

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**John Scottus Secondary School
Morehampton Road
Dublin 4
Roll number: 68071G**

Date of inspection: 27 January 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 John Scottus Secondary School. 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. 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

The school follows the core curriculum of the Department of Education and Skills for the Junior Certificate, the Transition Year (TY) programme, which is compulsory for students, and the Leaving Certificate. The school has a unique ethos that embraces aspects of a wider curriculum which are central to the John Scottus system of education, including philosophy, meditation and [spiritual education](#). The school is co-educational. Fees are paid annually to attend the school.

Class groups for Science and Biology are mixed-ability in formation. Higher level is taught in the majority of lessons and students are differentiated into ordinary level for assessments, as necessary. Class sizes are relatively small for the sciences with no more than sixteen students in any group visited. Small class size is due partly to the school context but also the splitting of year groups into smaller groups for Science and the small size of the laboratory. It is commendable that management is able to support this. The second year and third year groups are split for Science into separate classes for boys and girls, simply to allow them some lessons in a single-sex setting, but the year groups are mixed for most other subjects on the timetable.

Science is a core subject on the school's curriculum for Junior Certificate and is also included as a core subject in the school's TY programme. Biology is one of three science subjects provided as optional subjects for Leaving Certificate in the school, in addition to Physics and Chemistry. Access to Biology is very good as all students have the opportunity to choose Biology each year. It is possible to choose at least one other senior science subject. Leaving Certificate option bands vary from year to year in accordance with students' subject choice.

Appropriate timetable provision is made for Junior Certificate Science, TY Science and Leaving Certificate Biology as four, two and five periods per week are allocated to the subjects, respectively. This includes double lessons in line with best practice.

Laboratory access is good. One weekly double lesson is conducted in the school's laboratory and this access is provided for on the school timetable. Some other double and single lessons are also held in the laboratory and some are held in classrooms.

The level of resources at the subject department's disposal is very good including resources for student practical work. Budgetary requirements for the subjects are met by senior management. The laboratory was recently upgraded to modern standards. There is no preparation room, but many of the resources for practical work are kept in a nearby and very well-organised storage area. Sets of equipment are organised into resource boxes for swift access and retrieval. The learning environment in the laboratory is nicely enhanced with modern subject specific charts, student project work and information about careers in the sciences.

The laboratory and many classrooms are fitted with modern information and communication technology (ICT) equipment, including internet access, data projectors and laptop computers. Very good use is made of these facilities. Data logging equipment is available in the school but greater use could be made of this in Science and Biology. A mobile set of laptops for student use during lessons is available in the school and is used in the sciences. Audio-visual facilities are also readily available to support the use of educational DVDs in lessons.

Management strongly supports continuing professional development (CPD), encourages membership of professional organisations and facilitates teachers to attend in-service. This has included in-service courses in the revised syllabuses, ICT and problem-based learning. Teachers demonstrated a willingness to participate in an ongoing way in CPD opportunities.

PLANNING AND PREPARATION

Subject department planning is facilitated by school management and formal meetings between all science teachers are held each term. A position of co-ordinator for the subject department is established and this involves organisational planning and overall development. A subject department plan has been developed and teachers review and develop the plan during whole-school planning days. The plan is presented to and examined by the principal annually.

As part of the subject plan, common programmes of work have been developed for year groups and teachers use these as a base for lesson planning. Information from the recent in-service course in problem-based learning was disseminated and the science teachers are integrating aspects of this into their lesson planning. This is good practice as it will support the principles of the revised syllabus for Junior Certificate Science and the TY programme.

Cross-curricular planning with other subjects including Mathematics and Geography takes place. It was reported that lessons in Social, Personal and Health Education (SPHE) including modules in Relationships and Sexuality Education (RSE) are provided on the curriculum for junior cycle students as part of timetabled lessons in Philosophy and that related modules are also provided at times in senior cycle. It is recommended that science and biology teachers liaise with SPHE and RSE teachers when planning so that topics like human reproduction and genetics can be supported in a cross-curricular way and the timing of lessons can be co-ordinated. Management should ensure that arrangements for SPHE and RSE are in line with Department of Education and Skills Circular Letters M11/03 and 0027/2008.

Co-curricular planning is strongly encouraged by senior management and teachers support students in taking part in competitions such as the Young Scientist and Technology Exhibition

and some quizzes. Science week is celebrated and groups have visited Dublin Zoo, exhibitions at the Royal Dublin Society, seminars delivered in local universities and some museums.

A well-planned TY science programme reflects the general principles of TY and the school's commendable aims for the programme. The TY science course aims to develop students' scientific problem-solving and critical thinking skills, their communication skills, and an awareness of the latest scientific research and technology in inter-disciplinary areas such as forensics, microbiology, future fuels, sports science and environmental protection. According to the TY science plan, learning is purposefully problem-based and lessons incorporate co-operative learning as much as possible. These aspects are commended. ICT skills are also enhanced as students receive a netbook, engage in web-based research, and submit assignments online to the school's [eLearning platform](#). Student assessment in TY Science is also student-centred involving peer assessment by students on each other's presentations through the use of an evaluation rubric. The science course is reviewed annually following an evaluation by students and teachers.

A good range of resources for teaching and learning in the subjects has been built up. In some instances, very good and ongoing use is made of ICT to plan lessons, source ideas and visual material and to prepare teaching and learning resources. These resources are placed in a shared folder on the school's networked computer system. Continued expansion and sharing of resources for teaching and learning is encouraged.

TEACHING AND LEARNING

The quality of teaching and learning observed during the evaluation was excellent. At all times the methodologies used were facilitative and student-centred and this is very highly commended. The purpose of lessons matched the requirements of the relevant syllabus. Each lesson incorporated an appropriate mix of teacher instruction and student activity which was clearly varied from lesson to lesson. Teachers have a wide variety of methodologies in their repertoire. Exemplary use was made of a good range of resources and props, including judicious use of ICT presentations, to stimulate learning and discussion. Teachers expertly made use of opportunities to contextualise the material being covered by reference to every-day life experiences, hobbies and events in nature.

A very calm atmosphere existed at the beginning and close of lessons and in the movement of students. Optimum conditions for learning were generated and all lessons proved very productive. Students were attentive, co-operative and very much focused on learning. All students actively participated in all phases of their lessons and responded productively to the challenges set by their teachers in questioning and tasks. The high quality learning environment was enhanced by the excellent quality of the relationships and dialogue between students and teachers and among students themselves. There were very many exemplary instances of teacher questioning to encourage student observation, to elicit recall and application of learning, to enable students to establish links between topics and to help students draw their own conclusions during practical investigations.

Students were given many appropriate and challenging opportunities to vocalise, practice and apply their learning through a combination of real-life context-based problems, written work and group challenges and also through practical investigative work. Students were encouraged to work as a team in lesson activities but also to think independently. While the ability and potential of each student varied, they were encouraged to expand each other's observations and verbal comments so that a developmental approach to learning prevailed. Through the use of practical

and visual examples, teachers consciously enabled students to build a framework for their knowledge about each new concept. There were numerous examples of these ways of facilitating learning; a fifth-year group studying genetics was in the process of developing a comprehensive grasp of the concepts through real-life exemplification and application in problem solving, and a third-year group revising Science was fruitfully challenged to recall applications and integrate very many concepts in the disciplines of Biology, Physics and Chemistry through the carefully-chosen theme of hill walking.

Students have an extensive vocabulary and well-developed concepts and ideas about Science and Biology. A very high level of attention to detail maintained in all areas ensured students used appropriate terminology in their verbal and written work. A very high standard of presentation was evident by students in both their verbal contributions and their written work. Students had very well-developed notes copies containing much work relating to the topics. In some classes, students are encouraged to make out their own summary notes on topics and to conduct independent research on topics. Some students had developed their own note-making styles, for example through the use of spider diagrams or flash cards, as a development on lessons given in study skills. These skills are important in developing student competencies as independent learners and should be extended to all class groups at appropriate times.

The approach taken to student practical work is excellent. Prescribed practical activities are completed by the students in small groups for both subjects and the investigative approach to practical work is being very well applied in junior Science. For example, first-year students working in small groups separately designed their own apparatus and procedure to investigate the relationship between the extension of a spiral spring and force. Teachers are encouraged to develop this approach into senior cycle practical work in the sciences, wherever possible. Junior and senior cycle students demonstrated very well-developed laboratory skills including very good procedural understanding, the ability to design practical investigations and very good skills of observation. With very careful monitoring by teachers, students are encouraged to note and interpret their own set of results, draw their own conclusions and write up laboratory reports in their own words. The approach to student practical work and outcomes for students is highly commended.

ASSESSMENT

A very wide variety of modes of assessment of student progress during lessons was observed. Such variety is very appropriate and clearly supported student progression, confidence and interest levels. Methods observed included an on-the-spot short quiz, division of class group into two teams to complete challenges, peer assessment during pair work and an on-line quiz using laptops. There is also strong focus on preparation for certificate examinations through the use of workbook, text book and past examinations questions. It may be beneficial to make out revision schedules for examination classes and this would be best done in partnership with students themselves. As well as ongoing formative feedback, teachers give constructive written feedback to students on homework, tests and laboratory reports. It is school policy to give class tests every three weeks with longer tests held at Christmas, Easter, summer and some mid-terms. Reports are sent home to parents on student progress following the longer tests.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

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

- A facilitative and student-centred approach is adopted in all lessons.
- The highly inter-personal approach taken in lessons supports student confidence, learning and interest in the subjects.
- Students are encouraged to work as a team in lesson activities but also to think independently.
- Students have an extensive vocabulary and well-developed concepts and ideas about Science and Biology.
- The investigative approach to practical work is being very well applied in junior Science.
- Very supportive and varied modes of assessment of student progress are used during lessons.
- Very good use is made of ICT in planning, teaching, learning and assessment.
- Timetabling, access to subjects on the curriculum, resource provision and laboratory organisation are all very good.

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

- Science and biology teachers should formalise the cross-curricular planning process with SPHE and RSE teachers for key topics of human reproduction and genetics.
- Management should ensure that arrangements for SPHE and RSE are in line with Department of Education and Skills Circular Letters M11/03 and 0027/2008.

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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