

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Physics
REPORT**

**Our Lady's School
Templeogue Road, Terenure, Dublin 6W
Roll number: 60860Q**

Date of inspection: 1 and 2 October 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 Our Lady's School, Terenure. 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 deputy 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

Our Lady's School offers Science as a core subject. There are currently six science class groups in first year and third year with seven in second year. Junior science class groups are of mixed ability as are senior physics classes. Time allocation to all junior science class groups is appropriate. This is praiseworthy as it indicates that the recommendation regarding time allocation made in the 2004 subject inspection report on Science and Chemistry was addressed by senior management. Time allocation to senior physics is also appropriate.

All students study Science in the compulsory Transition Year (TY) programme which is provided as an eight-week block. This time allocation is very short and the school is urged to consider an increased time allocation to TY science.

There is very good science provision at senior cycle with Physics, Chemistry and Biology offered each year. Students are given an open choice of subjects following which option bands are generated in such a way as to optimally address students' needs. TY students are supported in making an informed choice in many ways. The uptake of science subjects at senior cycle is very good overall. However the cohort of students opting for Physics is small and requires ongoing monitoring and attention on the part of senior management and the science teachers to ensure that a sustainable number of students opt to choose the subject in coming years.

There are currently nine teachers in the science department in the school. New teachers and student teachers are provided with mentoring support from a post-holder in the school. In addition, there is ongoing support for new teachers from senior management and the science department. Teachers are well supported in attending in-service courses and in pursuing relevant continuous professional development (CPD) courses. Membership of a professional organisation is supported by the school, as is the pursuit of relevant post-graduate studies.

Four well-maintained laboratories, with adjoining preparation and storage rooms, are in operation in the school. All laboratory equipment is stored in an orderly and safe manner. In addition, the laboratories are enhanced with many relevant models, posters and charts and students' work is also on display. ICT facilities have been progressively increased in the science laboratories in the form of laptop computers and data-projectors. This results in an attractive and stimulating learning environment for Science. The planned new extension to the school will incorporate two additional science laboratories. The school library has a good science reference section and provides a good facility for students to borrow science books and to research project work. The simultaneous timetabling of junior science class periods for each year group has created a major problem in relation to current access to laboratories for double-class periods. It is imperative that this situation be rectified to ensure that students can engage in practical investigations on an ongoing basis and to fulfil syllabus requirements. It is therefore recommended that senior management should restructure the school timetable to ensure access to a laboratory at least for the double period in future years.

The school has a health and safety policy which was drawn up with relevant consultation carried out with the science department. During lessons observed, good health and safety practices were in evidence. Laboratory rules are signed by each student. This is very good. Safety equipment was visible in the laboratories. However, fire exits should be appropriately marked and fire exit doors should be capable of being opened immediately in case of an emergency. In the course of the evaluation, a major concern regarding the safe storage of materials was identified. This matter was brought to the attention of senior management and appropriate steps were taken to address the problem without delay.

In this context, a health and safety audit should be carried out and all hazards in the science laboratories should be listed. Measures should be taken to store all materials appropriately and provision should be made for the safe disposal of all unwanted materials. The school's health and safety policy should be reviewed and revisions brought to the board of management for ratification.

Students are encouraged to partake in a number of co-curricular and extra-curricular activities. In the course of the evaluation, students attended a meeting with their teacher to formulate a proposal for participation in the BT Young Scientists' Competition. In addition, students partake in events during Science Week, enter science quizzes and visit workshops and events in third-level institutions.

PLANNING AND PREPARATION

Formal science department planning meetings are convened on four occasions throughout the year. These meetings are minuted and evidence provided in the course of the evaluation confirms that many relevant issues relating to the science department such as access to laboratories, extra-curricular activities, common examinations, schemes of work and health and safety rules are discussed at these meetings. Science teachers also meet informally on an ongoing basis to collaborate on many aspects of science provision at both junior and senior cycle. The role of coordinator of Science is undertaken on a rotating voluntary basis and current duties include chairing subject meetings, maintaining minutes of meeting, maintaining the science folder and checking the progress of the agreed schemes of work. Ongoing liaison with school management also forms an important part of this role. All of these duties are carried out very effectively as evidenced in the course of the evaluation.

A comprehensive and wide-ranging science plan was made available in the course of the evaluation. This plan was drawn up collaboratively by the science department and is very extensive in its in-depth treatment of various important aspects of science provision. The difficulties regarding third-year laboratory access are outlined. Exemplary practice is promoted in the planning for students with special educational needs. The section on cross-curricular planning outlines the good extent of students' involvement in these important activities which link with other curricular areas. Effective teaching methodologies are promoted and it is very praiseworthy that there are in-built measures in place to monitor and evaluate the subject department plan. A very good physics plan was also made available in the course of the evaluation. It is suggested that the physics plan be further developed along the lines of the science plan. The content of the TY plan is very good, however, it should be restructured in line with Department guidelines on writing the TY programme. In addition, it is important that the TY science plan be drawn up by the entire science department and reviewed each year. It is praiseworthy that the physics content of the TY plan has been increased in line with a recommendation in a previous Science inspection report. For future development, it is recommended that the various elements of junior, senior and TY science provision be brought together into an overall plan for Science in the school. Elements of this plan should include long-term action plans for the development of Science education in the school, monitoring the uptake of science subjects at senior cycle, methods of sharing best practice, and the best use of ICT in learning and teaching.

Agreed schemes of work for each year group were made available in the course of the evaluation. These schemes are well produced with clear emphasis on learning outcomes linked to activities and resources for each section of the course at junior cycle. The physics scheme of work is also very good with each topic broken down into its components and linked to resources and practical work. Clear timeframes are set out with a well planned assessment and revision strategy.

Planning in evidence in advance of lessons observed was very good. 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.

TEACHING AND LEARNING

Lessons were well structured with lesson objectives shared with students at the outset. Seating arrangements were conducive to effective learning, for example small groups were formed in some lessons while in others the class group sat in a semi-circle arrangement.

The quality of teaching and student learning was very high in all lessons evaluated. Students were highly motivated to learn. The positive classroom rapport, the very good atmosphere for learning and the affirmative environment all contributed greatly to students' confidence at tackling the assigned tasks and to students' motivation to understand and apply the material being presented. Teachers were acutely aware of the range of abilities in each class group and applied differentiated techniques very effectively to their teaching methodologies. Individual and group support was given to students as necessary. However, in a few cases, further circulation by teachers was necessary to ensure additional support to a small cohort of students. Concepts were explained with clarity and learning was reinforced by making it relevant to students' everyday experiences. Students, in the main exhibited high levels of participation in classroom activities, however, in a small number of cases, more involvement by students in the initial stages of lessons would have enhanced the learning process.

Active learning was facilitated and promoted in line with science department planning and very effective methodologies were in place in all lessons observed. ICT was used particularly effectively in some lessons. In one lesson, students were revising the practical procedures to measure the angles of incidence and refraction in order to verify Snell's Law. These procedures had been recorded using a video camera in the laboratory some days previously. The video was paused at appropriate intervals when probing questions on possible errors, practical techniques and the arrangement of the apparatus were posed to students. This excellent methodology worked very effectively at consolidating concepts formulated during the previous practical class. In addition, the revision worksheet and the assignments set for student homework were very appropriate as a follow-up to an excellent lesson. In another lesson, an appropriate website was employed as an aid to demonstrate the factors affecting the capacitance of a parallel plate capacitor. Students' analytical and critical thinking skills were developed through probing questions posed. Further opportunities for utilising ICT in teaching and learning presented themselves in the course of the evaluation and teachers are encouraged to further plan for increased integration of ICT into their lessons.

Practical investigations formed the core of some lessons evaluated. In one lesson, students carried out an investigation to dissect a sheep's heart and to identify the parts. The entire lesson was carried out in a safe environment with students initially reminded of the laboratory health and safety rules. Small, well-organised class groups ensured that all students got appropriate hands-on experience. Whole-class discussion in advance of the practical work was very good, with clear explanations and with questions invited from students. Each group was encouraged to adopt an investigative approach to each activity. The task was well organised and students worked in a collaborative way to reach the desired learning outcomes. On another occasion, students were assigned to investigate acids and bases and to test a range of solutions for pH with universal indicator paper. An ICT presentation provided a focus for students on the necessary tasks. Students developed good practical skills. Results were collated from the various groups towards the end of the lesson and appropriate conclusions were drawn.

There was effective use of questioning in all lessons observed. Students exhibited good confidence in answering questions on their work during the lessons observed and student outcomes in terms of skills and knowledge as observed were very good. Questioning was used as an effective strategy to heighten interest in many instances. During a lesson on the theme of living things, very good questioning strategies were used to encourage participation and to consolidate concepts. The overhead projector provided a focus for many themes of the lesson.

Demonstrations were used very effectively in many lessons where models and charts were employed expertly as an aid to student learning. In one lesson on the theme of the bones in the human skeleton, a model of the human skeleton was used as a focus for the development of the lesson. A student-centred approach was adopted with students being aided with useful ways to recall the names of various bones in the body. Students were actively encouraged to challenge themselves. Many references to students' everyday experiences consolidated learning. In another lesson on the theme of human reproduction, charts were used to good effect in lesson delivery and as an aid to student understanding. The good use of video helped to reinforce the student learning experience.

Academic student achievement 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. It is very praiseworthy that an in-depth analysis of state examination results forms part of science department planning, with school results compared to national norms.

ASSESSMENT

Very good practice regarding the correcting, assignment and recording of homework, in line with the school's homework policy, was in evidence during the evaluation. Good records of assessments and attendance were maintained by teachers.

Formal school examinations are held in February and summer. It is praiseworthy that common tests are given to first-year and second-year students at these times. Third and sixth year classes sit pre-examinations in February. In addition, there is continuous assessment of students on completion of each section of the course. Revision tests are built into the third-year work schedule. Records of mandatory practical work are checked and monitored at intervals and it is very praiseworthy that ten percent of marks allocated to school examinations are now given to completion of this work. This is good practice and in line with a recommendation from a previous subject inspection report in Science. 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 further monitored to ensure that students take full cognisance of teachers' annotation.

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. Science department policy in this regard is clearly laid out in the science plan. The science department strategy is to make each classroom as inclusive and integrated as possible with a clear emphasis on differentiation, which benefits all students together with maximising access to students with special educational needs.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- There is very good science provision with Science offered as a core subject at junior cycle and in TY. Physics, Chemistry and Biology are offered at senior cycle.
- A comprehensive and wide-ranging science plan was made available in the course of the evaluation. Exemplary practise is promoted in the planning for students with special educational needs.
- The quality of teaching and student learning was very high in all lessons evaluated. Students were highly motivated to learn.
- The positive classroom rapport, the very good atmosphere for learning and the affirmative environment all contributed greatly to students' confidence at tackling the assigned tasks and to students' motivation to understand and apply the material being presented.
- Teachers were acutely aware of the range of abilities in each class group and applied differentiated techniques very effectively to their teaching methodologies. Individual and group support was given to students as necessary.

- Active learning was facilitated and promoted in line with science department planning and very effective methodologies were in place in all lessons observed.
- Academic student achievement 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.
- Very good practice regarding the correcting, assignment and recording of homework, in line the school's homework policy, was in evidence during the evaluation. Good records of assessments and attendance were maintained by teachers.

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

- The school should consider an increased time allocation to TY science.
- The school timetable should be restructured in future years in such a way to enable each class to gain access to a laboratory for at least a double period per week.
- The school's health and safety statement should be reviewed. A health and safety audit should be carried out and all hazards in the science laboratories should be listed, with measures taken to store chemicals and radioactive materials appropriately and advice sought on the appropriate disposal of hazardous materials.
- The physics plan should be further developed along the lines of the science plan. The TY plan should be restructured in line with Department guidelines on writing the TY programme and should be drawn up by the entire science department.
- The various elements of junior, senior and TY science provision should be brought together into an overall plan for Science in the school.
- Further opportunities for utilising ICT in teaching and learning should be advanced.

Post-evaluation meetings were held 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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