

**An Roinn Oideachais agus Eolaíochta
Department of Education and Science**

**Subject Inspection of Science
REPORT**

**Blackrock College
Blackrock, County Dublin
Roll number: 60030V**

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Report on the Quality of Learning and Teaching in Science

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Report on the Quality of Learning and Teaching in Science

This Subject Inspection report

This report has been written following a subject inspection in Blackrock College. It presents the findings of an evaluation of the quality of teaching and learning in Science and makes recommendations for the further development of the teaching of this subject in the school. The evaluation was conducted over two days 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 head of Science. The board of management of the school was given an opportunity to comment on the findings and recommendations of the report; the board chose to accept the report without response.

Subject Provision and Whole School Support

Whole school support for the provision of Science in Blackrock College is very good. A wide range of science subjects is available on the curriculum including Junior Certificate Science and Leaving Certificate Biology, Chemistry and Physics.

The school has implemented the revised Junior Science syllabus and, although it is an optional subject, the uptake of Junior Science is very high. Students enter the school at the beginning of second year having already completed their first year of junior cycle elsewhere, mainly in Willow Park School. The eight class groups in second and third year in Blackrock College are set for Science and are of an appropriate size. Timetabling arrangements for Junior Science in terms of the overall allocation and the scheduling of double periods are appropriate. Most of the class groups are taught Science by three teachers who specialise in the various elements of the course. Thus, for instance, a senior Biology teacher teaches the biology component of Junior Science to a particular class for a one or two week

period before alternating with one of the other teachers. Some classes, generally those requiring the most support, are taught all elements of the course by the same teacher. The continuity of the learning experience and the creation of smaller class groups in these cases are to be commended.

In senior cycle, students are well supported in making choices with regard to Leaving Certificate subjects. For example, information on the subjects available and the implications of particular choices is provided to students and parents and the school works closely with students and parents to ensure that the most appropriate choices are made. The majority of Transition Year students study one or more of the Leaving Certificate Science subjects and this experience allows them to refine their eventual subject choices for the Leaving Certificate. The flexibility evident in allowing students to transfer from one subject to another during Transition Year is to be commended. The overall uptake of the Leaving Certificate Science subjects is very good.

The school has excellent facilities for the teaching and learning of Science. At present the school is in the middle of an extensive building programme and three laboratories are located in a temporary structure. A further three laboratories and a science lecture room are available in one of the school buildings. On completion of the building programme it is envisaged that the school will have a total of eight laboratories. All of the facilities are in good condition and well stocked with equipment and materials. A good level of ICT facilities, including internet connections, computers, data projectors and data logging equipment is available in the Science department. Finance for the upkeep of the laboratory facilities is budgeted for by the school on an annual basis. The laboratories are well equipped with appropriate safety equipment such as fire extinguishers, fire blankets, etc. A high level of attention to ensuring a safe working environment is evident in the completion of risk assessments, the testing of electrical equipment, the guidelines for Science staff in the event of an accident and in the sourcing of relevant external resources.

The school is very supportive of the continuing professional development needs of staff. For example, teachers are facilitated to avail of external in-service courses such as those organised by the Junior Science Support Service. The school has also supported involvement in professional associations and further study. Financial support for membership of professional associations is included in the annual budget for the Science department.

A range of extra-curricular activities enhances the provision for Science in Blackrock College. Students have been involved in the Young Scientist Exhibition, the BA Festival of Science, and various Science Olympiads. The school is participating in the An Taisce Green-Schools programme which aims to improve the school environment and raise awareness of environmental issues. An annual science fair aimed at raising the general awareness and interest in Science has been organised as part of the Transition Year programme.

Planning and Preparation

A very good level of planning for the provision of Science is evident in the work of the Science department. The department is clearly structured and meets regularly. An annual report from the Science department is a useful means of reviewing the work of the department and of informing management of relevant issues.

Planning for the provision of Science has been facilitated by the organisation of formal departmental meetings. These meetings have allowed issues such as health and safety, assessment and laboratory resources to be addressed at a departmental level. The good practice of maintaining a record of the issues discussed and actions to be taken following these meetings is to be commended. In addition to the more formal meetings, planning and coordination continues through a high level of informal contacts on an on-going basis. The collegial and collaborative approach taken to common issues is to be commended. For example, resources such as notes or worksheets may be shared among staff and approaches to teaching particular topics are also discussed and shared.

A high degree of organisation is evident in the arrangements for Junior Science. In order to allow for the teaching of the subject as three separate elements, a rota of one or two-week blocks of Biology, Chemistry and Physics has been devised. Access to the relevant laboratory (i.e. Junior Biology,

Chemistry or Physics laboratories) is also organised as part of the rota and the rota has been adapted to allow for the completion of coursework investigations during the second term in third year. All class groups, including those taught all elements of Science by one teacher, follow agreed schemes of work which detail the content and practical activities to be completed during each term and year. The development of a system for recording each group's progress through the schemes is to be commended as it facilitates the overall coordination of the delivery of the Science course. Good provision has been made to ensure that students transfer from first to second year in a coordinated manner. For instance, an agreed scheme of work is also followed by first-year students, records of practical activities completed in first year are transferred to the College, and the staff of Willow Park School is an associate member of the Science department in Blackrock College.

The preparation of detailed schemes of work for each of the Leaving Certificate Science subjects also shows a strong commitment to planning for the provision of Science. Comprehensive schemes of work, prepared for each of the Transition Year Biology, Chemistry and Physics courses, provide for a range of experiences in each of the subject areas. However, overlap with the Leaving Certificate courses should be avoided in order to prevent putting students who choose to take a particular subject for their Leaving Certificate at the start of fifth year at a disadvantage. For instance, two of the sections in the sixth-year scheme of work for Biology are described as a 'recap from fourth year'.

The school is involved in school development planning on an ongoing basis and policies and practices on many aspects of school life have been developed. In order to build on the good work already completed in terms of planning for the provision of Science it is recommended that the Science department be facilitated in further developing a Science plan which incorporates and adapts relevant aspects of whole school policies or practices. This has already been completed in some areas such as homework and health and safety. For example, particular references to the homework requirements of Science subjects are made within the school's overall homework schedule. Similarly, specific material relating to health and safety in the Science laboratories has been devised. Other areas for consideration could include special educational needs, the use of ICT, child protection guidelines, co-curricular and extra-curricular activities, etc. The policies and practices formulated by the Science department on these and other relevant areas could be drawn together with the planning materials already in place to create an overall plan or set of guidelines for the provision of Science in Blackrock College.

The provision of practical activities is greatly facilitated by the manner in which laboratory equipment and materials are organised. A clear system for establishing needs is in place. The use of computer databases to record the location, associated hazards and quantities of chemical is to be commended. The services of a laboratory technician have been effectively used to provide technical support for the general operation of the science laboratories and the provision of practical activities for students.

Planning for the lessons observed was good as evidenced by their structured nature, clear aims and objectives and the prior preparation of resources such as PowerPoint presentations and items required for practical work. Teachers maintain good records of attendance, homework, and class tests for their classes.

Teaching and Learning

Some of the lessons observed were devoted to the completion of students' write-ups of the practical investigations completed for the Coursework B element of the Junior Certificate Science examination. The hands-on aspect of the investigations had been completed in the previous lessons where students had investigated the relationship between the temperature of a rubber squash ball and the height to which it bounces, the effectiveness of a range of plant pigments as acid-base indicators, and the effect of soaking peas on the length of time for germination. During these lessons the main role adopted by the teachers was that of being a facilitator. At the outset of the lessons, students were settled in their places, attendance was noted and the objectives of the lesson were briefly outlined. When these preliminary activities were completed the teachers circulated around the room assisting individual students with their work. A strong emphasis on promoting independent learning was evident in the manner in which students were expected to take responsibility for their own work. For example, when students requested assistance with some aspect of their work they were encouraged and challenged to propose a solution to the difficulty themselves. In this way most students figured out for themselves

the best course of action. This approach is to be commended as it facilitates and encourages the development of problem solving skills and a deeper understanding of Science.

A student-centred approach was evident in all of the lessons observed. Effective questioning strategies focused students' attention on the lesson content. Closed questions were used to probe students' level of knowledge, while more open-ended questions required students to demonstrate their understanding of the particular topic. For example, students were required to examine some data and find a relationship between the relevant variables. In another case, students were required to describe the composition of air before discussing the differences between air breathed in and that breathed out. Question and answer sessions were effectively used at the start of the lessons to create links with material covered in previous lessons.

Lesson content was clearly communicated. For example, good use was made of resources such as an overhead projector and a data projector to illustrate the relevant topics. In particular, the use of ICT generated resources such as PowerPoint presentations and animation sequences is to be commended. Practical demonstrations were well organised and served to gain students' close attention as well as assisting in the explanation of the relevant theoretical concepts.

All of the lessons were well managed. Students were well behaved and cooperated with their teachers. A very good teacher-student rapport was evident in the classroom interactions and the norms of classroom behaviour had been clearly established.

Assessment and Achievement

Students' progress is assessed regularly throughout the school year through a range of assessment methods including formal school examinations, class tests, questioning in class, and teacher observation. Parents are kept well informed of their child's on-going progress through parent-teacher meetings, students' journals, and examination reports. An innovation in Blackrock College is the use of weekly application cards where each student is assessed with respect to their efforts in terms of class work, homework and cooperation with teachers. Progress cards issued at four to five week intervals indicate the standard attained by students in each subject.

The use of common assessment across a year group is to be commended as it facilitates a collaborative approach to the teaching of Science. Good practice was also evident in the sharing among the Science department of the responsibility for setting the various examinations and devising the relevant marking schemes.

Students' records of practical activities are well monitored and showed that a good range of practical activities have been completed. A clear system for maintaining students' records of mandatory activities in Junior Science has been implemented. Students' practical activities are assessed to some extent through the use of the application cards in all years and practical activities in Transition Year are more formally assessed. However, they are not generally formally assessed as part of school examinations in junior cycle. Hence, it is recommended that the Science department would consider the introduction of some system of assessing students' practical activities in Junior Science. This would be in line with the introduction of coursework in the revised Junior Science programme and would reward and encourage students for their efforts in completing practical activities.

Students' learning outcomes are good and the majority of students take the Science subjects at higher level. Students were generally confident and capable at answering questions put to them during the course of the visit.

Summary of Main Findings and Recommendations

The following are the main strengths and areas for development identified in the evaluation:

- Whole school support for the provision of Science in Blackrock College is very good. The school has excellent facilities for the teaching and learning of Science and the uptake of all

the Science subjects is very good. The continuing professional development needs of staff are well supported.

- A very good level of planning for the provision of Science is evident in the work of the Science department. Planning has been facilitated by the organisation of formal departmental meeting and by the collegial and collaborative approach taken to common issues.
- A student-centred approach was evident in all of the lessons observed. The lessons were well managed and content was communicated clearly. A strong emphasis on promoting independent learning was evident in the manner in which students were expected to take responsibility for their own work.
- Students' progress is assessed regularly throughout the school year and parents are kept well informed of their child's on-going progress. The use of common assessment across a year group is to be commended as it facilitates a collaborative approach to the teaching of Science. Students' learning outcomes are good and the majority of students take the Science subjects at higher level.

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

- It is recommended that the science department be facilitated in further developing a Science plan which incorporates and adapts relevant aspects of whole school policies or practices.
- In line with the introduction of coursework in the revised Junior Science programme and in order to reward and encourage students for their efforts in completing practical activities, it is recommended that the Science department would consider the introduction of some system of assessing students' practical activities as part of school examinations.

Post-evaluation meetings were held with the principal, and head of Science at the conclusion of the evaluation at which the draft findings and recommendations of the evaluation were presented and discussed.