

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Chemistry
REPORT**

**Maria Immaculata Community College
Dunmanway, County Cork
Roll number: 76086P**

Date of inspection: 8 March 2010



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

**REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN SCIENCE AND CHEMISTRY**

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Maria Immaculata Community College. It presents the findings of an evaluation of the quality of teaching and learning in Science and in Chemistry 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 laboratories and observed teaching and learning. The inspector interacted with students and teachers 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. The board of management of the school 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

The sciences are well supported by school management. Science is studied by all students to Junior Certificate level. This is very positive. The numbers of students taking the higher-level paper for Junior Certificate is slightly low. Consideration should be given to the implementation of strategies that would further enhance the uptake of Junior Certificate Science at higher level. All three Science subjects are offered at senior cycle. Transition Year (TY) is optional and includes half-year modules of Chemistry, Biology and Physics. This is good practice as students are provided with the opportunity to further develop their scientific literacy. Biology, Chemistry and Physics are provided as optional subjects for Leaving Certificate. Student uptake of Biology and Physics is good. The school should explore strategies that would further encourage the uptake of Chemistry for Leaving Certificate. Consideration should be given to the timetabling of science elective modules in the Leaving Certificate Applied (LCA) programme, particularly in view of their entry requirement for some beauty-therapy courses.

There is an open choice of subjects for Leaving Certificate and subject-option blocks are devised based on students' interest. This is good practice. Effective procedures are in place to ensure that students are well supported when choosing their optional subjects and these strategies include information sessions and the receipt of documentation outlining the subject needs for different careers.

Science classes are mixed ability and in general school management strives to retain the same teacher through first, second and third year. However, the principal reported that for the academic year 2009-2010, timetabling and personnel constraints prohibited the continuity of a minority of

teachers with their class groups on entering second year. It is school management's stated intention that this unusual situation will not reoccur.

Timetable allocation is in line with the syllabus requirements and includes an appropriate number of double periods to facilitate investigative practical work that is an integral part of the science syllabuses. This, in addition to the good spread of classes across the week, supports continuity in the teaching and learning process. All science class groups have weekly access to a laboratory and this is good practice.

There is good support for students with special educational needs. The timetabling of resource time in Science for specific students is particularly positive.

There is a good focus on health and safety procedures in the school. Safety audits have taken place. An appropriate health and safety statement has been developed. Other health and safety documentation that has been devised include information on fire drills and safety check lists. In addition, the section of the safety statement that is specific to the science department is contained in the science plan and there are copies of this section in each of the laboratories. This is very good practice. Chemicals are stored in accordance with Department of Education and Skills guidelines. Care should be taken to ensure that all of the flammable chemicals are stored in the flame-resistant press at all times.

There is a good level of scientific resources and equipment available to support the teaching and learning of the sciences. The school has three well-resourced laboratories, a demonstration room and appropriate storage and preparation areas adjoining these rooms. A very satisfactory level of information and communication technology (ICT) equipment has been installed in laboratories including computers, printers, a data projector and internet access. The provision of such facilities is very positive.

New science teachers are supported in their work and the provision of an information document is beneficial to them in getting to know the procedures and policies of the school and of the science department. The commitment of the members of the science department to continuing professional development (CPD) is very good. Teachers have been facilitated in attending all relevant science in-service education courses. In addition, teacher involvement in delivery of subject-specific support is very positive. The school supports teachers' membership of the Irish Science Teachers' Association which is good practice. Whole-staff in-service training, which is beneficial to teachers' work in the classroom, has included topics such as mixed-ability teaching.

There is very good support for students' participation in a range of science-related, extracurricular and co-curricular activities. These include field trips, the Salters' Chemistry Festival and industrial visits. All of these activities serve to enhance students' interest in and engagement with science. Teachers' work in supporting students in such activities is highly commended.

PLANNING AND PREPARATION

The formal departmental planning that exists in the science department of Maria Immaculata Community College is supported and facilitated by management, through the provision of regular formal meeting times throughout the school year. It is clear from documentation that these timetabled meetings are supplemented by lunchtime meetings. The dedication and commitment of teachers in this regard is evidenced by the good number of these latter meetings that have taken

place. The minutes of all meetings demonstrate the good level of collaboration that exists among the members of the science department. Planning is also facilitated by the work of the co-ordinator, the position of which is rotated each year and this is good practice. Well-stocked laboratories provide evidence of successful planning for resources.

Well-developed and comprehensive planning folders have been devised in Science and Chemistry. Particularly noteworthy were references to the mission statement, planning for students with special educational needs along with suggested teaching strategies to support these students, subject-planning policies and procedures, a homework policy, an action plan for coursework B and the science curriculum action plan for 2010 in which targets are identified. It is clear from documentation that the subject plans are reviewed and this is good practice.

The development of a common outline programme of work and common assessments in Science provide further confirmation of the good level of co-operation that exists in the science department. The delivery of a common programme of work to all junior cycle science classes is good practice as it ensures standardisation of learning across a year group. The science programme of work facilitates the study of Biology, Chemistry and Physics during each year of junior cycle. This is a very good approach as it ensures that students have access to a science programme which is balanced in terms of the biological and physical sciences content in each year of junior cycle. An outline programme of work has also been developed in Chemistry. It is recommended that all programmes of work be broadened in time to include detailed provision in relation to, for example, links between practical work and theory, resource requirements, optional assessment methods and examination preparation, as well as continual revision work, when and where it is appropriate. This task could be carried out on a phased basis taking, for example, one senior and one junior year group per annum. Subject syllabuses and the guidelines for teachers developed by the National Council for Curriculum and Assessment (NCCA) should provide the basis for such detailed planning.

The TY chemistry plan is in keeping with TY philosophy as students are provided with the opportunity to study aspects of Chemistry that are not in the junior cycle and senior cycle syllabuses. Using approaches such as "*The case of Adolf Hitler's Diaries*" makes the concept tangible and interesting to students and anchors the subject in everyday applications.

There was clear evidence of effective short-term planning for all of the lessons observed. The teachers' preparation of the format and structure of the lessons were underpinned by an informed understanding of their students and the aim of consolidating student learning. In keeping with good teaching practice, the teachers chose a definite topic for their respective lessons. A good number of resources had been gathered and prepared for use in the delivery of lesson content. These included the development of student handouts, a PowerPoint presentation and over-head transparencies, and the organisation of equipment and chemicals.

TEACHING AND LEARNING

The laboratories are bright and visual stimulation is provided by the scientific models and posters. This contributes to the positive learning environment in Maria Immaculata Community College. The classroom atmosphere was warm, a good teacher/student rapport pertained and students were comfortable in asking and answering questions. Students' contributions were encouraged and affirmed. Celebration of students' work was also achieved through displays of students' work and

this is good practice. Classroom management was positive and encouraging of student engagement.

Lessons were well structured and the pace was appropriate to the learning. In one instance the intended learning outcomes were outlined at the outset of the lesson. In line with best practice, these learning intentions were revisited during and at the end of the lesson to monitor the progress of students and to ascertain individual students' learning. This is very good. All members of the science department should adopt this technique which provides direction for the students in their learning and facilitates them in assessing their learning during the recapitulation phase of the lesson.

A range of resources was effectively used to support learning. For example, in one lesson a PowerPoint presentation was used to provide visual images of an electronic circuit, a diode and photographs of various everyday examples. This was effective in assisting students in understanding the function and uses of diodes. In another lesson, the overhead projector was successfully used to illustrate the methodology employed to determine magnetic field lines in advance of the student activity.

There was evidence that efforts were made to make the scientific concept under consideration both concrete and tangible. In one lesson based on magnetism, some good whole-class discussion around a local geographical feature, Mount Gabriel and its effect on compasses, added to students' interest and made the topic relevant. This is positive.

Effective use was made of class questioning in the lessons observed to revise material learned and to introduce new content. Students who answered correctly were affirmed. Specific questions were asked about previously learnt material and more open-ended probing questions were used to develop lesson content. This had the effect of stimulating students' interest, facilitating their on-going engagement and linking the content to students' everyday experiences. This is positive. Teachers supported students as they developed answers to the questions put to them. This is good practice. Students' use of chorus answering, which was observed in a minority of instances, should be discouraged as it does not facilitate the teacher in ascertaining individual students' learning.

Practical lessons were well organised and managed. Students' practical skills and competencies were demonstrated through their abilities to complete practical tasks. During practical work, all students were actively engaged and worked safely. They worked collaboratively and the practical activities supported the development of their understanding and skills. As students performed these tasks, the teachers moved about the laboratory giving appropriate attention and support to individual needs. In some instances, a plenary session was used to consolidate students' learning on completion of practical work. This is good practice and should be built into the structure of practical lessons at all times, as it provides an opportunity to assess students' progress and learning. Increased use of the investigative approach to practical work is recommended. This approach facilitates the development of students' decision-making skills and may also enhance students' logical thinking and problem-solving skills.

Discussions between the inspector and students revealed generally good levels of interest in Science and in Chemistry. In the main, the students showed good competence in answering questions posed by both the inspector and their teacher.

ASSESSMENT

Assessment of students' learning is achieved using a range of modes. These include oral questioning, written homework assignments, topic tests and twice-yearly formal examinations. The setting of common examination papers in junior cycle is good practice as it assists in ensuring consistency and cohesiveness within the department. The utilisation of alternative types of assessment such as project work, student presentation on a research topic to peers, practical assessment and student portfolio is recommended in TY. The school conducts a subject-specific statistical analysis of certificate examination results and a comparison with the national norms. This is very good. The science department is encouraged to use this analysis to inform planning.

A whole-school homework policy has been devised and this is positive. There was evidence of good practice with regard to the regular setting, checking and monitoring of homework in the teaching of Science. In one instance, the students' homework was assessed and marks were allocated. This is beneficial to the students. Some student copybooks illustrated a number of good examples of the desirable practice of teacher annotation, which reflects the principle of *assessment for learning (afl)*. It is recommended that this practice be used to a greater extent across the science department, as appropriate annotation is constructive in assisting students' in advancing their learning. Further information on *afl* can be accessed at www.ncca.ie.

Practical notebooks are generally of a high standard and there was evidence of monitoring and annotation in some instances. As circumstances did not facilitate formal meetings, it was not possible to ascertain from the members of the science department if the good practice of assessing students' practical work as a component of the end-of-term examinations takes place.

Good communication mechanisms are in place to inform parents of their son's or daughter's progress. Results are communicated to parents on a twice-yearly basis and at each year group's annual parent-teacher meeting. The student's school journal is also utilised as a means of communication between teachers and parents.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Science is a core subject in junior cycle. All students study Chemistry, Physics and Biology in Transition Year and these subjects are offered as optional subjects for Leaving Certificate.
- The science department is well resourced for the teaching of Science and Chemistry.
- A good level of co-operation and collaboration exists among members of the science department and this facilitates the development of a common programme of work in Science.
- The teaching and learning in the lessons observed demonstrated many good qualities.
- The setting of common examination papers in junior cycle is good practice.
- The assessing students' practical work, as a component of the end-of-term examinations is good practice

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

- It is recommended that all programmes of work be broadened in time to include detailed provision in relation to, for example, links between practical work and theory, resource requirements, optional assessment methods and examination preparation, as well as continual revision work, when and where it is appropriate.
- Learning outcomes should be shared with students at the outset of all lessons and these could be subsequently used to ascertain students' learning.
- The use of a plenary discussion session to consolidate students' learning on completion of practical work should be factored into all practical lessons.
- Increased use of the investigative approach to practical work is recommended.

Post-evaluation meetings were held 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 of the College congratulates the Science and Chemistry Departments on its continued excellent work. This report gives a comprehensive over-view of the work of the Science and Chemistry Departments and commends the 'positive learning environment' in the school. The report recognises the 'dedication and commitment of teachers' in terms of departmental planning which is 'well developed and comprehensive'. Classroom management was recognised as positive and considered 'encouraging of student engagement'. Comment on the 'good teacher/student rapport' was also welcomed by the Board.

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

In light of the recommendations made in the report, the Chemistry and Science Departments are implementing the recommendations regarding Learning Outcomes, and the consolidation of practical work and theory.

Subject Department planning has identified key areas where the broadening of programme planning can be implemented, in time.