

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**Royal and Prior Comprehensive School
Raphoe, County Donegal
Roll number: 81011L**

Date of inspection: 4 November 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 BIOLOGY

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Royal and Prior Comprehensive 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 this subject 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 subject teachers. The board of management was given an opportunity to comment in writing on the findings and recommendations of the report, and the response of the board will be found in the appendix of this report.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

There is good whole school support for Science and Biology in the school. The subject department is well resourced and management encourages teachers to participate in continuing professional development (CPD).

In senior cycle, the school offers an optional Transition Year (TY) programme, the Leaving Certificate Vocational Programme (LCVP) and the established Leaving Certificate. Biology, Agricultural Science, Chemistry and Physics are available as Leaving Certificate subjects. Science has been a core subject at Junior Certificate level in the school since 2007. It is allocated three class periods per week in first year and five periods per week in second year and in third year. There is an optional Transition Year in which Chemistry, Biology and Physics are offered. School management should consider the feasibility of providing all four sciences in the TY programme.

Leaving Certificate Biology classes are allocated six periods per week which include at least one double period for practical work. These allocations of lesson periods are appropriate for the Junior Certificate Science and generous in the case of Leaving Certificate Biology.

Teachers generally retain the same science class group from one year to the next and this level of continuity is commendable.

The school has three science laboratories. They are bright, clean and well maintained. Access to the laboratories is arranged by the science team at the beginning of the school year. Two of the three laboratories are linked by a preparation and storage area while the third laboratory has an adjacent preparation room. At the time of the evaluation, only one of the preparation areas was lockable. This is a health and safety issue. Appropriate lockable doors should be installed in the second preparation room. The preparation rooms were very tidy and chemicals were well organised according to a colour coded scheme. Toxic chemicals are stored in an appropriate lockable cabinet in one of the store rooms. However, neither preparation room contains cupboards

for flammable chemicals. It is recommended that there should be appropriate storage cabinets for flammable and toxic chemicals in both store rooms. Also, ventilation was found to be inadequate in both store rooms. It is recommended that management explore how appropriate ventilation can be provided in each of the chemical store rooms.

Appropriate health and safety equipment was observed including emergency shut-off points for gas, fire extinguishers, fire blankets, first aid kits and safety goggles. The existing health and safety statement is undated. Management believe it to have been reviewed in 2006 and have plans in place to update the current statement. These plans involve a member of the management team attending a Health and Safety in-service course at the end of the month in Donegal Education Centre. Each member of the science team should have input into this review. A code of conduct for the laboratory was displayed in all laboratories and in students' practical notebooks. Accident reporting measures are in place and accident report forms are in the first aid area of the laboratory.

One laboratory and one science classroom is equipped with a lap-top, data projector and screen. The school has plans to extend the information and communications technology (ICT) provision in classrooms and this includes the provision of Broadband internet access. This will promote the inclusion of ICT as a methodology to enhance teaching and learning in Science and Biology.

The science department places emphasis on co-curricular activities as a method of supplementing the classroom environment. The school has an entry for the BT Young Science and Technology exhibition. Students are also encouraged to attend events such as Science week in Letterkenny Institute of Technology and events to promote the sciences are also held in the school. These include quizzes, a chemistry magic show, ecology trips and farm visits. This level of commitment to co-curricular activity is commendable.

PLANNING AND PREPARATION

There is evidence of a strong sense of collegiality among the science teachers and the level of co-operation is very high. The science department is well co-ordinated and a subject convenor has been appointed. In order to share responsibility for the co-ordination of the department and to encourage a sense of devolved leadership, it is recommended that the science team rotate this position among the science department members.

The science department meets approximately three times per term, as well as holding many valuable informal meetings. Minutes are recorded for formal meetings and a copy of these is provided to management.

During the inspection, common long-term plans were available for Junior Certificate Science, TY Sciences and Leaving Certificate Biology. An overall introduction to the organisation of the science department was based on the template from the School Development Planning Initiative (SDPI). This contained clearly defined aims and objectives for each subject, classroom organisation procedures such as roll calls, homework procedures, assessments and record keeping.

It is noteworthy that the health and safety guidelines which are outlined to students at the start of the year are also included in the planning documentation. Plans for Junior Certificate Science, TY sciences and Leaving Certificate Biology contained a collaboratively devised course overview which showed the topics to be taught as well as the approximate number of class periods to be spent on each.

Programmes of work for Junior Certificate Science were working documents and in draft form. They had been completed for first year and third year; however, the physics section should be added to the second year plan. It is notable that the programmes of work included the learning objectives from the Junior Certificate science syllabus, a suitable timeframe and a section for a comment which, in most instances, included reference to methodologies used, student activities, assessment and, in some instances, the resources used. The science team should review this template as part of a science planning meeting and develop a common template for the programmes of work which can be used across the sciences.

The current programme of work for TY includes topics such as optics, waves, sound, the Tacoma bridge collapse, careers in medical physics, medicine, disease and the role of vaccination. The programme of work should include modes of assessment to be used. For example, in instances where projects, presentations and posters are developed, assessment criteria and performance indicators for these activities should be included in the plans. These criteria should also be shared with the TY science students. There is scope to adapt the template for the programmes of work and then use it in planning the TY science programme. The content of the programme is dependant on the number and expertise of the science teachers involved and may vary from year to year. Management should consider retaining the same teacher with the programme for a number of years in order to build up resources and experience in teaching the programme.

Programmes of work for Leaving Certificate Biology were based on learning outcomes outlined within an appropriate timeframe. However, the learning outcomes were mainly based on the practical activities to be completed and there is scope to redirect these to focus on the biology syllabus as a whole. These programmes should also link the learning outcomes to appropriate methodologies and resources as well as the practical activities. This should be taken into consideration in the development of a template for the sciences, as mentioned earlier.

The planning documentation contains some reference to the links between the science department and the learning-support department. In order to improve this link, the science teachers should also provide the learning-support department with a list of science-specific key words in order to support students who may be experiencing difficulties with the subject. They should also consider the introduction of key-word notebooks for science terminology.

In the classes observed, there was evidence of good short-term planning. The necessary materials and resources for each lesson had been prepared in advance.

TEACHING AND LEARNING

Good quality teaching and learning was evident in all lessons observed. Methodologies observed included student practical work, demonstrations, group work, questioning, discussion, teacher talk and the use of ICT. There was appropriate use of handouts and student worksheets. Lessons were well structured and students were generally kept busy and engaged. However, it is important that teachers be mindful of the necessity to keep a balance between active learning methodologies and teacher-centred presentations. Teachers should avoid over-reliance on any one methodology, whether this is teacher talk or overuse of power point presentations.

Good progress was made in all lessons observed. Most students were attentive, interested and anxious to participate in the learning process. The teachers were affirming of students' efforts. There was evidence of differentiation in the manner in which lessons were conducted and all students were given the opportunity to achieve according to their abilities. Differentiated

worksheets were used in one lesson where key words were provided for the less able student and the assignment of differentiated homework tasks was also observed. This good practice should be implemented by all members of the science team. Furthermore, all good practices in relation to teaching methodologies should be discussed at science team meetings and included in the programmes of work for each year group.

Teachers were very knowledgeable regarding their subject matter, presentations were clear and concise and lessons proceeded at a suitable pace. Continuity with previous lessons was good. During the lessons, the teachers used language that was appropriate to the needs of their students. In some lessons, there was good emphasis on literacy, key words were reinforced, and use was made of the JCSP keyword posters.

Questioning of students was frequently used to check on levels of knowledge and understanding. Best practice was seen where students were given time to formulate their answers and were encouraged to put up their hands before a respondent was chosen. Good use of questioning is also a useful tool for drawing out those students who would otherwise participate minimally in class. Questions ranged from the factual, testing recall, to questions of a higher order that were more challenging and encouraged students to think at a deeper level. All teachers are encouraged to give thought to their use of questioning as a strategy in order to enhance the quality of learning opportunities for students. Students displayed a good level of knowledge, understanding and skills during interaction with the inspector.

The practical work that was undertaken was efficiently organised and implemented. The students worked in small groups and demonstrated a mature approach to their work. Best practice was observed where the teacher facilitated plenary sessions before and after the experiment, thus ensuring that the students clearly understood the purpose of the practical work and had an opportunity to discuss their findings afterwards.

In all of the classes visited, there was a positive atmosphere. The rapport between teachers and students was good and this is to be commended. Teachers were enthusiastic, patient and considerate of students, and they demonstrated very good classroom management skills.

Homework assigned was appropriate to the lesson content and was designed to assist the student in learning and understanding the topic in question. Students were encouraged to note their homework in students' journals.

ASSESSMENT

A range of assessment modes are utilised by the science team. Formative assessment of student learning is carried out, on an ongoing basis, by questioning in class, through correction of homework and through a good level of teacher observation. Junior Certificate students kept laboratory workbooks up to date as evidence of practical work being carried out. The level of attention that teachers give to examining and correcting notebooks is good. This is a very effective means of encouraging students and of pointing the way towards improvement. A range of practices with regard to the correction of students' work was observed. Some teachers collect the copybooks at the end of the class while some correct the work in class. Both methods were seen to provide valuable feedback to students. There is scope, however, for the science team to discuss methods by which they can encourage students to follow up on corrections made by the teacher.

All classes are assessed by means of a Christmas examination. This is a common assessment across all classes in the year group in the majority of instances. Common formal assessments are also held for non-certificate examination classes in the summer. Questions on mandatory practical work are included in these examinations and a percentage of the overall grade is allocated for the standard of the experiment books.

Certificate examination classes sit “mock” examinations in the spring. Additional testing is at the discretion of individual teachers. Records of assessment are held in teachers’ own class diaries. Results of assessments and progress reports are communicated to parents by means of Christmas and summer reports for non-certificate examination classes, and following Christmas and “mock” examinations for third-year and fifth-year students. Communication with parents is achieved by means of parent-teacher meetings and through parents’ nights where relevant. In addition, the student journal is used to communicate with parents.

There was evidence of good record keeping by teachers, covering such areas as student attendance, assessment records and homework. This is good practice. The recorded information can be used to build up students’ profiles and can form the basis of very useful evidence in communicating progress to parents. The information can also prove useful when advising both students and parents on choice of subjects at senior level and on what level of examination paper to choose in certificate examinations.

An analysis of achievement in the certificate examinations is provided by the principal and it is noteworthy that this includes comparisons with national averages. This analysis was seen to be used by some teachers in planning for their lessons and this good practice should be extended across the entire science teaching team.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- There is good whole school support for science in the school.
- There is evidence of a strong sense of collegiality among the science teachers and the level of co-operation is very high.
- Teachers were very knowledgeable regarding their subject matter, presentations were clear and concise and lessons proceeded at a suitable pace.
- The practical work that was undertaken was efficiently organised and implemented.
- In all of the classes visited, there was a positive atmosphere.
- The homework assigned was appropriate to the lesson content and was designed to assist the student in learning and understanding the topic in question.
- There was evidence of good record keeping by teachers, covering such areas as attendance, assessment records and homework.

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

- There should be appropriate storage cabinets for flammable and toxic chemicals in both store rooms.

- The preparation room, shared between the biology and physics laboratory, should be lockable.
- Management needs to explore how appropriate ventilation can be provided in each of the chemical store rooms.
- The science team should develop a common template for the programmes of work which can be used in planning for all the sciences.
- It is important that teachers keep a balance between active learning methodologies and teacher-centred presentations and avoid over-reliance on any one methodology.

Post-evaluation meetings were 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.

Appendix

SCHOOL RESPONSE TO THE REPORT

Submitted by the Board of Management

Area 1: Observations on the content of the inspection report

The Board of Management are very satisfied with this report and fully support its finding. The Board was most encouraged by the Inspectorate's recognition and commendation of the staff's competency in their subject areas. The Board was also delighted at the highlighting of the level of rapport between teachers and students in a positive, enthusiastic, patient and considerate ethos.

Area 2: Follow-up actions planned or undertaken since the completion of the inspection activity to implement the findings and recommendations of the inspection

The various recommendations contained in the inspection have been either addressed or are being addressed by the science department and the management of the school.