

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**CBS
Westland Row
Dublin 2
Roll number: 60490J**

Date of inspection: 1 February 2010



**AN ROINN DEPARTMENT OF
OIDEACHAIS EDUCATION
AGUS SCILEANNA AND SKILLS**

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 CBS Westland Row. 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

CBS Westland Row provides three certificate programmes to meet the needs of the 135 students currently enrolled. Almost all students live in the immediate vicinity of the school. All junior cycle students are included in the Junior Certificate School Programme (JCSP), and senior cycle students can choose to follow the Leaving Certificate Applied (LCA) or the Leaving Certificate Vocational Programme (LCVP). The school participates in the Delivering Equality of Opportunity in Schools (DEIS) programme and benefits from a number of supports. Class sizes at junior and senior cycle are small, with between nine and twelve students in each group.

Science is an optional subject within junior cycle in the school and is chosen by just under half of the students. Junior cycle students in first year are given the opportunity to choose between Science and Business Studies after a one-month sampling period in each subject. Biology, the only science subject provided at senior cycle in the school, is also optional and chosen by approximately fifty percent of students studying the LCVP. The current LCA programme does not include the science elective.

Generous provision is made for Science at junior cycle as, at the request of the science teacher, five single periods per week are allocated in first, second and third year. The Science syllabus recommends the timetabling of four lessons per week to include at least one double period. It is recommended that in future two lesson periods be timetabled together as one double period over each of the three years of the course. This would better facilitate the completion of course work assignments, in particular all of the phases of student practical work. For many of the mandatory hands-on student investigations in the syllabus, a double lesson can provide the opportunity for students to complete the design, set up, conduct, observation, interpretation and even the report writing phase of the investigation.

Biology is appropriately allocated five periods per week and this includes one double lesson period. The weekly double lesson in Biology is held in the laboratory and other lessons in a classroom used for the sciences. The majority of science lessons are held in the school's newly

refurbished laboratory. Both laboratory and classroom are enhanced with subject specific charts. Key word posters that support literacy development also feature in the science laboratory. Audio-visual facilities are readily available to support the use of educational DVDs during lessons. The laboratory and classroom used for the sciences are fully fitted for modern information and communication technology (ICT) use, including internet access, data projectors, and laptop computers. In addition, a set of laptops for student use during lessons is available.

A fairly good level of resources for student practical work in Science and Biology is available although some of the resources stored in the preparation room are outdated and should be removed to give space for modern equipment. Many good laboratory safety systems are in place and detailed in the science plan. However, the current system of chemical storage in the preparation room should be updated in line with best practice and flame proof cabinets should be installed for certain chemicals. Information on the proper storage of chemicals in school laboratories is available on <http://sciences.slss.ie> under Chemistry and Safety Docs.

Class groups for Science and Biology are mixed-ability in that higher and ordinary levels are taught in the same class. It was reported that most science lessons cover ordinary level material with extra group work, where appropriate, for students considering higher level. In biology lessons the opposite position is taken with higher level taught in the majority of lessons and students differentiated into ordinary level for assessments. While the uptake of higher level fluctuates from year to year in each subject, better outcomes for student attainment have been achieved in Biology. It is very noticeable that a good proportion of high grades (A and B) have been attained in certificate examinations at each level in Biology, but not in Science, over the past number of years and this is something that should be examined very closely by senior management. In response to this, a number of strategies to raise expectation and attainment in junior cycle Science should be developed. It is recommended that the approach adopted in Biology, in setting lessons at higher level, be taken in Science where possible as this may have an effect. Other areas such as enhanced liaison with the learning support department in the school to further develop teaching and learning strategies should also help. Every effort should be made to ensure that all students, based on their aptitude, are reaching their full potential in the subject.

Management supports continuing professional development (CPD) and facilitates teachers to attend in-service. This has included attendance at some of the sessions on the revised science syllabus but not training in the revised biology syllabus as the current biology teacher was not appointed during this time. Not all teachers of the subjects hold a recognised teaching qualification. The board of management should address this situation as soon as feasible. Teachers demonstrated a willingness to participate in suitable further CPD opportunities and it is recommended that this be arranged with the second level support service (SLSS) on the invitation of the principal.

PLANNING AND PREPARATION

Subject department planning is facilitated by school management and subject plans have been developed for Science and Biology. Good sequencing and timing of topics was noted in the plans. Provision for student practical work including field work and laboratory work was noted in the plan for Biology. This should be applied to the plan of work for Science as otherwise it is hard to see how the revised syllabus, in terms of the emphasis on student practical activities, could be fully implemented. It is strongly recommended that the plan of work for junior cycle Science be adapted to include precise provision for each one of the mandatory student hands-on practical activities and these should be integrated with the sequence of topics.

It is recommended that, for the next school year, the two plans be adapted into a single overarching plan for teaching and learning of the sciences in the school to include agreed principles on essential matters such as approaches to mandatory student practical activities, teaching and learning methodologies, assessment strategies and, as already mentioned, student attainment. It would be ideal if a set of learning outcomes for students that represented a continuum of knowledge and skills development from first year through to sixth year could be agreed by all science teachers and included in the plan.

A good range of resources for teaching and learning in the subjects has been built up, including resource CDs and DVDs, reference websites, ICT presentations and quizzes, booklets and worksheets and these are shared among the teachers. Very good and ongoing use is made of ICT to plan lessons, source ideas and visual material and to prepare teaching and learning resources.

TEACHING AND LEARNING

A very wide range and quality of teaching and learning methodologies was observed during the evaluation. Where teaching and learning was good the methodologies used were facilitative and student-centred, students actively participated in the lesson and the purpose of the lesson matched the requirements of the syllabus. Where lesson delivery was less effective there was an undesirable dominance of teacher-led instruction and teacher demonstration with little or no variety of experience for the student. Moreover, the lesson did not in any way match the learning objectives of the particular syllabus or the particular stage in the programme, other than developing the students' observation skills. In all lessons, a balance should be struck between teacher direction and independent student or group learning and all lessons should match the purpose of the particular syllabus.

Good practice was evident in some lessons where the learning objectives were clear from the outset and the students were reminded of what they needed to learn throughout the lesson. Good use was made of the school's set of laptop computers in one lesson when students successfully completed two short quizzes on the topic under the guidance of their teacher. This activity doubled as an assessment exercise as the computer programme gave students a score for their performance. The teaching style adopted in some lessons facilitated the development of good communication skills and the vocalisation by students of their knowledge about a topic. A wide spread of student ability was noted in the class groups visited, and some teachers managed this well. In these instances, pacing was good with good differentiation of the questions posed to support less able students and to challenge individuals according to ability in the subject. In these lessons, good formative feedback was given to students on their answers so that learning was developmental. In a sixth year biology lesson, it was clear that students had achieved a sufficient depth of understanding and a knowledge of topics studied that matched their capabilities. Some students have the ability to achieve a high grade at higher level.

In a number of lessons observed, classroom management was consistently good, students' contributions were sought and affirmed and a secure learning environment was generated. In these lessons, student-teacher relationships were very good and the students responded very well to their teacher and to the subject. It was also noted in these lessons that the teacher had good awareness of the learning potential of each student in the group and accordingly set appropriate expectations for students on an individual basis. However, in one lesson when the content of the lesson was not made relevant to students' everyday lives, small groups of students disengaged in turn and their ongoing challenging behaviour was not well managed during the lesson. These

students were not being led toward achieving their full potential in terms of participation in the lesson or in the quality of the written work in their copies.

The approach taken to student practical work varied considerably between the two subjects. A reasonable number of prescribed student practical activities were completed by the students studying Biology but, due to absences, not all students had completed the same set. Strategies to resolve this and to ensure that the full class group completes the full set of practical activities during the current school year will have to be considered. Some good ideas to achieve this were presented by the teacher during the evaluation. The completed practical activities in Biology had been properly conducted. One such activity was observed during the evaluation when students actively investigated the effect of exercise on pulse rate. Biology students had a written set of laboratory reports but it will be necessary to move away from presenting a written account of the activity on the overhead for the whole class to copy, and to incrementally develop students' report writing skills by asking students to write reports in their own words following the activity.

The approach taken to student practical activities in Science is inappropriately reliant on teacher demonstration and therefore needs urgent reconsideration. The revised science syllabus is activity-based in its design and emphasises a practical experience of science for the student through a minimum of thirty practical activities over the course of three years. The strategies used in Science should promote the learning outcomes described in the syllabus and they should incorporate student investigative work and experimental work. Students should do practical activities, ideally in small groups of two or three. However, there was little evidence of any such arrangement being realised in a satisfactorily regular or progressive way in either of the Science groups visited.

Greater opportunities for self-directed learning should be availed of with all class groups. For example, the aforementioned strategy of encouraging students to write up laboratory reports in their own words should be applied in Science and Biology. Students should do, rather than observe, practical activities in Science. While well-designed worksheets were used in some lessons, students could be productively challenged to make summaries of topics either through a set of bullet points or the use of graphic organisers such as spider diagrams. There is an urgent need in junior Science to change the current style of student note-taking from long essay-type and diary-type pieces. Instead, students should be guided towards producing short sentences that relate science to everyday life, and labelled scientific diagrams or definitions that encourage students to identify and incorporate the key words in the topic and apply their learning. This approach would promote literacy development, which is particularly important for JCSP students. In addition there is a need to incrementally develop students' commitment to homework and increased opportunities for self-directed learning may contribute in this regard.

ASSESSMENT

Formal school tests are administered at Christmas and summer. Biology students are given worksheets that include questions from past certificate examination papers for homework. However, student journals showed little evidence of assigned homework in Science. There was evidence that student written work is collected periodically and is checked and signed by the teacher. In order to ascertain student progress in a more meaningful way, teachers must pay more attention to checking that the learning outcomes of the science syllabus are being achieved by students and, for both subjects, to providing students with more meaningful feedback on how to improve their understanding of key concepts and the presentation of their individual written work.

It is recommended that developmental feedback be given on students' tests, homework and laboratory records in the form of affirming written comment and suggestions for improvement.

Teachers keep records of student attendance and in some cases teachers keep data on behaviour and homework completion.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

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

- Senior management supports the principles of progression and teacher professional development and makes provision for such through subject department planning, whole-school planning and the facilitation of CPD.
- A set of modern ICT resources are present for student use in lessons.
- Very good use is made of ICT to prepare teaching and learning resources.
- When teaching and learning were good the methodologies used were student-centred, students actively participated in the lesson and the purpose of the lesson matched the requirements of the syllabus.
- The teaching style adopted in some lessons facilitated the development of good communication skills and the vocalisation by students of their knowledge about a topic.

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

- Serious consideration needs to be given to the quality of teaching and learning in Science.
- Teachers must pay more attention to checking that the stated learning outcomes of the science syllabus are being acquired by students.
- Students should themselves do the full set of prescribed practical activities in Science.
- Active, experiential and self-directed learning should be promoted for all students.
- Students' science writing skills, note-making skills and report writing skills should be incrementally improved.
- The plan for the sciences should include agreed principles on essential matters such as approaches to mandatory student practical work, teaching and learning methodologies, assessment strategies and student attainment.
- One double lesson per week in Science should be timetabled.
- The storage of chemicals in the preparation room should be revised and outdated or unused laboratory equipment should be removed.

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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