

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**Bunclody Vocational College
Bunclody
County Wexford
Roll number: 71620H**

Date of inspection: 26 November 2009



**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 Bunclody Vocational College, conducted as part of a whole-school evaluation. 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 these 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 and teacher and examined students' work. 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.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

Bunclody Vocational College is a relatively small school with an intake of approximately thirty to forty students annually. The school provides two programmes in second-level education: the Junior Certificate School Programme (JCSP) and the Leaving Certificate Vocational Programme (LCVP). Students proceed directly onto the LCVP following junior cycle.

Commendably, Science is a core subject within the school's junior cycle curriculum. Junior cycle students complete both the science syllabus for the Junior Certificate examination and the learning targets for the JCSP science statements. Schemes of work for class groups reveal that these are planned for and achieved in tandem and this is appropriate. Biology is offered to incoming fifth-year students each year and one class group is timetabled. Currently, Biology is being studied by approximately forty percent of senior cycle students. Biology is timetabled against Engineering on the senior cycle timetable.

Students are placed in mixed-ability class groups in each year. Higher and ordinary levels are taught in the same class for both subjects and teachers differentiate their lessons and the work that they allocate to students accordingly. The uptake of higher level in the state examinations over the last number of years, however, is disappointing, and has fallen significantly for Science. Greater clarity as to how and when students make their higher and ordinary level choices has been identified as a developmental goal in the science plan. It is recommended that a decision on this be reached by teachers at the next subject department meeting. It is further recommended that increasing the uptake of higher level in both courses also be included as a goal in the science plan and that action plans be developed for both goals.

Timetable provision for the teaching of Science and Biology is very good. Four periods are provided in first and second year and five periods are provided in third, fifth and sixth year. All groups are provided with a double lesson for practical work and, in all but one instance, have access to the laboratory for this lesson. There are plans to provide for weekly laboratory access on the timetable in future years and this is achievable. Teachers are generally allocated to a group for

the duration of a course and this facilitates continuity and the development of positive relationships between learner and teacher. However, due to unforeseen circumstances, one third-year group has been taught by many different teachers. This situation should be resolutely avoided in future deployment.

Resource provision for the subjects is very good. Ongoing budgetary requirements are communicated directly to management and it was reported that all needs are met. The laboratory and preparation area contain a very good number of resources for student practical work with a very high level of organisation and development noted. A trolley system is in use to support the use of the laboratory by three teachers. Up-to-date safety systems are in place with clear safety signage for students, well marked exits and labelled laboratory presses. Laboratory codes of conduct are regularly reviewed by teachers and chemicals are stored in accordance with best practice in the preparation room. The work of science teachers in this regard is commended. The laboratory is fitted with a computer, data projector and internet access. A range of very accessible teaching and learning resources has been built up, including presentations, useful reference websites and animations on many topics. The learning environment has been enhanced with charts, displays of student work and resources. Similarly, the learning environment in a classroom where Science and Biology is taught is very well developed. Continuing professional development (CPD) is supported by management and teachers have been facilitated in attending in-service in the introduction of the revised syllabuses.

The commitment in the school to supporting the sciences is good. Almost all recommendations made in a previous subject inspection report were acted upon. These include development in the following areas: laboratory access, double lessons, the gas supply system, resources for student practical work, a position of science department co-ordinator, a science plan and modern information communication technology (ICT) facilities including staff training in ICT. Achieving greater gender balance in Biology class groups remains a goal in the science plan. Biology is taken mainly by girls but there has been some success in attracting boys to the subject. Biology is currently the only science subject on the senior cycle curriculum. The school is encouraged to examine the viability of providing another science subject as part of long-term curriculum planning.

PLANNING AND PREPARATION

A science department is established and teachers work collaboratively in planning for the subjects and resources. This has proved productive and beneficial to all. Meetings of the science teachers are held on a regular basis and science teachers also communicate daily in sharing the same facilities. Minutes of meetings are maintained and these indicate a focus on both organisational and developmental issues.

The science plan is very well developed in all areas that pertain to provision and teaching and learning in the subjects, and serves as a useful guide to practice in the classroom. The plan includes a science department mission statement as well as a set of very good objectives for learners. Most of these objectives are being achieved in lessons. However, there is scope for developing the objectives relating to students' preparation and presentation of reports on topics and their knowledge of how to obtain information from a variety of sources. The science plan also includes information on the role of the co-ordinator, arrangements for access to subjects and levels, class organisation, assessment and reporting, communication with parents, procedures for supporting students with special educational needs (SEN), CPD, safety, co-curricular activities and goals for development.

The plan shows commendable self-evaluation and reflection by the subject department in key areas. The Inspectorate publication *Looking at Science* is used as an aid to this process. Recent publications and resources from the science, biology and special education support services are also being used well. The science plan goals for 2009/10 are both astute and necessary. These include greater streamlining and variety of assessment methodologies, the development of stronger links with the school's learning support and JCSP co-ordinators, raising the profile of the Coursework B aspect of the syllabus with students and parents and the development of a school science week and an awards system. With the support of management, science teachers are urged to ensure these important goals are realised and achieved in this school year. The plan could also be developed to include an interface between the learning support teacher's plans or individual education plans for students and the plans of the science department for students with SEN.

In addition to the plan, agreed common schemes of work have been set out for each year group. These are collaboratively reviewed each year. Schemes contain time for integrated practical work, tests and revision. The layout of these for Science allows teachers to place a tick when syllabus learning outcomes and JCSP learning targets have been achieved. Good progress had been made with the plans in the class groups visited. In further developing the schemes, a variety of proposed assessment methodologies should be integrated with the learning outcomes so teachers can be assured that learners have acquired each outcome in terms of skill and knowledge.

Preparation for lessons was very good with complementary worksheets and ICT presentations that matched the abilities of the students. Materials for practical work were ready for use and this led to a seamless sequence of activities for students.

TEACHING AND LEARNING

Teaching practices observed ranged from fair to good. The dominant teaching methodology used in most lessons observed involved a series of questions posed by the teacher and encouragement and affirmation of students' responses. Questioning was integrated with short sections of instruction in material new to the concept and links were created with prior learning so that a continuum of learning was in evidence. However, in a number of lessons, students were not sufficiently challenged by the questioning strategies used and student vocabulary and ability to recall scientific concepts was not as good as in other groups.

Other teaching and learning methods observed included practical work, teacher demonstrations, ICT presentations, discussions and the use of worksheets. In one lesson, very good use was made of a three-dimensional model to enhance learning. In the main, teachers catered for the needs of students with SEN through individual attention, differentiated tasks and differentiated questioning. All students participated as fully as they were asked to in lessons and they were co-operative, respectful and responsive. In each lesson, learning was contextualised for the student.

There was a clear purpose to all lessons observed. It is recommended, however, that teachers share the intended learning outcome with students at the start of each lesson, set it out on the whiteboard and check with students at the end of the lesson whether it has been achieved. This practice will strengthen students' partnership in the learning process. The board was very well used in many lessons to record students' contributions to questions and to record key learning points. Appropriate key word posters on topics were prepared in advance and displayed during lessons. The pacing of lessons was generally good.

Good efforts are made to provide a secure, caring and supportive learning environment. In some lessons, however, observations indicated that this may be over emphasised and the level of support given may, at times, encourage a passive attitude among students. In this instance, students could be challenged more in homework, their written work, writing laboratory reports, completing past examination questions, class tests and in group work other than practical work. In addition, there was very little evidence that self-directed learning was taking place or was expected. If teachers and management are committed to helping students to achieve their full potential, initiatives to support this should be developed and implemented. While it is acknowledged that extra lessons are provided after school for the higher-level biology students, other in-class strategies should be developed.

Discovery learning was very well applied in one lesson, and its wider use is recommended, particularly in student practical work where a greater application of the 'investigative approach' to students' designing and conducting practicals should take place. In science lessons, teachers should avoid demonstrating to students how to conduct investigations in advance of the activity. Investigations should be used for students to seek information about a particular concept or process in a manner that is not predetermined in procedure or outcome.

Since the addition of ICT facilities in the laboratory their use has become central to teaching methods used in the subjects. ICT presentations were used throughout most lessons observed. While these provided a valuable reference point and visuals for the topics, the technology was over-utilised at times at the expense of student note-taking, good use of the text book and student written work. Text books were largely unused during lessons and it is recommended that appropriate reference to the topic in the text be made in each lesson so that learners can locate their learning easily when completing homework, including a revision of the day's lesson. This would facilitate independent learning and encourage the students to become more autonomous.

Students' skills in practical work were developed in lessons and good progress has been made with the set of prescribed practical activities with each group. Students were encouraged to make accurate observations during practical work and they promptly noted the results on their laboratory record sheets. Very good laboratory reports were completed on all practicals. However, the approach taken to the writing of laboratory reports by students needs to be adjusted so that students are encouraged to write these up in their own words and thus develop their report writing skills. It is recommended that standardised procedures for developing and achieving these objectives be set out in the science plan.

Worksheets were used at times and were effective, but to avoid the situation where loose sheets are placed in copybooks it is suggested that an agreed and good workbook to accompany the text book be acquired by all students and used instead in daily lessons and as a basis for daily homework. Their use would provide students with a greater number of opportunities to practise the application of their learning and to be repeatedly challenged in recall through a variety of question types. In some groups, students were expected to maintain indexed folders of handouts and worksheets. This is good practice and could be extended.

ASSESSMENT

As already outlined, effective and ongoing formative assessment took place in most lessons during teacher questioning. Teachers also effectively assess students' written work on an ongoing basis and this was evident in the regular teacher corrections and constructive annotations marked on students' written work, including their laboratory reports. However, it is strongly

recommended that students be expected always to implement corrections, redrafting answers to questions they answered incorrectly. This should be applied in all their written work. There was a good standard of presentation in the copybooks examined. Work completed was of an appropriate standard but it was difficult to find sufficient work in some class groups to account for three months study in the subject. Exercises given to students were mainly of the short question variety. In future this should be balanced with longer questions and other types of revision assignments, for example the construction of spider diagrams or mind maps. The use of a variety of student exercises with more frequent opportunities to complete assignments is strongly recommended.

There was considerable variation in the frequency of homework allocation among the class groups visited. According to the science plan, homework is set and corrected at the discretion of the class teacher. It is strongly recommended that this be changed and that the school's policy regarding the frequency of allocation and type of homework to be given to students in each year group be implemented consistently. Students keep their homework journals on the desk during classes and in all instances they carefully noted any homework. In junior cycle groups, there was evidence that parents and teachers sign the journals regularly and communicate short notes on student progress. Differentiation of homework for students doing higher and ordinary level in subjects and for students' individual capabilities was noted.

According to the science plan, class tests are given every six weeks or at the end of a major syllabus unit. However, most students could not locate a recent class test among their books or copybooks. It is recommended that class tests be kept by students and organised into folders for ready and regular access so that students are more aware of their ongoing performance and areas where they need to improve their own learning as individuals. Tests that were located had been corrected by the teacher according to a transparent marking scheme that reflected certificate examinations marking schemes, and this is commended. Formal school tests are administered at Christmas and summer and parents are given written reports after these examinations. Where possible teachers administer common tests and this also is commended. Teachers conduct an annual analysis of students' performance in the state examinations. It is recommended that this be placed in the subject plan and discussed at department meetings. JCSP students are profiled for Science at profiling meetings.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

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

- Science is a core subject on the junior cycle curriculum.
- Timetabling provision for the subjects is very good.
- The laboratory contains a very good number of resources for practical work and modern teaching aids, and is very well organised. Very good attention is paid to matters of safety in lessons and in the laboratory.
- Within the subject department, a reflective, realistic and self-evaluative approach is taken to the planning process and to the further development of the subjects in the school.
- Links were created with prior learning and concepts were put into context for the student.
- Students' written work is well monitored with constructive feedback given.

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

- In developing the schemes-of-work for each year group, a variety of proposed assessment methodologies should be integrated with the learning outcomes.

- The learning intention of each lesson should be shared with students at the outset.
- In-class strategies that challenge students more in the recall and application of their knowledge at the appropriate level should be established in practice across all groups.
- A better balance between the use of ICT presentations and the use of students' reference books and students' own notes should be reached in some instances.
- Greater emphasis should be placed on planning for an investigative approach to practical work in Science and students' laboratory report writing skills should be developed.
- A wider variety of more frequent and more challenging written assignments should be given to students and students should be expected to redraft corrections of their work.
- The school's policy regarding the frequency of allocation and type of homework to be given to students in each year group should be implemented consistently.

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

Published February 2011.