Subject Inspection of Science and Biology
REPORT

Plunket College
Swords Road, Whitehall, Dublin 9
Roll number: 70310K

Date of inspection: 26 April 2010
REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN SCIENCE AND BIOLOGY

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Plunket College. It presents the findings of an evaluation of the quality of teaching and learning in Science and Biology and makes recommendations for the further development of the teaching of these subjects in the school. The evaluation was conducted over one day during which the inspector visited classrooms and observed teaching and learning. The inspector interacted with students and teachers, examined students’ work, and had discussions with the teachers. The inspector reviewed school planning documentation and teachers’ written preparation. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal and subject teachers. The board of management was given an opportunity to comment in writing on the findings and recommendations of the report; a response was not received from the board.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

Plunket College operates under the auspices of the City of Dublin Vocational Education Committee (CDVEC). The programmes on offer in the school are the Junior Certificate, the Junior Certificate School Programme (JCSP) and the established Leaving Certificate. The school also offers a number of post-Leaving Certificate courses (PLC). It has a current enrolment of 522 students – a population which is predominately male but the school admits female students who wish to repeat the Leaving Certificate. Science is a core subject in this school and there is one class group in each year of the junior cycle. Biology is an optional subject on the school’s senior-cycle curriculum. There is one class group taking Biology in each of fifth year and sixth year. In both years of the senior cycle, a separate class group has also been formed for students who wish to repeat Biology in the Leaving Certificate. In addition, there is one Leaving Certificate class of adult learners. All classes are taught in mixed-ability settings.

In the junior cycle, Science is allocated three class periods per week in first year and four class periods in second year and in third year. Lessons are well spread throughout the week. In the senior cycle, some biology classes are allocated four lesson periods per week while others are allocated five. Management should address this imbalance, particularly as the guidelines from the National Council for Curriculum and Assessment (NCCA) suggest five periods per week.

The school has two science laboratories. While these are well organised, a number of issues are in need of urgent attention from a health and safety perspective. At the time of the evaluation, the provision for gas in both laboratories was being reinstalled to include an emergency shut-off point. As part of the ongoing upgrade of the laboratories, there are plans to install a similar shut-off point for electricity and this essential health and safety measure should be prioritised. Both
laboratories have fume cupboards, however, only one is functional. It is recommended that management should arrange to have the second fume cupboard repaired or replaced.

The laboratories are linked by a preparation area and chemical store. Lockable cabinets for flammables and toxics are available in this area. In line with good practice, the science team has begun the process of organising kit-boxes for a number of Junior Certificate practicals. It is recommended that kit-boxes be developed for all mandatory practicals. The science team should discuss how a staged approach can be adopted to facilitate this. In addition, it is good to note that the science department has begun to organise chemicals according to the colour-coded scheme advised by the Second Level Support Service (SLSS). Holes and cracks in the flooring of the preparation room have been reported to CDVEC and plans are in place to repair the floor in the immediate future. This should also be prioritised.

A range of appropriate health and safety equipment was observed in the laboratories. This included fire extinguishers, fire blankets, sand buckets and safety goggles. Procedures are in place for the efficient reporting of accidents and breakages. Fire alarms in the laboratories have recently been replaced with heat sensors. The location of one of the heat sensors should be reviewed as its proximity to the school heaters is causing inaccurate warnings.

Three teachers deliver Science and Biology in Plunket College and they are all subject specialists. Teachers work collaboratively while one member of the team co-ordinates the subject department. The role of science co-ordinator is currently part of the post of responsibility structure in the school. In future, there is scope to rotate this role amongst the members of the department.

School management encourages continuing professional development (CPD) for teachers both in relation to Science and to whole-school issues. As part of the induction programme, teachers who are new to the science department are mentored by a more experienced colleague. The learning-support co-ordinator provides the members of the science department with information on the learning needs of students. The science teachers also refer students to the learning-support department when the need arises. These good practices in relation to learning support reflect the school’s commitment to cater for the needs of all its students.

**Planning and Preparation**

Subject department planning is fairly well established in the school. Minutes of science department meetings, dating back to September 2000, provided evidence that teachers are working collaboratively to plan and monitor the teaching programme. The planning process is facilitated by the provision of formal planning time by school management once per term and by the work of the subject co-ordinator. Informal planning takes place on an ongoing basis as teachers discuss issues as they arise.

A subject department plan has been developed for both Science and Biology. They are based on the school development planning initiative (SDPI) template. The plans refer to the aims and objectives for the science department and outline the organisation of classes in both Science and Biology. The plans also contain a programme of work for all year groups. These programmes are set out in terms of learning outcomes. There is scope to expand the programmes by linking the stated learning outcomes to curriculum content, timeframes, resources, teaching methods and assessment. This is recommended.
Planning and preparation by teachers for all of the lessons observed was of a good standard. The lessons had clear aims and the good practice of sharing the aims of the lesson was evident in most of the classrooms visited.

Teaching and learning in all lessons was supported by teacher-generated resources. Resources used included plant samples, worksheets, diagrams shown via the data projector and overhead projector, laboratory equipment and supplementary text books. Both laboratories have data projectors and teachers use their own laptops. One laboratory is broadband enabled and there are plans in place to provide internet access in the second laboratory. This should have a positive impact on teaching and learning. It is recommended that, in the review of the programmes of work, reference to resources such as ICT be included.

**TEACHING AND LEARNING**

A positive, affirming and mutually respectful atmosphere was observed as teachers and students engaged in teaching and learning. Students were addressed by their first name and willingly participated in the planned learning activities. Clear classroom routines were evident in all of the classrooms visited. Lessons began with a roll call, homework was corrected, previously learned subject matter was recalled through focused questioning before new subject matter was introduced and lessons concluded with homework being assigned. This provided a secure environment that facilitated teaching and learning.

Good quality teaching was evident in the majority of the lessons observed, as teachers used a variety of methods to engage students in the learning process. Best practice was observed when there was a good balance between teachers’ exposition and students’ activity. Instruction was clear and lessons were appropriately paced. Students were encouraged to develop higher-order thinking skills when teachers used questioning to encourage students to analyse outcomes and elaborate on discussions. There was an obvious sense of enjoyment as students completed some of the set tasks. In some lessons there was much emphasis on teacher input and not enough student engagement. Teachers are advised to ensure that all students take part in the classroom activities.

Most teachers have adopted a visual approach to teaching the science and biology programmes. In the lessons observed the use of overhead projector and data projector stimulated students’ interest and facilitated their understanding of concepts. This was particularly evident in a lesson on genetics where problems to be completed by students on base pairs and genetic screening were incorporated into the presentation. Effective use was made of the overhead projector when the diagram of the transverse section of the flower was supported by the use of well-designed worksheets. In another lesson, first-hand experience was used in an effective way as samples of plant material from a previous lesson showed transpiration. This was very effective in helping students to understand the process which had taken place.

Students displayed a good knowledge of the subject material and willingly engaged in discussions with their teachers. They were able to use correct subject-specific terminology and could apply their knowledge to real-world settings. At the beginning of one lesson, good use was made of a question and answer session to revise acids and bases. This exercise provided a sound introduction as well as an effective recapitulation on what had already been learned previously. In another lesson, where the focus was on revision, students were given a follow-up question
based on the lesson content to check learning. The provision of such ‘quiet time’ is good practice as it allows students time to reflect on subject matter. This was followed by a discussion of the answers by teacher and students where information was checked and further issues elaborated upon.

The displays of posters, photographs, newspaper clippings and student-generated work provided a stimulating learning environment in both of the laboratories visited. This is an important way to acknowledge and celebrate students’ efforts. A special-needs assistant worked unobtrusively with some students in one lesson observed. Students were also given individual attention by the teacher during group work. When new terms were introduced into lessons, they were clearly explained and students were encouraged to use these in responding to teachers’ questions. There is scope to display lists of key scientific terms in the laboratories. Students for whom English is an additional language should be helped to build up a glossary of key scientific terms. Teachers should provide a list of key words used in lessons.

**ASSESSMENT**

Students are supported and facilitated in maintaining accurate records of their written work. In junior-cycle classes, students have a hardback notebook for class work and use a copybook for homework. In the senior cycle, students use a folder in which to keep a record of their work. This also provides a valuable revision aid when preparing for assessments. Students also have hardback notebooks or record books in which to note mandatory practical work. Junior Certificate mandatory notebooks are retained in the school. Senior-cycle students retain their own mandatory practical books. Those observed were of a good standard and overall reflected the mixed abilities present in the classes visited.

Homework is regularly assigned and monitored. At the time of the evaluation, some teachers were engaging in revision for the certificate examinations. Feedback was provided where students had answered past examination questions. Practices around the correction of and feedback on student exercises varied. The science team should discuss best practice in the assessment of students’ work and develop an assessment policy for Science in the school. The agreed assessment policy should then be implemented by all members of the science team.

Students’ progress is also assessed through questioning during lessons and by holding class tests when sections of the planned teaching programme are completed. Teachers maintain records of attendance, homework and class tests. These are used to inform discussions at parent-teacher meetings which are held annually for each year group.

Formal assessments are held at Christmas and at the end of the summer term. It is recommended that teachers include a percentage of marks for the standard of mandatory notebooks or for the write-up of particular practicals in the final grade in the formal assessments. Third-year and sixth-year students sit pre-examinations in the second term. Reports are issued to parents following formal assessments. It is commendable that an extra report for repeat Leaving Certificate students is issued in October in order to give prompt feedback on their progress.

An analysis of results obtained in the certificate examinations is carried out annually. This can provide useful information to teachers in relation to learning outcomes and to facilitate future planning. It is therefore recommended that the science teachers use this analysis in planning for teaching and learning of Science and Biology.
SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- School management encourages continuing professional development (CPD) for teachers both in relation to Science and to whole-school issues.
- Teaching and learning in all lessons was supported by teacher-generated resources.
- A positive, affirming and mutually respectful atmosphere was observed as teachers and students engaged in teaching and learning.
- Teachers used a variety of methods to engage students in the learning process.
- The displays of posters, photographs, newspaper clippings and student-generated work provided a stimulating learning environment in both of the laboratories visited.
- Teachers maintain records of attendance, homework and class tests. These records are used to inform discussions at parent-teacher meetings which are held annually for each year group.

As a means of building on these strengths and to address areas for development, the following key recommendations are made:

- Management should ensure that the health and safety issues with regard to the science laboratories are addressed as a priority
- The programmes of work for Science and Biology should be expanded by linking the stated learning outcomes to curriculum content, timeframes, resources, teaching methods and assessment.
- The science team should discuss best practice in the assessment of students’ work and develop an assessment policy for Science in the school. The agreed assessment policy should then be implemented by all members of the science team.
- Students’ final grades in the formal assessments should include a percentage of marks for the standard of mandatory notebooks or for the write-up of particular practicals.

A post-evaluation meeting was held with the teachers of Science and Biology and with the principal at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.

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