

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Physics
REPORT**

**Mount Anville Secondary School
Mount Anville Road, Dublin 14
Roll number: 60140F**

Date of inspection: 12 and 13 November 2009



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

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Mount Anville Secondary School, Dublin. It presents the findings of an evaluation of the quality of teaching and learning in Science and Physics 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 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. 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

Mount Anville Secondary School offers junior Science as a core subject. Classes are of mixed ability. Continuity of teaching and learning is maintained, in that class groups where possible retain the same teacher throughout junior cycle. Science provision in the compulsory Transition Year (TY) programme is very good with each class group receiving a six-week module of Physics, Chemistry and Biology and an additional three-week applied science module which may include astronomy, forensics or sports science. This is a commendable aspect of the TY programme.

There is very good science provision at senior cycle with Physics, Chemistry and Biology offered to students each year. TY students and parents are very well supported when making subject choices for Leaving Certificate. The uptake of science subjects at senior cycle is very good. There is one class group in each year of senior cycle for Physics. In addition, there are two class groups for Chemistry and three class groups for Biology in fifth year and four class groups in sixth year.

Time allocation to Science at junior cycle and to the range of science subjects at senior cycle is in line with syllabus recommendations. TY students are allocated one single and one double class period which is satisfactory. The distribution of class periods across the week is good.

There are six teachers in the science department in the school. Teachers are very well supported by the school in attending in-service courses, in following relevant continuous professional development (CPD) courses and are supported in their membership of a professional subject association. There was evidence that expertise among the staff of the science department is shared, particularly in the field of information and communication technology (ICT). Teachers are well deployed according to their qualifications and subject specialisms.

Five well-equipped and well-maintained science laboratories are in operation in the school, most of which have access to a storage room. The laboratories are allocated as base rooms for many of the science teachers and are positioned in diverse locations across the school. This presents some logistical difficulties for access to some equipment and chemicals. However, these difficulties have been in the main overcome by allocating specialist laboratories for each of the senior science subjects and by employing the services of a laboratory technician.

The school's health and safety policy has been reviewed and updated in the current year. There are good health and safety practices in the science laboratories as evidenced in the course of the evaluation. Safety equipment was in evidence and laboratory rules are on display. The school should consider the provision of electrical cut-off switches in the laboratories in the interests of best safety practice. There are some very good practices already in place for chemical storage. However, it is recommended that an upgrade of chemical storage provision be implemented in line with best practice and Department guidelines.

Materials are ordered by the laboratory technician in consultation with the science teachers, senior management and the school bursar. Duties of the laboratory technician include stock control, maintenance and upkeep of the laboratories and the preparation of classroom materials. These duties are clearly documented in the science plan and are carried out very effectively.

Very good ICT facilities, including computers, broadband internet access and interactive whiteboards have been provided in four of the science laboratories. The school library also provides a valuable resource to students. It is very well organised, has a very good science section and provides students with the opportunity to research, to study and to use the extensive computer facilities.

Students are encouraged to partake in a number of co-curricular and extra-curricular activities. Science Week activities were ongoing at the time of the evaluation including the first-year science fancy dress event. Other events in the school during Science Week included second year students participating in a 'human periodic table' activity and third-year students partaking in a science quiz. TY students hosted a science fair and high quality projects were on display in the course of the evaluation. Such activities raise the profile of Science, facilitate and encourage students to carry out research and improve students' communication skills by encouraging them to present their findings to the whole group. This builds confidence together with knowledge of Science and is a very praiseworthy activity. Senior students participated very successfully in the Irish Science Teachers Association senior science quiz in the current year. The school regularly participates in the BT Young Scientists' Competition. The teachers of Science demonstrate a proven commitment to their subject and to the provision of these activities which enrich greatly the learning of Science.

PLANNING AND PREPARATION

The school has an advisory board of studies in place with representation from each subject department, including the science department. Formal science department planning meetings are convened on two occasions per term. Meetings are minuted and evidence provided in the course of the evaluation confirms that many relevant issues including common assessment, homework, teaching methods, laboratory issues and Science Week activities are discussed at these meetings. In addition, the science team also meets informally on an ongoing basis. The science team works very well together. In order to strengthen the educational leadership role of team members, it is suggested that a coordinator of Science be agreed on a voluntary rotating basis. Agreed duties

may include the chairing of meetings, distribution of correspondence and facilitation of the development plan for Science.

A collaborative and comprehensive science plan was made available in the course of the evaluation. Teachers demonstrated excellent commitment in drawing up the science plan which outlines in detail current science provision in the school. The plan focuses on key areas such as differentiation, provision for students with special needs, investigation, assessment, reporting to parents, study skills, resources, teaching methodologies and co-curricular activities. To build on the excellent work completed to date, the science department should focus on the development of science education at junior and senior cycle into the future. This would involve the setting of long-term goals, action planning, planning for the integration of ICT into learning and teaching and planning for the further sharing of best practice between teachers in the science department and across the school.

Agreed schemes of work for each year group at junior cycle are detailed in the plan, each one outlining the topics to be taught in the course of the year. It is recommended that the topics in these schemes be explicitly linked to teaching strategies, methodologies, resources and assessment. Schemes of work for Physics in fifth year and sixth year were also in evidence, with a comprehensive work plan for each section of the course. Very good and well-organised resource folders were in evidence in the course of the evaluation. Teachers maintain very good records of students' assessment, attendance and homework. This material is stored in teachers' journals and on the shared school computer network. This is very good practice.

A very good TY plan for each of Physics, Chemistry and Biology was made available during the evaluation. The TY plan for Physics, for example, initially focuses on the mathematical skills necessary for problem solving and then progresses to project work, and to applied aspects of Physics including astronomy. While the content of these plans is very good, it is recommended that each plan be written up using the template outlined in the Department guidelines on writing the TY programme. The science department may wish to develop TY science modules into a transition unit. Further details, including a teachers' handbook on designing transition units, are available on the website of the National Council for Curriculum and Assessment, www.ncca.ie/transitionunits.

There was very effective individual planning in evidence in advance of all lessons observed. Practical and ICT equipment were set up and ready to use. Lesson content was well planned which led to successful learning outcomes as evidenced during the evaluation.

Students with additional needs are very well supported. Information regarding students with special needs is communicated to the entire staff and there is close liaison between science teachers, parents, school management and the learning support and guidance departments. The folder with information regarding students with additional needs is available in the staffroom and resources on differentiation are stored in the science department.

TEACHING AND LEARNING

The quality of teaching was excellent. Students were made aware of lesson objectives and each lesson had a clear structure. There was very good continuity with prior learning in many lessons evaluated. Some lessons began with the distribution of corrected tests which had been undertaken by students at the conclusion of a particular section of the course. This is very good practice. In one lesson evaluated, students were organised into groups while completing revision material,

and received ongoing help and support in the completion of the assigned task. Students' motivation and interest were maintained throughout all lessons. The very good atmosphere and positive classroom rapport supported student learning and led to very successful learning outcomes. Students applied themselves to the assigned tasks with confidence and enthusiasm and were very knowledgeable in their understanding of concepts and facts encountered in class. Affirmation of students was evident in all lessons. The positive atmosphere led to very high levels of participation. Science and Physics were made relevant to everyday life in many lessons. It is very praiseworthy that students were made aware of Science Week during many lessons visited and the whole school environment, with its displays of project work, reminded students of this event. Teachers are highly commended for their commitment in this regard.

Methodologies were varied and very effective with the use of practical work, practical demonstrations and ICT across many lessons. The interactive white boards were very well utilised in the delivery of lessons with teachers and students showing good confidence in the use of this technology. Key words and concepts were highlighted, tables were constructed and diagrams were developed as an aid to focus and consolidate lesson material. For example, during one lesson observed, the board was used as an effective and useful aid to log the results of each individual student following a practical investigation on the measurement of acceleration. In this way, the accuracy of results could be compared and discussed. In another lesson, students were well prepared in advance of a practical investigation on electricity with some students drawing the appropriate circuit for the investigation on the interactive board.

Group work was used appropriately in many theory and practical lessons, with clear emphasis of engagement of students and on activity-based learning. The further development of group work, for example when analysing data during the calculation of results is recommended for some lessons. It is very praiseworthy that the varied methods used by teachers led to very high levels of student participation in all lessons. Worksheets, problem sheets and handouts were distributed to students during some lessons. These materials were well utilised focusing students' attention on key aspects of the lesson. It is recommended that the use of specially designed worksheets as appropriate be utilised so that students can record their observations during practical investigations. There is scope for the further development of the use of ICT in some lessons and it is recommended that teachers plan for this.

There was very effective use of questioning in all lessons observed. Questioning was used as an ongoing learning strategy and interest and motivation were heightened in many instances by the use of probing questions. Students exhibited very good confidence in answering questions on their work during the lessons observed.

Practical investigations formed the core of some lessons. Students demonstrated good skills while carrying out an investigation on making and separating a mixture of iron and sulphur during one lesson visited. During another lesson, students tested for the presence of water and carbon dioxide in exhaled air and showed good investigative skills in carrying out this task. In another lesson, students successfully measured the acceleration of a trolley using a ticker-tape timer. There was very good emphasis on accuracy, precautions and analysis of results. Physics students successfully completed graphs of their practical investigations. Very clear explanations of the concepts and very concise student answers to probing questions all consolidated learning. Teachers are commended for conducting practical work in a safe and supportive environment. Very good practical techniques were in place and students applied themselves expertly to the mathematical problem-solving tasks. Critical thinking skills were encouraged.

Students' academic achievement is excellent. The uptake of higher-level for Science and Physics is excellent and the proportion of students receiving a high grade in these subjects has been consistently very good over recent years.

ASSESSMENT

There is a draft school homework policy in place and there is very good emphasis on regular homework, class testing and revision as evidenced in the course of the evaluation. Common Christmas tests are in place for first-year, second year and TY students with first and second-year students also sitting common summer tests. TY students are also assessed on an ongoing basis through projects and presentations. Third-year and sixth-year students sit pre-examinations in February. All students are assessed regularly in class and parents receive reports of ongoing progress issued every six weeks. This is very good practice. Parents also receive reports following the Christmas, summer and pre-certificate examinations. Communication with parents is ongoing in many ways including school events, information nights and through the school homework journal. Teachers maintain very good records of student assessments. A parent-teacher meeting is held annually for each year group.

Practical notebooks and student folders examined in the course of the evaluation were generally of a very high standard. The quality of teacher comment and annotation was very high overall. Teachers were aware of the immense benefits to students of formative assessment and had received training in assessment for learning. In an effort to further improve the quality of students' written practical records, it is recommended that consideration is given to allocating a portion of the marks in school assessments for the completion and accurate recording of practical work.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- There is very good science provision at junior and senior cycle. Science is offered as a core subject at junior cycle and at senior cycle Physics, Chemistry and Biology are offered each year. There is also very good science provision in TY.
- Teachers are well deployed according to their qualifications and subject specialises.
- Science Week activities raise the profile of Science in the school and encourage students to carry out research and to present their findings.
- A collaborative and comprehensive science plan was made available in the course of the evaluation. Teachers demonstrated excellent commitment in drawing up these plans. There was very effective individual planning in evidence in advance of lessons observed.
- The quality of teaching was excellent. Students' motivation and interest were maintained throughout all lessons.
- The very good atmosphere and positive classroom rapport supported student learning and led to very successful learning outcomes.
- Methodologies were varied and very effective with use of practical work, practical demonstrations and ICT across many lessons. Very good practical techniques were in place. Critical thinking skills were encouraged.
- Students' academic achievement and the uptake of higher-level for Science and Physics is excellent.

- Assessment practices are very good with collaborative planning in place regarding examinations, frequent reporting to parents and a strong emphasis on homework and revision. Practical notebooks and student folders examined in the course of the evaluation were of a high standard.

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

- It is recommended that an upgrade of chemical storage provision be implemented in line with best practice and Department guidelines. The school should consider the provision of electrical cut-off switches in the laboratories.
- It is suggested that a coordinator of Science be agreed on a voluntary rotating basis.
- To build on the excellent work completed to date, the science department should focus on the development of science education at junior and senior cycle into the future.
- It is recommended that consideration is given to allocating a portion of the marks in school assessments for the completion and accurate recording of practical work.

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

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