An Roinn Oideachais agus Scileanna
Department of Education and Skills

Subject Inspection of Science and Biology
REPORT

Coola Post-Primary School
Riverstown, County Sligo
Roll number: 72310U

Date of inspection: 11 May 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 Coola Post-Primary 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 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 the teacher, 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. 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

Coola Post-Primary School provides a wide range of programmes to meet the needs of its students. Science is a core subject in junior cycle. At senior cycle, the full range of programmes is offered. The Transition Year (TY) programme, introduced in 2008, is the most recent addition to the school’s curriculum. Science and Biology are well supported by management and the timetabling of these subjects is appropriate. Biology and Physics-Chemistry are provided in TY and Biology and Physics are currently available to students sitting the Leaving Certificate. It is noteworthy that, in response to demand from students, management has plans in place to add Chemistry to the list of optional subjects in senior cycle in September 2010.

The school has two laboratories which are clean and well maintained. One of the laboratories was opened in 2008, and while the second is older, it is entirely functional. An appropriate range of health and safety equipment is available in each laboratory including safety goggles, fire extinguishers, fire blankets and emergency shut-off points for gas and electricity. Each laboratory has an adjacent chemical store and preparation area. All chemicals are stored appropriately. Reporting procedures are in place in the case of accidents, telephone numbers are available for the emergency services and the science department has devised a health and safety statement. This statement should now be framed on the Safety, Health and Welfare at Work Act of 2005.

There are five teachers of Science in the school. Management deploys teachers according to their interests and qualifications and strives to ensure continuity in allocating teachers to classes. The teachers have attended continuing professional development (CPD) provided by the Second Level Support Service on the Junior Certificate science and Leaving Certificate biology syllabuses. The most recent whole-school CPD has centred on the introduction of the TY. Induction procedures are in place to introduce new teachers to the school and its organisation. They are issued with a staff induction booklet and are mentored by the subject co-ordinator.
Good information and communications technology (ICT) facilities are available for the sciences. All classrooms are broadband enabled. One laboratory is equipped with a smart board while the second has a PC and data projector. In addition, access to the computer room is organised informally among the teaching team and it is noteworthy that County Sligo Vocational Education Committee has also subsidised laptops for teachers.

Information is provided to parents on open night. On this night, the science teachers, working with a team of students in each laboratory, provide an insight into the sciences in the school. During the evaluation, copies of templates sent to parents providing information on science events such as field trips, SCIFEST and information pertaining to the coursework section of the Junior Certificate syllabus were made available.

PLANNING AND PREPARATION

The science department operates a collaborative approach to planning. Formal meetings are held three times per year and it is noteworthy that informal planning meetings regularly take place. Minutes of the formal meetings are recorded and contained in the planning folder. These are good practices. The subject is co-ordinated effectively and this position is rotated on a yearly basis.

The science department’s first formal subject department policy was adopted in 2005 and revised in 2007. In 2008, the programme of work for the Junior Certificate Science syllabus was reviewed, with particular emphasis on the development and sharing of common resources. The science department’s work in this regard is praiseworthy. This collaborative practice is further augmented by the recent provision of a science folder on the school server.

The planning documentation for Junior Certificate science was comprehensive. It contained an overview of the topics to be covered in each year on a term-by-term basis. It is good practice that it also contained a list of the associated mandatory practical work to be completed in each year of the junior cycle. The relevant list of mandatory practical activities is distributed to students at the start of each school year. Programmes of work were also provided. These contained appropriately chosen topics, desired learning outcomes, practical activities as well as appropriate timeframes, modes of assessment and resources to be used.

Programmes of work were also provided for Leaving Certificate Biology. While some of the Leaving Certificate Biology programme includes a list of possible modes of assessment, these were not linked to the learning outcomes. The programme for Biology in TY is known as ‘Science by Enquiry’ and an outline of the programme was provided as well as a more detailed scheme of work for TY. Topics include cell ultra-structure, dissections and an introduction to Science for primary-school pupils. The science department should discuss and agree best practice in delineation of the programmes of work and adopt a common template across all the science subjects. The template advised earlier would also be useful in this regard.

A code of conduct has been developed for the laboratories and this code is signed by parents and students at the beginning of each school year. It is praiseworthy that the initial lessons in all programmes of work are based on an introduction to good health and safety practices as well as the code of conduct for the laboratories. The emphasis on health and safety was also evidenced in the actions of teachers and students in the lessons observed during this evaluation.

It is praiseworthy that the science team has developed lists of terminology for students who receive learning support and these are provided to the learning-support department on a term-by-
term basis. In one instance, a folder of differentiated resources and resources suitable for students with special educational needs has been developed. This level of planning and preparation is laudable. In order to ensure that these useful resources are accessible to all members of the science team they should be stored in the science folder on the school server.

**TEACHING AND LEARNING**

The lessons observed were well structured and purposeful. They included a range of topics including photosynthesis, the heart, breathing and respiration, electric currents and microscope work. A variety of methodologies was employed in each lesson. These included group work, pair work, brainstorming, demonstration, the use of plants, quiz, games, overhead projector, practical work, board work and ICT. A good balance was maintained in lessons between teachers’ instruction and student-centred activity.

Instructions to students were clear and concise. Teaching was supported and enhanced by a range of relevant visual resources such as the data projector, worksheets, models and jigsaws. The white board was used effectively to highlight the aim of the lessons, key words and definitions. In one instance, the board was put to very effective use in clarifying a student’s query on the calculation of resistance and Ohms Law. This is good practice. Overall, visual resources were used well to clarify concepts for the whole class and to consolidate learning. In one lesson, on microscope work, the smart board was used to display a photomicrograph of the vascular bundles in a plant stem while students worked in groups to compare a stained and unstained transverse sections of the stem.

Effective use of ICT was observed in many lessons. This included PowerPoint presentations, CD-ROMs and animations and video clips which had been downloaded from the internet. The good visual approach was further enhanced by the use of models, exemplar materials and wall charts. In one lesson, good use was made of a clear and colourful PowerPoint display as an introduction to a demonstration on the dissection of a heart. The variety incorporated into the teaching methodologies, coupled with teacher-led discussions, served to encourage students to contribute, query and engage with the lesson content. Methodologies such as paired learning and paired tutoring were used in some classes and these proved to be good methods of encouraging learning. This was particularly evident in one lesson on electric currents where the teacher set up a series of experiments. These included the use of a multi-meter to measure current, the change in resistance as light intensity changes and comparisons between household bulbs and light emitting diodes. Students were asked to circulate in small groups to observe each experiment where one student demonstrated the activity to the remainder of the group.

Textbooks were used to aid learning in a number of the lessons observed, but they were not overly depended upon. Teachers moved around the room ensuring that all students were focused and providing extra assistance to those experiencing difficulty. Students were well managed and their work was monitored carefully by teachers in a supportive and encouraging manner. This support contributed to a positive classroom atmosphere that was conducive to learning. Discipline was sensitively maintained, chorus answering was discouraged immediately and there was a clear code of conduct in the classrooms visited.

Where experimental work was carried out, students displayed good routines for setting up and clearing away apparatus. Students worked with due regard for health and safety and it is laudable that good practices in this area were discussed at the outset of the lessons. In one lesson, students worked in pairs to test a range of acids and bases. It is good practice that results were discussed as
a class group at the conclusion of the practical activity and that key points were noted on the board. The responses of individual students indicated a broad knowledge of subject-specific terminology.

Questioning was used effectively in all lessons observed. Teachers encouraged students to expand and elaborate on their answers in order to give a full and clear explanation. Students were challenged to use their prior learning to formulate predictions and conclusions. This approach promotes higher-order thinking among the students. Good practices were seen in regard to differentiation. Examples included differentiated questioning, extra teacher assistance for less-able students, differentiated worksheets.

Most responses from students indicated a sound understanding of scientific concepts and good scientific literacy, which is praiseworthy. A good rapport existed between students and their teachers. Teachers frequently provided affirmation to their students and encouraged them to be actively involved in the lesson. This created a mutually respectful atmosphere between the students and their teachers. In one lesson, the teacher made effective use of a card game to motivate and engage students. Cards displaying a question on one side and an unrelated answer on the other side were distributed to all students who sat in a circle. In turns, each student was asked to read aloud his or her question from the card. The classmate who had the card containing the correct answer then read it aloud in response. This pattern continued until all questions had been matched with the appropriate answer. This approach to revising topics proved to be effective and enjoyable and it also incorporated a positive emphasis on literacy into the lesson. Overall, the ways in which teachers managed their students visibly contributed to the creation of a positive learning environment.

Observation of students’ notebooks and practical books indicated that the skills being developed were appropriate in terms of their nature and the standards achieved. The notebooks and practical books were generally well maintained. Most students were confident and competent in the organisation of worksheets and the presentation of written work.

**ASSESSMENT**

The good collaboration in the science department extends to assessment practices. Common science tests are administered in first year and in second year and it is good to note that these tests include a percentage of the overall mark for coursework. One science teacher sets the common papers and marking scheme for each year group and another science teacher corrects them. It is noteworthy that these roles are rotated amongst the team. Homework and assessment policies have also been developed.

Teachers’ records, which were made available in some of the lessons visited, provided information on students’ achievement in class tests as well as on attendance and homework assignments. Communication with parents takes the form of a written report at Christmas and summer. Parents can also be issued with a further progress report on request. Parent-teacher meetings are held annually. Teachers also use the school journal to report on students’ progress.

A sample of students’ notebooks showed evidence of regular checking and annotation by teachers. When exercises have been checked and commented upon by the teacher it is important that students act on these corrections in order to consolidate the learning process. It is recommended that the science team should develop procedures for follow-up on exercises that
have been checked and annotated by the teacher. These procedures could then be included in the science department’s homework and assessment policies.

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- Science and Biology are well supported by management and the timetabling of these subjects is appropriate.
- The science department operates a collaborative approach to planning.
- The subject is co-ordinated effectively and the role of co-ordinator is rotated on a yearly basis.
- Good ICT facilities are available for the sciences.
- It is praiseworthy that the science team has developed lists of terminology for students in receipt of learning support and these useful lists are provided to the learning-support department on a term-by-term basis.
- Discipline was sensitively maintained, chorus answering was discouraged immediately and there was a clear code of conduct in the classrooms visited.
- Teachers frequently provided affirmation to their students and encouraged them to be actively involved in the lesson.
- Instruction was supported by the use of varied, relevant, visual resources.
- The responses of most students indicated that they had a sound understanding of scientific concepts and good scientific literacy.
- Students were challenged to use their prior learning to formulate predictions and conclusions.
- Good assessment practices are used in the sciences in this school. These include the use of common tests in first year and in second year and the allocation of a percentage of the final marks for the coursework.

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

- The science department should discuss and agree best practice in the delineation of the programmes of work and adopt a common template across all the science subjects.
- The health and safety statement should be framed on the Safety, Health and Welfare at Work Act of 2005.

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.

*Published December 2010*