

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**Magh Ene College
Bundoran, County Donegal
Roll number: 76083J**

Date of inspection: 10 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 Magh Ene College. 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, deputy 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

Science and Biology are well supported in the school. Science is a core subject at Junior Certificate level and all students have access to the subject. It is allocated four class periods per week. Biology and Physics/Chemistry are provided in Transition Year (TY) and allocated three periods per week. The school offers a range of programmes in senior cycle, including the Leaving Certificate, an optional Transition Year (TY) programme and the Leaving Certificate Vocational Programme (LCVP). Biology and Physics/Chemistry are offered at Leaving Certificate level. Biology classes are generally allocated five periods per week and six periods per week in one option block. This class allocation includes at least one double period for practical work for each year group. This provision is in line with National Council for Curriculum and Assessment (NCCA) recommendations.

The school has two science laboratories. The majority of science classes are held in a laboratory and this is good practice as laboratory access is particularly important, given the substantial practical content of the Junior Certificate science and the Leaving Certificate biology syllabuses. The two laboratories are linked by a preparation and storage area. The preparation area is tidy and apparatus and equipment are stored in labelled boxes and on shelves. The lockable chemical store is appropriately ventilated. Chemicals are organised using a colour-coded scheme. Toxics, corrosives and flammables are stored in appropriate lockable cabinets.

The health and safety statement is reviewed annually and it is commendable that the science team has been involved in this review. Appropriate health and safety features were observed during the evaluation. Health and safety equipment such as fire extinguishers, fire blankets, first aid kits and safety goggles are available in both laboratories. A code of conduct for the laboratory is displayed and also included in students' mandatory notebooks. Appropriate accident report procedures are in place and a list of telephone numbers for the emergency services is also available. Each laboratory has an isolation switch for gas and electricity.

The school has a networked Information Communications System (ICT) in place. This facilitates efficient registration and communication among teachers. Each laboratory is equipped with a PC, data projector and screen. Both are broadband enabled. The science team also has access to a range of data loggers.

Teachers are encouraged and facilitated to engage with continuing professional development (CPD). Members of the science team attend annual events organised by the Irish Science Teachers' Association (ISTA). Whole school CPD has focused on Assessment for Learning, instructional intelligence and co-operative learning. Along with two other post-primary schools in the area, the school is part of a co-operative learning initiative organised by the Leadership Development for Schools (LDS) programme and Donegal Education Centre.

The science department places emphasis on co-curricular activities as a method of supplementing the classroom environment. The school has had many entries in the BT Young Science and Technology exhibition and it is noteworthy that, this year, four groups have been selected to exhibit. First-year students are brought to the exhibition each year. Science students are also encouraged to get involved in *Scifest*, a science fair which involves a competition and the exhibition of projects, a selection of science talks, science demonstrations and a prize-giving ceremony. Students have also attended lectures in Sligo Institute of Technology as well as St Angela's College, Sligo. Presentations have been organised on a range of science related topics such as Discover Sensors, Seismology Ireland as well as guest lecturers from the Science Foundation of Ireland. This level of commitment to co-curricular activity is commendable.

PLANNING AND PREPARATION

There is a high level of co-operation and collaboration among the members of the science team. Science and Biology are well co-ordinated and the position of co-ordinator is rotated among members of the science team which is good practice. The science teachers meet approximately once per term and minutes of these meetings are recorded. In addition, regular informal meetings are held as necessary.

Planning documentation, presented at the time of the evaluation, was organised using the SDPI template. It included the aims and objectives of the science department, records of meetings, co-ordination of the science department, class organisation policy and homework policy. It is commendable that the documents also contained planning for students with special educational needs. Plans also contained documentation provided to the science teachers by the learning support department. This included strategies on teaching students presenting with Aspergers Syndrome, attention deficit disorder, cerebral palsy and hearing impairments. It is evident that there is a good level of collaboration with the learning support department. In order to build on this good practice, 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 Science. The introduction of key-word notebooks for science terminology should also be considered.

Planning for the curriculum content of the course consisted of lists of topics to be completed in each term for Junior Certificate science, TY biology and Leaving Certificate biology. These lists have been compiled collaboratively by the science team and are agreed at the beginning of each school year. There is scope to provide a more detailed time frame which would suggest the number of weeks or class periods to be spent on each topic. It is noteworthy that the science team works on each topic concurrently, where feasible.

A more detailed scheme of work was provided for Junior Certificate science. This was based on the learning outcomes from the syllabus, linked to practical work and resources, as well as some modes of assessment. There is scope to develop this programme of work further to link learning outcomes with appropriate methodologies as well as resources and modes of assessment. It is recommended that the science team develop a common template for the programmes of work which can be used across the sciences. These programmes should include a short recapitulation on appropriate health and safety practices for each year group.

Planning documentation for TY included a range of appropriate topics. The programme of work should include modes of assessment to be utilised, their assessment criteria and performance indicators for the activities as necessary. These criteria should be shared with students and form the basis of the marks awarded and feedback provided. The template for the programmes of work recommended earlier should be adapted and used in planning the TY science programme.

Planning documentation for leaving Certificate Biology consists of the learning outcomes from the biology syllabus. These plans should now be developed into programmes of work which are tailored to meet the learning needs of the students in Magh Ene College.

The science team has developed a large range of resources. These include PowerPoint presentations, downloaded diagrams from the internet, CD ROMs and video clips as well as past examination papers and chief examiners' reports, worksheets and class tests. All these resources are to be found on the science department's folder in the school's e-portal system. It is noteworthy that the resources are organised in line with the topic headings found in the science and biology programmes of work. Hard copies of many tests, answer booklets, web addresses, worksheets, quizzes and games are also available in the subject department planning folders. This level of planning for resources is highly commended.

TEACHING AND LEARNING

Very good teaching and learning were observed in all classrooms visited. The lessons were well structured and the instruction was clear and concise. Teachers clearly outlined the learning outcomes to students at the outset of the lesson.

A variety of methodologies was employed in lessons. These included group work, brainstorming, the use of graffiti diagrams, placemats, mini-white boards, quiz, investigative practical work, board work and worksheets. The effects of whole school in-service in the area of instructional intelligence were evident in the teaching and learning methodologies used.

Good use of information and communication technology (ICT) was also observed in PowerPoint presentations, animations and video clips. The good visual approach was further enhanced by the use of models, exemplar materials and wall charts. 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. The text book was used as a resource to support teaching. Methodologies such as paired learning and paired tutoring were used in some classes and this is a good method of encouraging student learning.

Questioning was used effectively in a number of lessons observed. A range of question types was used, there was appropriate 'wait-time' and the teacher encouraged students to expand and

elaborate on their answers in order to give a full and clear explanation. This approach promotes higher-order thinking in the students and indicates the high expectations of the teacher.

Most student responses indicated a sound understanding of scientific concepts and good scientific literacy, which is praiseworthy. A positive 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. This is good practice and it nurtures a positive environment in which learning can take place.

Observation of students' notebooks and practical books indicated that the skills developed were appropriate. 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. Teachers are advised to reinforce best practice in this area at appropriate intervals.

The pacing of lessons was good and it is noteworthy that time had been built into the lesson structure to allow for summary and recapitulation. This was a very effective method of reinforcing the lesson content. Where experimental work was carried out, results were discussed by the class group at the conclusion of the practical activity and the key points were noted on the board. This structured approach is commended.

ASSESSMENT

Teachers' records provided information on student achievement in class tests as well as attendance and homework records. Teachers also made good use of the e-portal system of recording data. Communication with parents takes the form of a written report at each half-term and at the annual parent-teacher meetings. It is commendable that the e-portal report system allows for free text to facilitate more directional feedback to parents on student progress. The student journal is also used occasionally to report on progress.

Common science tests, where feasible, are administered at Christmas, Easter and at the end of the school year. In most instances, these include a percentage for continuous assessments throughout the term and this is good practice. "Mock" examinations are also held for students sitting certificate examinations and reports are issued following these assessments.

The science department homework policy is based on the whole school policy. It includes the types of homework to be allocated and, commendably, the length of time which should be spent by students on homework. The policy also includes information on evaluation of homework and the benefits of homework.

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

An analysis of certificate examination results is carried out by the science team and it is noteworthy that this includes comparisons with national averages. It is good practice that the outcomes from this analysis are used in planning for the incoming year.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Science and Biology are well supported in the school.
- The health and safety statement is reviewed annually and it is commendable that the science team has been involved in this review.
- The school has a networked Information Communications System (ICT) in place.
- There is a high level of co-operation and collaboration among the members of the science team.
- The science team has developed a large range of resources for the science department.
- Very good teaching and learning were observed in all classrooms visited.
- Most student responses indicated a sound understanding of scientific concepts and good scientific literacy, which is praiseworthy.
- Observation of students' notebooks and practical books indicated that the skills developed were appropriate.
- It is good practice that the outcomes from the analysis of results in certificate examinations are used in planning for the incoming year.

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

- There is scope to develop the programmes of work further to link learning outcomes with appropriate methodologies as well as resources and modes of assessment.
- The science team should develop a common template for the programmes of work which could be used across the sciences.
- The science team should agree procedures for follow-up by students on exercises that have been checked and annotated by the teacher.

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.

Published March 2011