An Roinn Oideachais agus Scileanna

Department of Education and Skills

Subject Inspection of Science and Physics
REPORT

Muckross Park College
Donnybrook, Dublin 4
Roll number: 60710U

Date of inspection: 19 January 2011

AN ROINN OIDEACHAIS AGUS SCILEANNA | DEPARTMENT OF EDUCATION AND SKILLS

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 Muckross Park College, 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 and subject teachers. The board of management was given an opportunity to comment in writing on the findings and recommendations of the evaluation, and the response of the board will be found in the appendix to this report.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

Muckross Park College offers Science as an optional subject at junior cycle with in excess of ninety percent of students opting to study Science. There are currently five science mixed-ability class groups in each year of junior cycle. Continuity of teaching and learning is maintained, in that class groups generally retain the same teacher throughout junior or senior cycle.

Science modules form a core part of the compulsory Transition Year (TY) programme. The content of these modules is appropriate to the aims of TY and promotes applied aspects of Physics, Chemistry and Biology. There is very good science provision at senior cycle with Physics, Chemistry and Biology offered each year. Students are well supported in making an informed choice with input from the guidance counsellor and specialist input from the science teachers. The uptake of science subjects at senior cycle is very good overall. There is in excess of twenty students in the current fifth year Physics class group. The current small number of students in the Leaving Certificate Physics class is an anomaly in uptake trends in recent years.

Time allocation to Science at junior cycle and to the range of science subjects at senior cycle is satisfactory. However, two second year class groups have Science timetabled twice on the same day. This practice should be avoided.

There are eight teachers in the science department. Teachers are supported in attending in-service courses and in pursuing relevant continuous professional development (CPD) courses. Membership of a professional organisation is supported by the college. Future professional development needs should include training in the use of the recently installed interactive boards so that their impact on student learning can be maximised. New teachers are supported by senior management and by colleagues in the science department.

There are four well-equipped and well-maintained laboratories in the college. They are frequently used by the science teachers and their class groups. There is a laboratory access timetable in place to ensure their availability especially for double periods. Equipment is stored in an orderly and

safe manner. Ready access to equipment has been enhanced with sets of apparatus for particular experiments stored in labelled boxes. Spacious and well organised preparation and storage rooms are conveniently located between each pair of laboratories. In addition, the laboratories are enhanced with many relevant models, posters and charts and displays of students' work. Information and communication technology (ICT) facilities have been increased in the science laboratories over recent years.

The college has a health and safety policy about which the science department was consulted when it was being drafted. There are good health and safety practices in the science laboratories. For example students are required to store school bags outside of laboratories. Safety equipment was available. Laboratory rules are signed by each student and parent and this is appropriate practice. Separate chemical storage facilities are provided in each preparation room. The school should consider installing ventilation in each chemical storage room in line with best practice.

Students are encouraged to partake in a number of co-curricular and extra-curricular activities including participation in the BT Young Scientist and Technology Competition, science week activities, science quizzes and visits to workshops and events in third level institutions.

PLANNING AND PREPARATION

Formal science department planning meetings are convened every term. Minutes of meetings provided confirmed that many relevant issues relating to the science department are discussed such as laboratory access, planning for common assessment and the development of a formal written policy. Science teachers also meet informally on an ongoing basis to collaborate on many aspects of science provision. Coordination of Science is effective and duties of the coordinator include: maintaining minutes of subject meetings; liaising with school management; distribution of information regarding science events; updating the science planning folder and coordination of formal assessments. This role is voluntary and is rotated annually. In addition, a special duties teacher post is allocated to stocktaking and the ordering of laboratory equipment.

An agreed common science plan was made available in the course of the evaluation. The department's subject plan for Science addresses many aspects of science provision including methodologies, resources, class organisation and assessment. The plan also outlines schemes of work for each year group. The schemes of work would benefit from the inclusion of active methodologies, resources and formative assessment strategies for each section of the course. The science plan should be broadened to include longer term action plans for the subject over coming years, the development of ICT in teaching and learning, planning for the professional development of the science teachers, the sharing of best practice following in-service, the analysis of state examination results and monitoring the uptake of Science at junior cycle and the science subjects at senior cycle.

A physics plan and scheme of work for each year group are in place. However, the plan should be further developed along the lines outlined above for Science. This plan should be drawn up using ICT so that it can be readily updated and reviewed when needed. The content of the TY plan for Science is appropriate. However, it is recommended that this plan be drawn up using Department guidelines available at http://ty.slss.ie/resources/writing.pdf. Reference should also be made to the website of the National Council for Curriculum and Assessment where sample transition units may be downloaded, www.ncca.ie/transitionunits.

There was very effective planning in evidence in advance of lessons observed. This contributed to successful learning outcomes and to effective classroom management. Lesson content was well planned and practical and ICT equipment were set up and ready to use.

TEACHING AND LEARNING

Lessons were well structured. Short clear teacher inputs ensured that learning progressed seamlessly. The good practice of sharing lesson objectives with students at the outset should be a feature of all lessons. Lessons progressed at a suitable pace and a commendable feature of many lessons was the inclusion of a plenary session at the end of each lesson to consolidate prior learning.

Teachers provided a positive and supportive learning environment. Students were highly motivated to learn and there was very good rapport between the teachers and their students. Individual and group support was given as necessary and students tackled the assigned tasks with confidence and enthusiasm. Concepts were explained with clarity; skills development was prioritised and learning was reinforced by making it relevant to students' everyday experiences. The affirmation of students that was evident in all lessons consolidated the positive atmosphere and led to high levels of participation. In some lessons, the use of group work would have further enhanced students' active participation in the lesson. During a physics lesson, students worked on assigned revision examination questions on the theme of nuclear energy, fission and fusion. Students' analytical, problem solving and critical thinking skills were developed throughout.

Methodologies were varied and frequently involved students in active learning. This led to effective student learning outcomes. In one lesson, the students actively worked on their chemistry coursework assignment for the Junior Certificate examination. The assignment enabled the students to develop their research skills. The board was well utilised in many lessons as a focus for recording key words and concepts. This practice should be extended to all lessons.

ICT was used effectively in many lessons. In one lesson a short and well chosen movie was used as an aid to students' understanding of the operation and functions of the human digestive system. In another lesson, an applet was well utilised to review the properties of static electricity. However, there were further opportunities for utilising ICT in teaching and learning that were overlooked in the course of the evaluation. Teachers are encouraged to plan for increased integration of ICT into their lessons.

Practical investigations formed the core of some lessons evaluated. The investigative approach to learning that was prioritised in these lessons set appropriate challenges for the students. Physics students carried out an investigation on Newton's second law. Whole-class discussion in advance of the practical work was very good, with clear explanations and with questions invited from students. The investigation was carried out with one set of apparatus with each group of students recording a particular result. It is important that students achieve hands-on practical experience of entire mandatory practical investigations. Therefore, consideration should be given to the purchase of additional apparatus or to the rotation of mandatory investigations thus ensuring that small groups achieve appropriate practical experience in line with syllabus recommendations.

Junior cycle students carried out a range of investigations during lessons evaluated that included food tests, static electricity and volumetric analysis. Each investigation was conducted in a safe and supportive environment. Students worked in small groups and took due care when handling apparatus. The use of appropriate worksheets consolidated student learning. In the case of mandatory practical work, students recorded their results while the teacher circulated and provided individual help and support. The positive working environment, the focus on student-

centred learning and the level of affirmation and support from teachers all contributed to a greatly enhanced student learning experience.

There was effective use of questioning in all lessons and this served to heighten interest in many instances. The students were confident in answering questions on their work during the lessons observed and student outcomes in terms of skills and knowledge as observed were very good.

ASSESSMENT

Modes of assessment in the college include class tests on completion of a topic, question and answer sessions, formal examinations at Christmas and summer, self-assessment in TY and pre-examinations for third and sixth-year classes. Importance is attached to regular homework, class tests and revision. Relevant homework was assigned during all lessons evaluated. Assignments included the completion of records of practical activities, previous examination questions, textbook assignments or completion of worksheets.

A parent-teacher meeting is held annually for each year group with the exception of TY. Reports are sent to parents after each formal examination. Students with additional needs are well supported with close liaison between science teachers, parents, school management and the learning support and guidance departments.

Practical notebooks examined in the course of the evaluation were generally of a high standard. In an effort to further improve the quality of students' written practical records it is recommended that notebooks are monitored more often to ensure that students take full cognisance of teachers' annotation. It is particularly recommended that greater emphasis be placed on accuracy, errors and precautions in students' reports. Formative assessment strategies should be developed when monitoring written records of practical work. Consideration should be given to allocating a portion of the marks for school examinations to the satisfactory completion of assigned practical activities.

The academic achievement of the students is excellent. The uptake of higher-level Science and Physics and the proportion of students receiving a good grade in these subjects at both higher and ordinary level is very high and has remained consistently high over recent years.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- The uptake of Science at junior cycle is very high. Modules in Science are offered as a core part of the TY programme. Physics, Chemistry and Biology are offered at senior cycle.
- The science plan addresses many aspects of science provision.
- Teachers provided a positive and supportive learning environment and students were highly motivated to learn. Students tackled the assigned tasks with confidence and enthusiasm.
- Concepts were explained with clarity; skills' development was prioritised and learning was reinforced by making it relevant to students' everyday experiences.
- An effective investigative approach to learning was prioritised in some lessons with appropriate challenges set for students.

- Methodologies were varied and frequently involved students in active learning. Short clear teacher inputs ensured that learning progressed seamlessly.
- The academic achievement of students is excellent. The uptake of higher-level Science and Physics and the proportion of students receiving a good grade in these subjects at both higher and ordinary level is very high and has remained consistently high over recent years.

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

- The science and physics plans and schemes of work should be further developed.
- The TY plan should be restructured in line with Department guidelines.
- Formative assessment strategies should be developed when monitoring written records of practical work and consideration should be given to the allocation of a portion of the marks for school examinations to the completion of assigned practical activities.

A post-evaluation meeting was held with the teachers of Science and Physics, together with the principal and deputy principal, at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.

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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 welcomes the very positive report on the teaching and learning of Science and Physics in the school. The report acknowledges the traditionally high uptake of the Sciences and Physics by students as well as the excellent academic achievement of students and the role of the Science teachers in providing a supportive learning environment that facilitates the highly motivated students to learn with confidence and enthusiasm. The Board was surprised to learn that ventilation in the chemical storage rooms was inadequate as the laboratories are part of a new school built in 2006 and will investigate the installation of same as suggested. The comments on the frequent use of the Science laboratories for carrying out practical investigations, reflects the importance the teachers and Board of Management place on practical work in the Sciences. The report also affirms the high level of collaboration by the Science teachers on many aspects on Science provision.

The Board of Management wishes to congratulate the Science teachers.

The Board of Management would like to thank the Inspector for the courteous and professional manner in which the inspection was carried out.

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

- Schemes of Work: the existing schemes of work are being regularly reviewed and updated. The plans for each area in Science and Physics are being reviewed and revised in line in line with Department recommendations and good teaching practice.

- TY Plan: The restructuring has begun in August 2011 in line with Department Guidelines and is a work in progress.

- Formative Assessment: A whole school approach to formative assessment has been adopted as a theme for subject development planning. The Science Department have agreed to this and will be allocating 10% of Christmas and summer exams to practical notebooks, starting December 2011.