

## **Science Provision Review**

### **Haydon School Hillingdon**

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#### **Introduction**

The review was performed over four days and consisted of a series of dual observations (With Haydon staff) of all the science teachers plus meetings with subject leaders, HOD, KS3 coordinator and AST. All but one of the teachers had feedback on their lessons.

The department consists of a group of well-qualified specialist teachers. There is a good mixture of experienced staff together with a number of teachers who have recently joined the profession. The department is organised into subject specialisms with heads of chemistry, biology and physics. There is also a post of responsibility focused on Key Stage 3. The department has at the moment one AST although there is a possibility of a second post in the near future. The laboratories are spread over two floors and are in general well appointed and resourced. However, some science lessons cannot be timetabled in a laboratory. There is access to ICT facilities.

The teachers are well supported by an effective team of technicians. These have their own areas of responsibilities and work in a cooperative manner within these areas. There is a clear delegation of responsibilities for KS3, biology, chemistry and physics (including the sixth form). The support for dual science award is less well defined but effective. The technicians' workload is heavy having, on average, 50-60 lessons to prepare per week including extensive sixth form practical investigations. The technicians have attended the necessary training including child protection. There is only one trained first aider.

The department is led and managed by a head of department with responsibilities for coordinating and monitoring the range of subjects and courses offered. There is a clear line-management structure with a member of the LST.

## **Standards and achievement.**

Students enter the school in Year 7 with prior attainment significantly above the national average. The national aps at the end of Year 6 has been around 27.8 over the past few years while the average level of attainment on entry for Haydon students is 29.1. This is judged at above national average on entry. There are a significant number of students who enter the school at 33+ aps and represent high standards well above the national average.

The percentage of students gaining at least a level 5 in science has been 87% over the past three years. This is above the national average and LA average of 72%. This represents good achievement of these students based on their prior attainment. The percentage figure is however below that seen in the two other core subjects. The percentage of students gaining a level 6 in science has been relatively constant over the past four years at 67%. This is well above both the national and LA figures. This again represents good achievement in science. This figure is similar to that from English but below that of mathematics. There is, at the moment, no validated or un-validated data on inclusion group achievement or attainment in the Raiseonline for analysis.

At Key Stage 4 in 2008 the standards analysis is complex as the students followed a rather unusual choice of courses. Haydon delivered GCSE courses where students could choose to take 1,2 or 3 of the separate sciences or a dual award applied science. The outcomes are not collated in the Raiseonline for 2008 to give a detailed picture of the outcomes. The data within the Hillingdon SEF data analysis review gives a somewhat more accurate reflection of the outcomes. In the 2008 Raiseonline the published figure for the percentage of students gaining a dual certification in science is based on the outcomes from the Applied GCSE course only and does not take into account any students gaining two GCSEs from the choice of separate sciences. The published figure for dual science is 55% in the table (p55) but 41% on the attainment in science page (p 48). The graph on p48 indicates that standards in dual science was significantly below the national and considering the level on entry could well represent inadequate achievement if it was applicable to the whole cohort. The published figures of percentage A\*-C for biology (83%), chemistry (92.1) and physics (86%) are accurate. Although these figures for separate science are relatively high compared to applied science they are only at or close to the national figures. When the relative performance indicator data is analysed biology (-2.0), chemistry (-0.8) and physics (-3.0) indicate that the students did not do so well in these subjects compared to the other subjects they took at GCSE. The percentage of students gaining the highest grades at GCSE (A/A) were below those seen nationally indicating some underperformance by the students with the highest potential.

Fortunately from analysis undertaken during the review and from the SEF data analysis report a clearer picture emerges. Overall 62% of all Year 11 students at GCSE in 2008 gained at least two grade A\*-C GCSEs in science. This overall and embracing figure is apparently not used in the ROL but is used by Hillingdon. The detailed inclusion group analysis from this LA document clearly indicates that standards are rising in science and probably might represent something close to good achievement if a ROL CVA was published. The contextual FFT indicators notes that the achievement of students is below the FFT D band threshold suggesting satisfactory achievement at best. This data also indicates that although standards are rising in science they are still below those in English (Lang and Lit) and possibly mathematics although it must be remembered this is a single certification. There is no significant difference in the attainment between boys and girls. There are differences however in the attainment of lower attaining students in science including students with LDD when compared to their peers and in the other core subjects. The other significant outcome is that higher attaining students in science underperform significantly when compared to English and mathematics. It is probable that the negative RPI for science in the separate sciences is due mainly to this fact.

Overall therefore standards were above national figures and the achievement in science in 2008 was likely to be good for the majority of students in both key stages but less so with the lower and higher attaining students.

The ALPS analysis for A2 science indicate that standards were above the national and the achievement in all three subjects was good. The AS results were however at or below the national and represents inadequate achievement for some of the students with an ALPS grade of 7-8. The relatively poor progress of students in Year 12 is due to a relatively large number of students struggling with the subjects and attaining grades well below those predicted. Most of these students do not progress, in science, to Year 13.

### **Personal Development and Well Being**

In the lessons observed and in the corridors between lessons the behaviour of students was good. They share very good relationships with each other and work in a constructive and cooperative manner in class with group activities and practicals. Practical activities are performed in a careful and safe manner although in one lesson some students were reluctant to wear goggles even when instructed. All the teachers observed had effective classroom control and, where necessary, followed the behaviour policy well. Teachers and students share good relationships and in discussions students appreciate the quality of teaching they receive and have respect for their teachers. The atmosphere in the vast majority of lessons was relaxed and supportive. The students show a good attitude to learning and are able to work independently

in most cases without the need for correction. This leads to a situation where the teachers can focus on teaching and supporting students. Attendance is not an issue and this is not a significant factor in student progress. In discussions the students stated that they enjoy science and feel they are doing well. There are opportunities for practicals but few trips, visits or visitors.

### **Curriculum**

The science curriculum has recently been modified into a somewhat more logical structure. Students now have the choice of following all three separate sciences or the dual award core/additional science at GCSE. The Key Stage 3 curriculum has started to embrace the new National Curriculum objectives of making science more engaging and relevant. This will be a key issue for the Key Stage coordinator.

The delivery of the curriculum is well planned with clear timescales for module delivery following a logical order. There are sufficient specialist teachers who are able to deliver the separate science content. Most teachers have their own laboratory but some science lessons cannot be accommodated in a laboratory. For whatever reason science delivers the curriculum to mixed ability groups in Years 7 to 11. This is unusual and sets a real challenge to lesson planning, resourcing and delivery.

There is sufficient time to deliver the courses offered at GCSE. The post 16 curriculum in science reflects the needs of students with large numbers opting to follow science subjects in the sixth form.

There was little evidence of science enrichment or support activities outside the timetabled lessons.

### **Teaching and Learning**

19 Lessons were co-observed during the review and all staff were seen teaching. In all cases the joint observation outcomes were similar indicating that the school is very able to make accurate judgements on the quality of provision and learning.

Of the lessons observed the progress made by students was adequate in nine lessons, good in eight lessons and outstanding in two. No inadequate teaching was observed. The head of department in discussions regarding the outcomes of the observations demonstrated a good knowledge of the

teaching within the department. Overall therefore the teaching in science would be good but not a really strong good. Lessons were well controlled with the students keen to enter into class discussions and to answer questions. They were attentive to both teachers and peers. One of the major factors that restricted progress in lessons in Years 7 to 12 was the mixed ability of the students and the fact that, in general, the HA and LA students made less progress than the other students. In some lessons the HA were insufficiently challenged and not only found the work too easy but also finished quickly. Many lower attaining students found the work too hard and could not understand or complete the tasks leading to off-task chatter. An exception to this was seen when students with LDD were supported in class by a LSA where the progress was better due to effective support. In Year 13 the situation was slightly better as the grade differences between students was narrower. Even in some of these lessons the HA (Grade A potential) student was insufficiently challenged while a few less able students struggled.

This demonstrates a central issue throughout science. If the classes are to be mixed ability then it is essential that effective differentiation strategies and resources be implemented to support all students. There were a few instances in the brief lesson planning sheets where differentiation was mentioned such as additional help for some students but this was not evident during the observation.

Lesson planning is insufficiently detailed. There is no evidence of prior attainment data being used to identify suitable learning objectives. Many planning sheets show national strategy structure with a starter, learning phase and plenary. In reality some lessons start late and the starter is too long. The learning phase is often teacher dominated with only one or two activities that did not engage the students sufficiently. In the really successful lessons the teachers shows real enthusiasm and effectively shares this with the students. The pace of the lesson is rapid with students being directly involved in group work, discussions and presentations that were arranged in short sharp focused and timed activities. After one really good lesson the student said "Is that the end where did the time go". During the student activities the teachers circulated effectively entering into discussions with students, asking challenging questions and assessing their understanding in a very effective manner. Many teachers handle Q&A sessions well. They are able to control the room and ask targeted questions at selected students. Other teachers ask a question then choose a student who is willing to answer or sometimes accepting an answer that was called out. This mainly involved boys and as a result the girls tended to keep quiet and go passive making it difficult for the teacher to assess their learning or understanding.

All teachers demonstrated good subject knowledge and were able to respond to student questions with clear explanation. This was especially true in the sixth form where the subject knowledge of staff was of a high standard. A quality appreciated by the students.

## **Care, Guidance and Support**

The use of AfL strategies is emerging within science. There is evidence that teachers are skilled in assessing the learning of students but this is sometimes not fully inclusive. There is a lack of data use within the department. Little evidence was seen of teachers referring to prior attainment in their lesson plans to identify suitable and challenging learning outcomes for all students. Students were rather vague about their target grades in some lessons and fewer students were aware of their current attainment or what they needed to improve. Books are marked according to the departmental policy on a regular basis. Teachers obviously spend a great deal of time checking, correcting and annotating notes. These notes have narrative comments added that seems to have little impact. Very little of the work is levelled or graded and even fewer comments are given on what that student needs to do to improve. The department will need to review this area so that notes are, or course, monitored but a real focus is made on assessments to determine the level/grade achieved then matched to their target. An analysis of student response will indicate those areas that need further revision/explanation in order to improve. As science is not sequential this assessment should ideally be performed during the module and not just at the end. This process of early intervention should be used to support students not reaching their targets and praising those who exceed theirs.

The department has recognised that many students (HA) do not reach their potential grades. These students must be identified and strategies put in place to ensure they succeed. Likewise there are too many D grades at GCSE. A target group of students should be identified and supported in areas where they struggle to help them gain a grade C. It is hoped that with this monitoring of progress approach the students at AS will also be more effectively supported.

## **Leadership and Management.**

The head of department is a good role model for the department and works in a supportive manner to guide all staff. He is well supported by the three subject heads that organise the delivery of their subjects in an efficient manner. The staff within the department are cooperative and open to suggestions and recommendations. This is clearly illustrated by the effective way in which the behavioural policy and procedures are followed in a consistent manner by all staff. The subject leaders and head of department are fully aware of the strengths and relative weaknesses within their areas.

The schemes of work and programmes of study are well planned and delivered effectively. The department is large but there is no dedicated workroom/social area where they can meet and informally discuss issues and ideas.

The department's use of data is not effective. The use of data to evaluate the effectiveness of the teaching and learning is not sufficiently rigorous. For example from the GCSE outcomes and the departmental SEF there is no indication that the achievement for higher attaining students was lower than expected at GCSE. Subsequently there was no mention of what strategies would be adopted to overcome this issue. End of module or block assessments are performed and underachievement identified. However, there is no chance of the student improving as the next module is a totally different topic. No effective analysis is performed on class outcomes or on inclusion group achievement.

Staff do not use baseline student data in an effective manner to plan and evaluate their teaching. All staff should have access and use this baseline data to inform students of their end of year and key stage targets. All assessments are then linked to these individual targets to monitor progress. At the present time students are, in general, unsure of their targets, their current attainment or what they need to improve. The attainment of individual targets should be central to the engagement and motivation of all students.

Formal assessments are performed at the end of blocks in Key Stage 3 after three modules (9 weeks) or with unit examinations at GCSE. The data obtained is not used in a rigorous manner to evaluate progress or other issues. Also it is, in many cases, too late to help and support students improve and therefore not in the spirit of AfL. The department needs to look at ways in which students' attainment can be measured within a module to ensure they are on target and to identify areas of understanding that need addressing before the summative assessment. In this way any underachievement can be addressed to assist success. This early intervention is vital in the non-sequential nature of science assessment. The monitoring and subsequent mentoring of students is an issue for the department. This monitoring data should be shared with subject leaders, managers and key stage coordinators and also with heads of house/tutors. The reaching or exceeding of targets might be linked to the rewards system.

There needs to be an agreed "Learning policy" across all staff based around planning effective lessons. Teachers should be looking at ways to engage ALL students, setting challenging learning outcomes in lessons that are enjoyable. A motto of "To enjoy science is not a sin" might be adopted. The use of data, identification of learning outcomes, using an extensive range of T&L styles, short sharp focused student based activities and effective evaluation of student learning should be central. There is a vital need to routinely include differentiated tasks and resources in the mixed ability classes to ensure all students are challenged and make good progress. This was discussed in detail with HOD, KS3 coordinator and the AST and it was suggested that any new developments should be trialled in KS3 through the coordinator and AST. Some support suggestions are attached as an appendix.

## **Overall**

Science is a good department with real potential. It consists of enthusiastic and capable teachers with a shared desire to improve and give success to their students. The department has clearly shown it is able and willing to adopt and implement whole school policies. They will need to be supported and guided by the managers within the department if it is to match the outcomes of the other core subjects and become outstanding.

Well-qualified subject specialists who teach with enthusiasm

Well-mannered and behaved students who enjoy their lessons and share good relationships with their teachers

Well supported by technical team

## **Areas for development**

1. Use of data to evaluate outcomes including inclusion group analysis and quality of teaching as discussed with HOD.
2. More engaging student-focused lessons that have pace and enjoyment.
3. Differentiation within lessons to ensure good progress is made by ALL students.
4. Setting of individual student targets that are used by staff and students to monitor progress within a module of work
5. Early intervention for students not achieving their targets BEFORE the summative examination
6. Mission statement "All students regardless of the ability will reach their aspirational targets".

## **Suggested strategies and strategic plan.**

Discussed in detail with HOD, KS3 coordinator and AST.

1. Baseline data class sheets to all teachers including inclusion group details such as b/g, KS2/3 outcomes (En, ma and sc), end of year and end of key stage targets, inclusion group details, b/g, HA,MA,LA,LDD,EAL for later analysis when on-going formative assessment is introduced. To be used when planning lessons and deciding on learning outcomes. HOD
2. Extend this data into a formative tracking spreadsheet to be shared with students. Hiding the targets etc but conditional formatted so when an assessment mark is entered this is modified to a level that is

compared to the individual target and if above cell is green if below goes red etc. Individual target tracking to engage and motivate. Any student not reaching target is mentored and areas of weakness identified to enable the individual to improve. HOD

3. To produce a simple guideline to all teachers in planning for engaging and enjoyable lessons that are fully inclusive and enables all students to make good progress. KS3 coordinator and AST.
4. Extend use of AfL strategies for formative assessment. KS3 coordinator and AST
5. Trial of use of data, formative assessment with Year 7 next term linked to lesson planning. All.

#### Note

This review was made enjoyable by a series of factors. The outstanding organisation of the schedule, the professional and welcoming nature of all staff and the open discussions held with the managers within science.

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