

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Physics
REPORT**

**Newbridge College
Newbridge, County Kildare
Roll number: 61680T**

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AN ROINN OIDEACHAIS AGUS SCILEANNA | DEPARTMENT OF EDUCATION AND SKILLS

REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN SCIENCE AND PHYSICS

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Newbridge College. It presents the findings of an evaluation of the quality of teaching and learning in Science and Physics and makes recommendations for the further development of the teaching of these subjects in the school. The evaluation was conducted over three 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 subject teachers.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

Newbridge College has a large science department with a good mix of skills and experience among its members. The department works to a high standard and aspires to continual raising of its standards. The science subjects are well supported. Science is a core subject at junior cycle level, and at senior level Physics, Chemistry, and Biology are on the school's curriculum. There is good provision for the subject with regard to time, double-class-period allocation, and other resources.

Teachers' participation in continuing professional development (CPD) is encouraged by the school, and members of the science department have undergone regular CPD. It is suggested that with the likelihood of greatly reduced external CPD provision in the near future the science department should look to its own resources for this. A very good start has been made with regard to internally-based CPD with the work that the physics department has already carried out with regard to assessment for learning, comment-only marking, and other areas. This work should be developed further and should be shared among the teachers of Science as a group.

Science and Physics are well provided for with regard to laboratories, two of which have been supplied relatively recently. All of the laboratories are well-maintained, well-equipped, and well-presented. There is a good system in place for keeping equipment and other science resources up to date. In the case of one of the older laboratories, the school should consider making minor adjustments that would lead to more efficient use of the available space. The dual use of the preparation room attached to another laboratory as a cleaning store should be reviewed. The school is advised to include its future laboratory provision in its long-term development plans, as the three older laboratories are not well suited in layout to the emphasis on the investigative approach that is integral to the science syllabus.

Safety has a high priority in the school in general and in particular in the science department. As part of its practices in regard to safety, the department carries out regular safety assessments and records of these are retained in the department plan. This is good practice.

The school has a taster programme in respect of optional subject in first year. As a consequence of this, the student groupings in first year science are different to those in second and third years. As a result, many students have a change of teacher after first year. To minimise the risk of disruption to students' science education from this change, a very high priority needs to be placed on having common practices and a common approach to the curriculum in all first-year classes.

The system for students' choices of optional subjects for Leaving Certificate is based on groups of subjects that are fixed from year to year. Where students' choices cannot be accommodated within the option bands, additional classes are provided by the school. Unusually the two physics class groups each year are in the same option band, thus allowing for the considerable interaction and sharing of classes between the teachers of Physics.

Science is a core element of Transition Year (TY). There are five different TY classes, each having three science lessons each week. They take a TY Science programme called World of Science that includes seven modules. Considerable planning and development and acquisition of resources by the science department underpin what is, on the basis of the TY lesson inspected, a high quality programme.

Underpinning the high standing of science in the school is the promotion of the subject by the teachers of Science and the annual involvement of students in the Young Scientist competition and in the Young Environmentalist competition. The school has also participated in Scifest.

PLANNING AND PREPARATION

The science department is the focus for the collaboration and cooperation that takes place among the teachers of Science and Physics. The department co-ordinator has this role as a post holder duty. This is quite a demanding role due to the size of the department and the resources that are available to it, and it is carried out in a committed and effective manner. The role is shared to an extent through involving all members of the department in carrying out a range of specific tasks and responsibilities from time to time. As the school reviews its post structure, consideration should be given to how best the co-ordination of the science department can be organised in the future, with a greater sharing of responsibility for its co-ordination.

The department has regular meetings, and among the most common agenda items are the student investigations, common assessments for year groups, and curricular plans. Very good co-operation takes place among the teachers with regard to the science curriculum. Long-term outline plans for teaching the subject have recently been broken down into more detailed plans. In order to increase the focus on student learning in its planning, the department should include student learning outcomes in its short-term class planning.

Very good work has been carried out with regard to the incorporation of information and communication technology (ICT) in the department's work. All of the laboratories are equipped with data-projectors and ICT is being used for communication and sharing of departmental resources. The teachers of Science have begun the process of using Edmodo to allow students to access shared class folders. This is one aspect of the school's overall plan for the incorporation of ICT in its activities.

The planning that has taken place for TY Science is of a high standard and an indicator of a very strong commitment on the part of the teachers concerned.

Planning documentation in respect of Physics indicates a high level of teamwork among the three teachers of Physics, and in particular the two teachers currently teaching in fifth year and in sixth year. A feature of teaching and learning in Physics is that the programme has been modularised and the responsibility for each physics group is shared. The physics planning documentation references the syllabus and the relevant sections of the textbook. The plans for Physics and for Science indicated that there is a good level of contact with the school's learning-support department. However, given the large number of students taking Physics, it is recommended that a greater emphasis be placed on differentiation in planning and delivery.

All lessons were very well planned and prepared for. It was evident in the case of each lesson that considerable work had gone into preparing materials.

TEACHING AND LEARNING

High quality teaching was in evidence in all the lessons observed, two of which were physics lessons, five science lessons, and one a TY Science lesson. It was evident in all lessons that very good student learning was taking place. This was clear from the engagement of students in lessons and the questions students asked of their teachers. Indeed in some lessons the questioning by students was very perceptive, and such interest and enthusiasm could perhaps have been used to a greater extent by the teachers in developing the lesson theme.

Teaching was characterised by a lot of activity on the part of the teachers. This emphasis on teacher activity in lessons needs to be reviewed, as it is not sustainable long-term and it reduces the opportunities for students to be active in their learning. Teachers in the science department need to shift the focus towards a greater emphasis on students learning. The key elements that should be addressed in doing this are as follows: identifying the student learning that is to be achieved in the lesson; determining what activities students need to engage in to achieve this; planning and organising the lesson to do this; and, assessing whether and what students have learned.

All lessons were introduced with the content indicated to students. Where the lesson was introduced in terms of the learning outcomes that the students were to achieve, this served to increase the emphasis on student learning. When the learning outcomes were referred to during a lesson and then used at the end of the lesson to check on what students had learned, teachers were able to clearly see whether students were learning. The greater use of learning objectives in science lessons is a strategy that could be used to differentiate lessons. This could be done through having a range of learning targets that are targeted at different student ability levels.

In most lessons teachers used a combination of presentation, frequently using ICT, and questioning of students. Most questions directed to students had clear answers, although some good examples were seen of open questions that required students to think before answering. When teacher demonstrations were carried out, students were involved as much as possible and in several lessons students engaged in practical work. In one of the physics lessons observed, a very good example was seen of the use of a range of different methodologies, including the use by students of modelling clay to make concrete their understanding of atomic structure. Such an approach helped students' learning through addressing several different learning styles.

The TY Science lesson that was seen was well structured and included a good level of student activity. Examination of students' TY Science folders showed that they had carried out a good

deal of work in TY to date. Students had carried out literature research projects that had been assessed by their teachers. Very good assessment practice was seen, in that clear written feedback had been given to students on their work. In cases where there was a negative comment on a student's work, the student was given clear directions as to how that work could be improved. To build on this good practice, student-designed investigations should be included to a greater extent in modules of TY Science, as happened last year with regard to the sports science module.

Student practical work observed was well organised. It was evident from questioning students that they were engaged and were learning. In order to sustain and build further on students' evident interest in science, there is a need for a greater emphasis on enquiry-based learning. In the case of student practical work, this should involve using an investigative approach to student practical work where time is given to planning collaboratively and to discussing the outcomes of investigations. As part of the development of the investigative approach and as preparation for the third year coursework B project, the possibility should be examined of including small-scale science projects in the first-year or the second-year science curriculum.

Teacher-student relationships were very good in all lessons observed. There was also a very good atmosphere that was conducive to learning in each lesson. In all lessons very good attention and engagement of students was evident.

ASSESSMENT

Homework is assigned in all lessons and students' progress is regularly assessed in school examinations.

The teachers of Science and Physics show very good practice with regard to the compilation and analysis of the school's outcomes in the state examinations. The written commentaries that were prepared by the science department and the physics department shows that the departments are using state examinations' outcomes to target further increasing student achievement and to also to continually improve their practice in both Science and Physics.

The science department has a consistent approach to the recording of student practical work, having changed to using printed practical record books in September 2009. A substantial amount of students' work was inspected in the course of the evaluation. It was evident that students' homework and other notes and their records of practical work carried out were being regularly checked by teachers. In most cases, however, no comment was given on such work. Students should be given feedback and guidance on all their work, including their homework, in-class notes, and their practical write-ups. When advice is given to students or their work is corrected, this should be followed up on by teachers. Procedures for this should be agreed at departmental level.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- The department works to a high standard and aspires to the continual raising of its standards.

- The work of the physics department in relation to assessment for learning and comment-only marking is a very good initial step with regard to school-based CPD.
- The science department carries out regular safety assessments and records of these are retained in the department plan.
- The TY Science programme is of a high quality.
- The subject co-ordinator shows very good practice in sharing that role through involving members of the department in carrying out a range of specific tasks and responsibilities.
- Planning documentation in respect of Physics indicates a high level of teamwork among the teachers.
- High quality teaching was in evidence in all lessons observed, and it was evident in all lessons that very good student learning was taking place.
- The teachers of Science and Physics show very good practice with regard to their analysis and commentaries on the school's outcomes in the state examinations.

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

- The focus of teaching in Science needs to shift towards a greater emphasis on students' learning through including student-learning outcomes in its short-term planning.
- In order to sustain and build on students' evident interest in science there is a need for a greater emphasis on enquiry-based learning.
- Students should be given feedback and guidance on all their work, including their home work, in-class notes, and their practical write-ups.

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