

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Physics
REPORT**

**St Joseph's College, Garbally,
Ballinasloe, County Galway
Roll number: 62880J**

Date of inspection: 11 February 2010



**A N R O I N N | D E P A R T M E N T O F
O I D E A C H A I S | E D U C A T I O N
A G U S S C I L E A N N A | A N D S K I L L S**

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 St Joseph's College, Garbally, Ballinasloe. 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 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 deputy principal. 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

Science and Physics are well provided for in the school in terms of resources, staffing, and timetable provision. The strong position of Science in the school's curriculum is shown by its status as a core subject. Each junior cycle science class has four lessons each week including one double class period. While this provision has been reduced from five classes per week in the context of modification of the school's junior cycle curriculum it is adequate for the teaching of the subject. In senior cycle the school has Physics, Agricultural Science, Chemistry and Biology in its curriculum and the time allocation for the teaching of these subjects is adequate. All classes are of mixed ability and of an appropriate size. Timetabling of all of the science subjects is appropriate.

The school's long-established and successful Transition Year (TY) has a science component that consists of modules of Chemistry, Biology and Physics. The three modules are planned separately. So as to further develop TY Science the physics, chemistry, and biology modules should be presented as parts of a single programme with aims that are linked to the overall aims of the school's TY. These aims should include the encouragement of active and independent student learning and the content of TY Science should be largely different from that of the Leaving Certificate. The programme should be developed by the science department as a whole.

Of the four senior sciences the number of students opting to take Physics is rather low with Chemistry somewhat higher. Neither of the school's two specialist teachers of Physics teaches at junior cycle. For this reason it is recommended that, in co-operation with the guidance department, small interventions should be developed in second year that would enable the physics teachers to give students an understanding of physics and of what physics at senior level entails and the benefits of study of Physics at this level. A similar initiative could also be considered for Chemistry.

As well as giving general briefings to staff the learning-support teachers are available for consultation with science teachers. Learning support in Science centres primarily on helping students in completing their records of practical work and involves consultation between the teachers giving that support and the students' own science teachers. To supplement this good practice the science department through its planning activities should develop guidelines on good practice in mixed-ability teaching and in particular in addressing the learning needs of students with special educational needs.

The school's three laboratories and the science demonstration room are well-equipped and well-maintained. Given the size of the school's science department, co-operation is necessary between teachers in the use of the laboratories. This ensures that all students are facilitated in carrying out practical work. There is a need to review the safety of the high-level storage of equipment in the laboratories and to dispose of redundant equipment. Displays of science-related print material in the laboratories should be broadened in scope and should include material on careers in the sciences.

The school and the science teaching areas are well equipped for the use of information and communication technology (ICT).

The school has a health and safety statement that includes reference to safety in the science laboratory. To support the regular review of its safety statement, the science staff should carry out annual health and safety audits of the science teaching areas. The work should be informed by the Department of Education and Science and State Claims Agency publication *Review of Occupational Health and Safety in the Technologies in Post-primary Schools* (page 25) and the Department of Education and Science publication *Safety in School Science*.

The science teachers have been involved in continuing professional development (CPD) related to science. As well as membership of professional associations and participation in CPD some teachers have been involved in the STAR (Science Teacher Assistant Researchers) programme of Science Foundation Ireland. The science teachers also participate in whole-school CPD. The science teachers' participation in whole-school CPD should be linked to the departmental planning process.

The science department has facilitated co-curricular activities for its students in support of its science education. To further develop this area the school it is suggested that the school become involved in *Scifest* and the *Discover Sensors* project

PLANNING AND PREPARATION

Planning at a subject-department level to support the work of the individual members of the science department takes place through meetings of the science teachers held each term. The position of coordinator rotates among the members of the department in line with good practice. At present departmental planning centres on the provision of a joint outline curriculum for Science for each year of junior cycle, sharing of laboratories, and having common examinations at Christmas and summer for each year group. To support its work the department has developed a planning document that outlines practices in the department, departmental policies, and a curricular plan. A similarly-structured document also exists for Physics. Collaborative subject-

department planning in Science and Physics should be deepened so as to progress the development of Science and Physics in the school.

The science teachers should work to develop a vision of teamwork in their department as the means by which they will take leadership and responsibility in regard to raising the expectations of students and also the outcomes achieved by students. In order to increase the department's emphasis on student learning the existing curriculum plans should be developed further through the use of learning objectives along with timeframes for their achievement. The plans should also refer to the methodologies to be used, the resources required and should give information on assessment. In this way subject-department planning should support greatly the class planning of each teacher.

To further harness the school's very good ICT resources the science teaching team should set up a common folder on the school's intranet. This should be used to catalogue the ICT resources currently being used by individual teachers, to store them and to make them available for use by each teacher. Having a folder like this will also help joint planning. The school's science and physics plans should also be stored on this folder as well as records of departmental meetings. Using the folder or a similar method the department should be able to make online support available to students and information to parents on the progress of their sons.

In the case of all lessons seen it was clear that very good individual planning and provision of the required resources had taken place.

TEACHING AND LEARNING

Good quality teaching and learning was seen in each of the lessons observed. Each lesson had a clear topic that was introduced by the teacher. In one case the introduction included the desired learning objectives or intentions for the lesson. Very good practice was seen where these were followed up with students at the close of the lesson. Such a practice helps the teacher to evaluate the lesson, to assess students' learning, and to plan for succeeding lessons. Learning objectives for lessons should be stated for each lesson so that it is clear to students what they should be able to do following the lesson.

Teachers showed a high level of competence and skill in Physics and in Science and in almost all lessons they used a range of methodologies to teach the topic of the lesson. These included making use of the data projector to provide a range of explanations and examples of topics, teacher demonstrations, student practical work, and effective use of the whiteboard. While in almost all lessons the lesson content and pace were appropriate to the class group, in one lesson it was considered that the topic of the lesson was too challenging for the particular class. In another lesson the entire lesson consisted of a single activity. By having a range of methodologies within a lesson the lesson topic can be explained in a number of different ways thus increasing students' learning. Some lessons would also have benefited from a greater balance between the contributions of teachers and students, in particular those that centred to a large extent on the teacher and in which the extent of student activity was rather low. To address this use should be made of such methodologies as group work, pair work, or the use of handouts or worksheets.

The lesson topic in most cases was related well to students' lives and this succeeded well in gaining their interest. While all of the classes observed were of mixed ability the use of differentiation was quite limited. As well as differentiation through the use of learning objectives

use should be made routinely of keyword charts to help students in coming to terms with the vocabulary of science.

Student practical work observed in the course of the evaluation was well-organised. However, it is necessary that an investigative approach be adopted for this work so that the objectives of the work are discussed beforehand with the class and students have the opportunity to plan their approach.

Classroom management was good in all cases and there was a good atmosphere in all lessons observed. There was good interaction between students and their teachers and good engagement of students in most lessons. Classroom discipline was effective in all cases.

The participation of students in lessons was generally good and it was evident that where the topic of a lesson was treated in such a manner that it related to students' experience their interest and their level of participation was increased. Overall, in securing greater student participation more should be demanded of students through questioning to a greater extent and through using a greater variety of question types. While there was some student assessment in classes there is need for a greater emphasis in all classes, through student questioning.

In order to teach students how to handle the preparation of records of their work, the key skills of drawing diagrams and preparing accounts of practical work undertaken should be emphasised in first-year lessons. It is suggested also that a second-year student project be planned that would allow students to practice the skills involved in their third-year state examination project.

As judged by their engagement in lessons, their responses to teachers' questions and the questions that they asked most students in each of the classes were learning.

ASSESSMENT

The department's planning documentation includes sections on homework procedures, assessment and examination procedures and record-keeping procedures. The section on homework procedures should be expanded to include information on the types of homework to be set and the procedures for examining that homework. Students' homework and other written work should be taken up for assessment on a regular basis. In examining students' homework and other work, teachers should use the principles of formative assessment, that is, to affirm students' efforts and offer them advice and direction. The *Assessment for Learning* section of the NCCA website gives information on this. Students' work is regularly checked and in most cases teachers' corrections were followed up with students.

The section of the department plan on assessment modes and examinations procedures of the department should be extended so as to include more detail on appropriate assessment modes. The science and physics departments should incorporate students' practical work, homework, and project work in end-of-term assessments. The department should analyse school performance in the State Examination Commission examinations each year and use this as a basis for measuring its success in raising standards.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Science and Physics are well provided for in the school in terms of resources, staffing, and timetable provision.
- The school and the science teaching areas are well equipped for the use of information and communication technology (ICT) in teaching and learning.
- Good quality teaching and learning was seen in each of the lessons observed.
- Teachers showed a high level of competence and skill and in almost all lessons they used a range of methodologies.
- Classroom management was good in all cases and there was a good atmosphere in all lessons observed.
- As judged by their engagement in lessons, their responses to teachers' questions, and the questions that they asked, most students in all classes were learning.

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

- The physics, chemistry, and biology modules of Transition Year Science should be presented as parts of a single programme with aims that are linked to the overall aims of the school's TY.
- There is a need to review the safety of the high-level storage of equipment in the laboratories and to dispose of redundant equipment.
- To further harness the school's very good ICT resources the science teaching team, including all teachers of the sciences, should set up a common folder on the school's intranet so that all of the ICT resources currently being used by individual teachers can be catalogued, stored and made available for use by all teachers.
- An investigative approach should be adopted for student practical work, where the objectives of the work are discussed beforehand with the class and students have the opportunity to plan their approach.

Post-evaluation meetings were held with the principal and deputy principal at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.

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