An Roinn Oideachais agus Scileanna

Department of Education and Skills

Subject Inspection of Science and Biology
REPORT

Blessington Community College
Blessington,
County Wicklow
Roll number: 70760S

Date of inspection: 11 October 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 Blessington Community College, conducted as part of a whole school evaluation. 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 the 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, 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 teachers.

SUBJECT Provision AND whole school support

The school provides the Junior Certificate, a compulsory Transition Year (TY) programme, the Leaving Certificate and the Leaving Certificate Vocational Programme (LCVP). At the time of the evaluation, 271 students were attending the school. Class groups are arranged on a mixed ability basis throughout junior cycle and groups for Biology are also mixed ability.

Science subjects are very strongly supported on the curriculum and with appropriate resources. A recent decision was taken to make Science a core subject on the junior cycle curriculum from the 2010 intake onward and this is commended. Good timetable provision is made for the subjects; Junior Certificate Science is allocated four periods per week in first, second and third year, TY Science is allocated two periods and Biology is allocated five periods per week in both fifth and sixth year. Each allocation includes one double period in line with best practice.

During TY, the school’s guidance counsellor provides advice and support to students and their parents on subject choice for Leaving Certificate. Biology and Physics each have very good uptake levels; currently, forty-four percent of senior students are studying Biology and thirty-two percent study Physics. There is one biology class group and one physics class group in each year. Unfortunately, access to Biology and Physics was restricted for the current sixth year group as both subjects were placed on the same option line. This has been improved this year and the current fifth years can do both Biology and Physics if they wish. This is a positive development.

There is one laboratory and one adjacent demonstration room in the school and these rooms are used by the two science teachers. Although teachers demonstrate flexibility and work well together, they generally remain in one or other room. It is strongly recommended that greater rotation take place. To ensure this, laboratory access should be formally assigned on the school timetable annually so that each class group is allocated one double lesson there. Teachers should then rotate the use of the laboratory accordingly.

The subjects are very well resourced for practical work. The purchasing of stock is skilfully arranged through the subject co-ordinator. Storage is well managed and resources for practical
work are very well organised in the rooms and the inter-connecting preparation area for ease of access during lessons. The laboratory and demonstration room presented as stimulating learning environments with up-to-date charts displayed. Both rooms are very well fitted with information and communication technology (ICT) facilities, including teacher laptops and mounted data projectors. Teachers used these regularly throughout all lessons. The school’s excellent ICT infrastructural network supports the use of computers in lesson delivery, planning, record keeping and student assessment. This has enhanced science education in the school.

Management arranges whole-staff continuing professional development (CPD) events annually and most recently this has included the very valuable areas of ICT, school development planning, assessment for learning (Afl), behavioural management and learning methodologies. Members of the science department demonstrated a very progressive attitude to professional development and a considerable interest in participating in additional opportunities for CPD. Current additional education and training among science teachers include a Masters in science education and training in health and safety. These are proving immensely beneficial for the science department, particularly in teaching and learning but also in subject department planning. Some teachers avail of membership of the Irish Science Teachers’ Association. Teachers are encouraged to continue to disseminate and discuss their learning and expertise from CPD in the future and to avail of ongoing courses provided in both Science and Biology by the Professional Development Service for Teachers (PDST), particularly those that relate to the investigative approach to learning Science. Participation in this is strongly recommended as not all teachers were in a position to avail of previously held in-service in the revised syllabus.

The school principal and members of the science department have a vision for leading learning and leadership qualities to effect change. This has led to recent and very successful developments across the whole school as well as science education. For example, a whole-school initiative was recently undertaken in study skills involving all subject teachers in the delivery of a programme with their subject groups. There was much evidence during the evaluation that the programme had yielded positive outcomes for students, increasing their awareness of how they learn best and of tools that support them in revision. In addition, some science teachers are using an interactive Classroom Participation System (CPS) as a means of monitoring learning during lessons. This electronic system allows the teacher to poll the class on responses to multiple-choice questions through a handheld responder. The system registers all the responses to the question, calculates class data, and projects it onto the screen. Teachers are monitoring its usefulness in improving student interaction and in enhancing the Afl process.

**Planning and Preparation**

The subject department planning process currently involves an effective cycle of action planning, implementation, monitoring and review. This takes place during regular meetings when teachers also share ideas and innovations. The impetus to work to this pattern came from the school principal and teachers find it very empowering and productive, particularly in the past year when the process has progressed and yielded tangible outcomes. Collaborative planning is now more focused and reflective. A position of subject co-ordinator is undertaken with dedication and is facilitating the progressive planning approaches.

Recent subject department meetings were used to set out action plans for development in five key areas. For example, in one action plan, science teachers laid out targets for the greater use of ICT by students and its application in teacher assessment of learning through the use of the CPS and available interactive slate software. These are very progressive developments and they further exemplify the willingness to innovate. Action planning is proving productive in other areas also
and there was much evidence throughout the evaluation that it is having a beneficial effect in the classroom. It is recommended that teachers continually focus discussions on teaching and learning approaches. This will ensure ongoing development for all as well as consistency of experience for students in the various class groups. It is suggested that teachers could next establish common approaches to Coursework A, laboratory report-writing and the frequency and type of assessment modes used in the sciences.

Part of the self-evaluative process involves an analysis and discussion of student outcomes in the certificate examinations. This too has brought about beneficial outcomes for students as there has been a significant upward trend since 2006 in the uptake of higher level in Science and Biology. Science teachers are encouraged to continue to effect this trend as significant student potential was evident during the evaluation; specifically, the uptake of higher level in Junior Certificate Science still has scope for improvement given the student cohort observed. To advance this, and in support of the current way of working, it is recommended that the department set out an action plan, similar to the ones already developed, for improving attainment in the subjects. Much of the good work already taking place – teaching higher level as the common level for as long as feasible; the whole-school approach to study skills development; and current liaison activities with the guidance and learning-support services – could be included in this action plan.

Common schemes of work have been developed for year groups and teachers use these as a basis for lesson planning. The schemes for Science and Biology are exemplary in lay-out as they are based on a matrix that enables topics to be timed and integrated with learning outcomes as well as student practical work, teaching and learning activities, AFL approaches and ICT use. All of these were appropriate and varied. In addition, a set of well-chosen priorities for each year group features on the front of some schemes and this is recommended for all.

Exemplary planning by science and biology teachers for students with special educational needs reflects the school’s commitment to student progress. An individual educational planning template has been prepared by a science teacher in conjunction with the learning-support department that will act as a working document to assist all subject teachers in supporting these students and maximise their learning opportunities. Teachers are encouraged to maintain their proactive approach to teaching students with special needs and to continue to learn about effective strategies and apply these in lessons.

The school’s TY plan for Science is innovative and inter-disciplinary in relation to Biology, Chemistry and Physics. The plan incorporates a system of credits for students on the completion of modules and participation in projects. Active and ongoing co-curricular planning also takes place and teachers support students in taking part in a wide range of environmental and science-related competitions including the Young Scientist and Technology Exhibition.

A very good range of electronic resources for teaching and learning in the subjects has been built up. Many of the resources have been adapted from those provided through the sciences support services and very good use is made of these in lessons. The continued expansion of this practice is encouraged, particularly the sharing of electronic resources and website links on the network.

**TEACHING AND LEARNING**

The quality of teaching and learning was generally very good and there were many examples of highly effective teaching practices with some scope for development in a few areas.
All lessons demonstrated structure and purposefulness and were appropriately paced and stimulating for students. The learning intention was shared with students and shown on the board at the start of each lesson. The board was used very well by teachers to build diagrams and notes on topics during lessons. ICT applications were used to keep motivation and interest levels high during lessons; ICT was used throughout all lessons to present diagrams, animations, quizzes, live internet links, and succinct notes which the students took down independently. These activities provided further evidence of the thorough planning and preparation which took place in advance of lessons. In addition, well-designed worksheets were prepared and used. ICT use was also noted in teacher record keeping of attendance, homework and student application.

Teacher-student relationships were productive and very well-developed and students were excellently behaved and very respectful. In some instances, teachers should have circulated more among students during lessons, particularly while the students were writing and correcting their homework. As this was in some way restricted by the lay-out of the demonstration room, the necessity to rotate rooms is reiterated. It is necessary in all lessons for the teacher to check what the students are writing to ensure they have understood the task or the particular correction. There was much evidence in student copies of the use of concept mapping to summarise many topics and this is very highly commended for the way it supports independent learning and different learning styles. Students very much appreciated the value of this activity for learning.

In the main, lessons were planned and delivered in a way which maximised student participation in the lesson. For example, learning was effectively contextualised for students. In addition, there was a very good balance of teacher and student talk in lessons. Frequently, students were encouraged to visualise and come up with their own examples and applications of the topics through skilful questioning by teachers. There were many excellent examples of “smart questioning” by teachers that encouraged the participation of all, the expression of opinions and the collective arrival of the group at an appropriate conclusion. Higher-order questioning that facilitates learning was less well-applied in a few instances and this is an area for development that could be approached through subject department discussions on methodologies.

In many lessons, exemplary attention to detail was noted in teacher instruction and student response. This led to high standards of student written work in copies and laboratory reports. Perhaps greater consistency is needed across the subject department in this area, particularly in relation to biological terminology and its pronunciation. At times also, some additional provision could have been made for the development of scientific literacy among some students. For example, some students demonstrated difficulties in distinguishing between words like ureter and urethra and covalent and ionic. It is suggested that teachers explore the use of mnemonics and other learning tools for the sciences, perhaps in consultation with the school’s learning support department. In addition, teachers are encouraged to try pair or group work during assessment or instruction phases of lessons as a means of enhancing scientific literacy as well as co-operative learning.

It was clear from observation of students’ skills and laboratory notebooks that lessons throughout the year in Science and Biology are given a practical focus. In many lessons, very good support was given to the investigative approach to learning Science at junior cycle, as appropriate to the syllabus. Students were observed being skilfully led through a logical pattern of decision-making to arrive at a particular procedure themselves, thereby avoiding teacher demonstration or reliance on procedure in the text books. As required, teachers are directed to the Guidelines for Teachers for further guidance on the development of this technique. Other good practice during lessons included an instance in which students’ general numeracy development was given attention.
ASSESSMENT

There was much evidence of good AfL principles in practice, particularly in the aforementioned questioning and also in the type of teacher annotation given on student written work. Teacher annotation was affirming and constructive, and gave the students a definite focus and advice as individual learners. In addition, one examination class group was observed using a traffic-light system to identify the most pressing topics for revision. A revision programme for third and sixth years is integrated into weekly lessons and routinely followed up with past examination questions and feedback on progress in the written answers submitted to these. The CPS was observed to enhance the AfL process by providing immediate feedback to students and teacher about individual progress and any possible misconceptions. The system also enhances students’ engagement and makes them more involved in the learning process. Homework is given frequently and linked with the purpose of the lesson or revision. Well-chosen questions from past papers are frequently assigned to examination year groups and these are differentiated for higher and ordinary level students. As already indicated, it is recommended that peer correction be used from time to time.

Assessment of learning takes place regularly through class tests, quizzes, mock examinations and formal school examinations. Third-year and sixth-year students do pre-mocks in November and mocks in February. A parent-teacher meeting follows the pre-mocks and a detailed report follows the mocks. The application of two formal examinations prior to the State examinations is very much appreciated by students. Interactions with students revealed that they are aware of how they are doing in the subjects and report that their parents are kept informed through school reports and parent-teacher meetings. In addition, journals are signed by parents and class teacher weekly and teachers can include notes to parents at times.

Student progress with coursework A is monitored twice each year by teachers through the student laboratory notebooks and a record is kept. The annotation of laboratory notebooks and the quality of student written work in laboratory copies varied from class to class. It is recommended that more focused AfL-type annotation be applied to the laboratory notebooks to support progressive development of students’ report-writing skills. In additional, students should always write up laboratory reports after the practical activity. This is an area where the development of a set of agreed principles by the subject department would bring greater consistency.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation of Science and Biology:

- The subjects have a high profile and are well supported on the school curriculum.
- The excellent ICT facilities and network are greatly enhancing science education.
- Significant successful work by members of the science department is bringing innovation and progression to both planning and practice.
- The subject department planning process involves a highly effective cycle of action planning, implementation, monitoring and review.
- Teacher-student relationships are highly productive and support learning.
- Many very good teaching practices that facilitate learning are consistently employed.
- Very good ‘assessment of learning’ and ‘assessment for learning’ strategies are used.
As a means of building on these strengths and to address areas for development, the following key recommendations are made:

- Laboratory access should be formally assigned on the school timetable annually and teaches should rotate the use of the laboratory accordingly.
- An action plan should be developed for improving student attainment in the subjects.
- In a few instances, greater focus should be placed on co-operative learning strategies, teacher circulation, higher-order questioning, students’ report-writing skills and scientific literacy.

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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