students used ICT very effectively to develop their knowledge and understanding of biological resource management. The lesson started with a card matching exercise to revise terminology and key ideas. The teacher then drew attention to the email he had sent all the class the previous week. This outlined the main activity for the lesson and specified a number of key websites where the students could find information on the management of resources such as timber, deep ocean fisheries and livestock. The students used the class set of laptop computers to access the Internet and, working effectively in small groups, produced short presentations in PowerPoint on their findings. There was even time for two of the groups to share their findings with the whole class before the session ended.

20. Departmental or subject Intranets were developing well. In some of the larger institutions visited, they were already very well developed and provided interesting and user-friendly information for students and staff. Most subject sites contained copies of syllabuses, schemes of work and assessments, together with deadlines and assessment criteria. The best contained summaries of key concepts, examination questions and mark schemes, links to useful websites and photographs, diagrams and video/TV clips.

Assessment

21. Assessment in the sciences was judged to be outstanding in eight colleges, good in eight other institutions and satisfactory in two. Outstanding assessment enabled students to be fully aware of their target grades and the progress they were making. Their science teachers discussed their target grades sensitively with them; the students did not regard these as predictions but as real targets to aim for. Regular assessments involved a variety of activities, including written assignments, reports on practical work, problem calculations, examination questions, tests and quizzes. Marking was thorough and constructive, with written comments that helped students to understand what they needed to do to improve their work and grades. Past examination papers and mark schemes were used effectively so that students were confident about the standards expected.

22. Well planned strategies helped students to make the most of the modular examination system at AS and A level. They were encouraged to take an informed and strategic approach to module entries and repeats. Although there was no overall consensus by the institutions in the survey, most students would take one module in January and the remaining modules in June each year. Students were encouraged to think carefully about repeat module entries and it was not uncommon for students to retake AS modules in the second year when they had a better overall grasp of the subject matter. A number of science teams in the survey, although not the majority, had opted for practical examination tests instead of coursework options at AS and A level. The results so far were good and these teams did not intend to return to coursework.

23. Reviews of students' progress took place regularly and many institutions set aside time each half term for students' individual meetings with teachers. Target grades and progress were discussed, targets were modified if necessary and specific actions were planned. However, in a minority of the science departments visited, individual learning plans were not developed sufficiently to be of real use to science students. Assessment for learning was still underdeveloped, specific and time constrained targets were not used well and the quality of some marking was inconsistent.

Support for students

24. Most science teams in the survey had highly effective systems to identify students who were making slow progress or not meeting their targets. Very good attendance tracking and rigorous follow up of absentees were supported by effective help for students to catch up with missed work. This was made easier by subject-specific Intranet sites which contained easily accessed copies of all assignments and worksheets. Science teachers liaised closely with support workers to ensure that learning support was effective, both in class and outside it. Regular informal reviews of progress, linked to target grades and test and assignment marks, ensured that good progress was celebrated, poor progress was identified quickly and help provided. The science teachers were particularly adept at recording and tracking their students' progress.

25. In some of the sixth form colleges visited, peer mentoring was well organised and was a highly effective means of improving students' grades. Year 13 student mentors spoke very positively about helping students in Year 12 and the unexpected benefit to them of getting to know a topic very thoroughly in order to help someone else.

26. Subject-based workshop sessions were also used successfully to help students complete assignments and improve their performance. The timing and the number of workshops varied according to the size of the subject teams.

In one large sixth form college, subject support workshops were available most of the time throughout the week. A regular timetable was posted in the corridors and teachers were allocated time within their contracted hours to cover the sessions. A large number of students of all abilities attended the workshops to complete assignments and take advantage of the help available.

Student enrolments and the science curriculum

27. Enrolments on AS and A-level science courses in sixth forms in schools numbered between 250 and 400 students; the numbers on science courses in sixth form colleges were much larger, with student numbers of 1,500 and above. In the general further education and tertiary colleges, science courses were not large in relation to enrolments as a whole, but student numbers often exceeded 700.

28. In the school sixth forms and sixth form colleges visited, the majority of courses offered were at level 3, that is to say at GCE AS and A level. Most schools offered biology, chemistry, physics and psychology and the average class size was around 10. In sixth form colleges, the offer was usually wider, with electronics, environmental science and geology also being offered, with larger class sizes.

29. The numbers studying physics remain relatively small in schools and sixth form colleges, whereas the number of students taking psychology has increased markedly over the past few years.[1] In one sixth form college, over 600 students were studying AS and over 400 were studying A level psychology.

30. Science departments used a variety of syllabuses. Salter's and Nuffield courses in chemistry, biology and physics were offered as alternative syllabuses in some schools and sixth form colleges. A small number of schools and sixth form colleges in the survey offered courses aimed at broadening the scope of science studies. These included AS public understanding of science and AS perspectives on science. Small numbers of students took these courses and enjoyed the breadth of discussion and topics that they entailed.

31. The general further education and tertiary colleges visited offered AS and A-level courses alongside vocational options such as BTEC National courses in applied science, forensic science, ophthalmology and dispensing pharmacy

[1] Psychology is classified as a science in the Learning and Skills Council subject sectors but is often taught as a social science in schools and colleges. For the purposes of this survey, psychology has been treated as a science subject.

qualifications. These courses attracted a wider range of students, often adults, than those taking the sciences in schools and sixth form colleges.

32. In addition, general further education colleges offered level 2 courses (usually BTEC diplomas) as progression routes to level 3 studies. Enrolments on level 2 vocational courses were not high. In schools and sixth form colleges, progression to level 3 was usually through GCSE, and vocational science courses at levels 2 and 3 were rare but not unknown. Some provision was made for level 2 sciences in sixth form colleges, usually as repeat GCSE subjects. Again, numbers were not high and progression routes from level 1 through level 2 on to level 3 sciences were underdeveloped in all the institutions visited.

33. Sixth form colleges and general further education colleges in the survey successfully offered access to higher education courses in a variety of sciences, including nursing, pure sciences and psychology. Again, these attracted mainly adult students who had returned to study later in life and, although not enrolling large numbers of students, they often had good success and progression rates.

Enrichment

34. In 15 of the institutions visited, stimulating extra-curricular activities enthused and interested science students. Teachers gave their time freely for these activities, some of which took place during weekends, half-terms and holidays, in order that their students could experience science in different contexts.

35. Most of the science departments organised informal activities such as talks by visiting scientists, trips to local laboratories and museums or discussions on current topics of scientific interest. Biology fieldwork was popular and some visits had taken place abroad, such as to Belize, Malta and Australia.

36. Four of the institutions had very good links with local science industries. Their science teachers had recent industrial experience and were developing or teaching specialist vocational science courses. More generally, however, schools and sixth form colleges had few links with local industry and enrichment activities had an academic rather than vocational focus.

37. Students spoke highly of the visits which were organised to help them to decide on specific science career pathways. These were sometimes augmented by peer mentoring schemes where Year 13 students discussed their career options with their Year 12 counterparts. Grant aid from scientific bodies such as the Royal Society had enabled some schools to fund students' attendance at examination revision courses. In addition, some institutions had successfully hosted talks by chief examiners from examination awarding bodies to help their students prepare for module tests.

Staffing, resources and accommodation

38. Overall, the science teachers in the institutions visited were experienced, well qualified and taught their own science specialism. The vast majority had teaching qualifications and many of them had post-graduate research experience. The technical support for science teaching was very well organised and practical work was well prepared.

39. There was no lack of scientific equipment and practical work was usually resourced for individual or small groups. However, some teams teaching physics and electronics stated that expensive equipment such as single beam oscilloscopes was in relatively short supply.

40. In around half the institutions visited, newly built or refurbished laboratories provided a very good environment in which to study sciences, including bright, informative posters on walls and in corridors. The laboratories were set out so that the full range of learning activities could take place easily. In most science departments, students' work was given prominence and featured as colourful posters and displays.

41. Most science laboratories had electronic projectors; the proportion fitted with electronic whiteboards was highest in the sixth form colleges. Nearly all the laboratories had at least one personal computer which was usually used by the teacher for registration and presentations. Few laboratories had more than three or four personal computers for students' use. Environmental science and electronics laboratories had the best computing facilities, usually one for each student.

42. During the survey, some curriculum teams mentioned times of budgetary constraint, but no team said that it had inadequate funding to resource courses.

Leadership and management

43. Leadership and management were outstanding in 11 colleges and schools in the survey and good in the remainder. Overall, science departments were very well led and the day to day management of teaching and learning and resource allocation was efficient. Science teams had a strong focus on students' achievements, on improving the quality of teaching and learning and a student-centred approach to tackling any issues that arose. Lesson observations, including peer observation, were well established and team leaders were confident in identifying the strengths and weaknesses of teaching in science. Good practice was disseminated well through team meetings and communication was good. Teachers frequently discussed better ways of teaching difficult topics. In some institutions, subject learning coaches had been identified and trained and they worked well to ensure that teams discussed a variety of approaches to teaching and learning.

As part of improving students' achievements, the senior management team at a sixth form college encouraged teachers to involve themselves in action research. Among a number of interesting projects, a psychology specialist investigated the effects of grades and written feedback on A-level students and uncovered a good deal of very useful information relevant to motivating and encouraging high-performing students to improve their performance.

44. Self-assessment was comprehensive in most science teams. Teams were self-critical and worked collaboratively to produce annual assessment reports and action plans. Course reviews were honest and open about strengths and weaknesses. Thorough analyses of centrally produced data ensured a consistent approach to quality assurance. Students' progress, attendance and retention were recorded well and demanding targets for students' achievements were set. Self-evaluation reports were less well developed in the science departments in the schools in the survey, compared with those in the colleges, where self-assessment had been in place for much longer. A small minority of the curriculum teams did not use value-added data effectively; others produced lengthy and largely descriptive reports without identifying key areas for development.

45. Science teachers and their managers were well aware of the methodological differences in calculating value-added scores. They expressed concern about the different scores obtained, from the same base data, by the Advanced Level Information System, the Advanced Level Performance System, and Learner Achievement Tracker. They wanted a consistent method for calculating value-added scores as a matter of urgency because of the emphasis placed on setting and meeting targets.

Notes

The survey was conducted between October 2006 and April 2007. A sample of 18 schools and colleges was selected, comprising four grammar schools and one comprehensive school, nine sixth form colleges, one tertiary college and three general further education colleges. The colleges and schools were selected because the science provision had been judged to be outstanding or good by Ofsted in their previous inspection.

The visits were conducted by two HMI and two Additional Inspectors. During each visit, the inspector observed at least six lessons, scrutinised students' work, curriculum teams' plans, schemes of work and self-assessment reports and held meetings with students, teachers and managers.

Useful websites

The British Educational Communications and Technology Agency (Becta) provides useful e-learning resources and links to alternative sites to access further digital and interactive technology materials for use by teachers: www.becta.org.uk/

Further information on qualifications in science can be found on the Qualifications and Curriculum Authority (QCA) website: www.qca.org.uk/qca_12891.aspx

The QCA's website includes some material across the range of science subjects which is useful for post-16 studies: www.qca.org.uk/qca_8058.aspx

The Quality Improvement Agency's website has useful information on innovation and excellence in the post-16 learning and skills sector: www.qia.org.uk

The QIA excellence gateway is for post-16 learning and skills providers. It is the new home for Excalibur.[2] Here you will find examples of good practice and self-improvement; suppliers of improvement services; and materials to support teaching and learning:

- http://excellence.qia.org.uk
- Excalibur Good Practice Database: http://excellence.qia.org.uk/goodpracticedatabase

Colleges and schools participating in the survey

Beverley Grammar School, Beverley, Yorkshire
Chislehurst and Sidcup Grammar School, Sidcup, Kent
City and Islington College at Marlborough Building, London
Ealing, Hammersmith and West London College, London
Greenhead College, Huddersfield, Yorkshire
Havant College, Hampshire
Heckmondwike Grammar School, Kirklees, Yorkshire
Hereford Sixth Form College, Hereford, Herefordshire
Maidstone Grammar School, Kent
Nelson and Colne College, Nelson, Lancashire
New College Swindon, Wiltshire
Pendleton College, Salford, Greater Manchester
Peter Symonds College, Winchester, Hampshire
Sir John Deane's College, Northwich, Cheshire
St Dominic's Sixth Form College, Harrow, Middlesex
The Cherwell School, Oxford, Oxfordshire

[2] Excalibur is now called the Good Practice Database.

The Sixth Form College Farnborough, Hampshire
Winstanley College, Wigan, Greater Manchester.