

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**St Tiernan's Community School
Balally
Dublin 16
Roll number: 91343T**

Date of inspection: 23 November 2009



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

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 St Tiernan's Community School. 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 the subjects in the school. The evaluation was conducted over one day during which the inspector visited classrooms and observed teaching and learning. The inspector interacted with students, 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 deputy principal and 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

St Tiernan's Community School offers a wide range of certificate programmes to meet the diverse needs of the 301 students currently enrolled. These include the Junior Certificate and the Junior Certificate School Programme (JCSP). Senior cycle students may take the optional Transition Year programme (TY) or proceed to the established Leaving Certificate or the Leaving Certificate Applied (LCA). The Leaving Certificate Vocational Programme (LCVP) is also provided. In addition to the mainstream second-level enrolment, the school also offers full-time Post-Leaving Certificate courses (PLC) and a number of part-time adult education courses.

The science subjects are in a strong position and have a high profile in this school. Three science subjects are provided for Leaving Certificate, including Biology, Physics and Chemistry, with a very good uptake in each. Some students study two or all three of these subjects. A full-year programme of Science is provided in TY. In addition, Science is a long established elective in the school's LCA programme. This is commended as it enables students to be confident and competent when faced with science in their everyday lives. Science is an optional subject for junior cycle and is chosen by approximately half of the students, including a small number of JCSP students.

This year, the uptake of Science in first year is low but this is being actively addressed through the school's newly developed Primary School Science Initiative. This promotes the uptake of Science in first year by facilitating laboratory visits by sixth-class pupils from neighbouring primary schools. A number of schools have already participated and it is hoped to expand the programme. This is an excellent initiative. It supports the development of important links between schools and also provides primary pupils with hands-on practical experience of Science in a laboratory environment. The enthusiasm and work of science teachers and the support provided by management for this initiative, indeed the commitment by all to supporting the sciences in the school, is acknowledged and highly praised. The science department would like to see Science as a core subject on the junior cycle curriculum and it is recommended that a proposal be put to the board of management for consideration as part of medium to long-term curriculum planning.

The teachers of science do much to support a whole-school interest in the subjects. The science department runs open-laboratory sessions during Science Week for those students who are not studying Science. Co-curricular activities, competitions and fun challenges are promoted among science students. Teachers actively forge links with external agencies such as local science-related businesses and universities as part of co-curricular planning.

Students are placed into mixed-ability class groups in each year. Higher and ordinary levels are taught in the same class for both subjects and teachers differentiate their lessons and the work that they allocate to students accordingly. This practice is effective and inclusive. It is recommended, however, that increasing the uptake of higher level in both Science and Biology be set as a goal in the science plan and that action plans be drawn up for this goal. These should establish how and when students can best make their choice of level and how best to develop examination technique.

The number of periods provided on the timetable for Science and Biology is good. Two double lessons per week are provided for Science in first, second and third year. Two double lessons plus one single lesson are provided for Biology in fifth and sixth year. However, it would be preferable to have only one double lesson per week, as this would increase frequency of class contact between teachers and their class groups. It is recommended that this arrangement be considered by management and implemented where practicable. Access to a laboratory is very good as most lessons including single lessons are held in one of the school's three laboratories. Provision for laboratory access is made on the school timetable. Teachers are generally allocated to a group in junior and senior cycle for the duration of a course and by a system of rotation that has been agreed by teachers as fair.

Management supports continuing professional development (CPD) and has facilitated teachers to attend in-service including training in datalogging, information and communication technology (ICT) and the revised syllabuses. There was evidence that teachers share new ideas and resources gained from these. Whole staff in-service in assessment for learning (AfL) took place recently and there was ample evidence in the lessons visited that teachers are incorporating many aspects of this into their daily practice. This is highly commended. Teachers demonstrated an eagerness to participate in further suitable CPD opportunities as they arise. Teachers also demonstrated a willingness to network with science teachers in other schools and to arrange for work shadowing experiences in these schools with the facilitation and permission of management. This is an excellent idea which will be beneficial and enlightening as well as yielding new ideas for teaching and learning methodologies, planning and subject resources.

The commitment of the school to support the sciences is evident in the very positive responses to all of the recommendations made in an earlier subject inspection report. Management and teachers have facilitated the development of: resources for student practical work, provisions for health and safety, including the proper storage of chemicals and the refurbishment of the gas and electricity supply systems, improved uptake of in-service opportunities, the introduction of ICT equipment to the laboratories and the establishment of an overall plan for the development of the sciences. Some of these developments were made possible by the allocation of grants and funding from the Department of Education and Skills. To further develop the resources for student practical work, ongoing and successful efforts have been made to source funding for the purchase of new laboratory resources as part of laboratory refurbishment. The work of the subject department in this regard is highly commended.

A very high level of organisation and recent development was noted in the laboratories and the connecting preparation area. Sets of resource boxes for the full range of prescribed practicals have been developed and further work on this is intended. Up-to-date safety systems are now in place and redundant chemicals have been safely removed. The learning environment has been enhanced with charts, interesting reference material and displays of student work.

ICT resources are excellent. Each laboratory is fitted with a networked teacher computer, data projector and wireless internet access. A mobile computer library, consisting of a class set of laptop computers for students, was purchased with a donation from a past student. Students use the laptops in lessons, mainly for on-line research. The expansion of their use in datalogging is intended when the appropriate sensors are purchased, and plans for this are advanced. In addition, the science department has developed a virtual learning environment (VLE) for students as a link from the school website www.tiernanscience.ie that contains lesson notes, interactive science experiments and science careers information. Plans for the future development of ICT in both teaching and learning are very highly commended.

The school's health and safety policy statement was most recently updated in 2006 and it contains a section on the laboratories. This should now be reviewed in light of more recent legislation.

PLANNING AND PREPARATION

Collaboration among the science teachers has resulted in considerable development in planning, teaching and assessment practices and resource enhancement. Science teachers are very supportive of each other and collaborate in sharing their expertise and new approaches to the range of syllabuses. The science department takes a team approach to development in all areas and is proactive and progressive in its outlook. Meetings of the science teachers are held on a regular basis and records of meetings are maintained on the computer system along with other shared files pertaining to areas of organisation and agreed procedures. Formal planning is commendably supported and facilitated by two subject co-ordinators and the positions are rotated among science teachers.

Very well developed subject plans have been prepared for all subjects including Science, Biology and LCA Science, detailing all areas that pertain to provision, teaching and learning in the subjects. Common to all plans are the sections that set out agreed procedures for homework, assessment, examination procedures, reporting, effective teaching and procedures for good practice in the classroom. These sections are very highly commended as they detail agreed practice, thereby ensuring consistency of experience for the student. There was ample evidence that these plans are implemented during lessons.

Planning for students with special educational needs (SEN) in Science and Biology is good. Some students have been assessed as having low reading ages or other assessed SEN. The science department is confident that their needs are being met through the strategies outlined in the science plan. These strategies include the setting of suitable learning challenges, the implementation of differentiated teaching and learning practices and overcoming barriers to learning and assessment for individual students. This is commended. Planning for students with SEN involves liaison with the learning support department within the school to ascertain information on how best to support and guide individual students. Future revision to the written plans for students with SEN could include developing an interface between the learning support teacher's plans or individual education plans for students and the plans of the science department for students with SEN.

Agreed common schemes-of-work have been set out for each subject and year group. These are collaboratively reviewed each year and the sequence and timing of topics is altered accordingly. Provision is made in the schemes for integrated practical work and in some cases for coursework, tests and revision. The scheme for junior cycle Science also contains the range of extension activities suggested in the teacher guidelines providing teachers with alternative teaching and learning approaches to topics. Reasonable pace of progress is being made with the schemes with each group visited during the evaluation, although a faster pace may be necessary in some instances to complete all of the work planned up to Christmas. In further developing the plan for Biology, some experiential learning outcomes that specify the development of students' skills should be included.

The TY Science plan incorporates a broad variety of interesting inter-disciplinary topics and a range of active learning activities for students that are different from the Leaving Certificate syllabuses. This is commended. The assessment structure that has been designed for the course incorporates an evaluation of student skills in group work, presentations, class contribution, laboratory report writing and laboratory processes. It is recommended that more frequent written class tests be also included in the assessment structure in order to focus students more and to ensure that appropriate outcomes in terms of knowledge, as well as skills, are being acquired. In developing the TY plan for Science, it is recommended that a set of desired learning outcomes for students be developed for the course and these be discussed and agreed by all science teachers. All science teachers should contribute to the evaluation and design of the TY plan each year.

An excellent range of very well designed resources for teaching and learning in the subjects has been built up, including presentations, worksheets, reference websites and animations. Very good and ongoing use is made of ICT to plan lessons, source ideas and visual material and to prepare teaching and learning resources. Many of the resources developed included an appropriate cartoon or visual on the topic.

Preparation for lessons was in all instances thorough. Appropriate materials that matched learners' needs and the planned student activities, including ICT presentations, worksheets and materials for practical work were ready in advance of lessons. In some instances, lesson preparation extended to the use of lesson plans and these confirmed good planning for lesson structure involving lesson objectives, teaching, learning and assessment activities, resources to be used and homework to be allocated.

TEACHING AND LEARNING

A very good standard of teaching and learning was evident in lessons evaluated. Objectives were clear in all lessons and there was appropriate variety to the structure of lessons. A wide spread of student ability was noted in the class groups visited and teachers managed this very well. The pacing of lessons was good with good differentiation of the tasks set and the questions posed to support less able students and to challenge all according to ability in the subject. Questions were directed at all students in the class and included a variety of lower-order and higher-order question types. Very good formative feedback was given to students on their answers. Movement from one phase of the lesson to the next was conducted with teacher questioning in order to bring about a summary of the main concepts before moving on.

Very clear instructions were given at all times so that students knew what was expected of them. There were many excellent examples of teachers approaching difficult concepts in stages, moving

from the concrete to the symbolic and at times to the abstract. This was aided by the very good use of ICT and investigative practical work by students. Learning was always contextualised for students. Teachers employed touches of humour to enhance the relevance of topics to students' everyday lives. There were many excellent examples of attention to detail which teachers modelled in the way they guided students and in their presentations. It was evident that students followed this example in their own verbal responses and written presentations.

Very good use was made of the mobile computer laboratory in two lessons. Individual students successfully navigated the internet to locate resources for the topic under the guidance of their teachers. This was a very good application of self-directed learning and should encourage learners to conduct independent research and to use the VLE as an aid to homework.

The range of teaching and learning practices observed in lessons was very good. There was very good emphasis on student involvement in all lessons and a very good balance was struck between teacher direction and independent student or group learning. This is commended. Given the very good reaction of students to opportunities for self-directed learning it is suggested that additional approaches of this type be availed of. This could include self-evaluation of written work, creative role-play scenarios, group work other than practical work, and student summaries of topics through the use of spider diagrams. These would augment the already wide range of learning activities observed.

Classroom management was consistently good, students' contributions were sought and affirmed and a secure learning environment was generated in all lessons. Student-teacher relationships were very good and students actively engaged in all parts of their lessons. Teachers were acutely aware of the potential of each student in their class groups and accordingly they set appropriately high expectations for students.

Students' responses to questioning reflected their differing abilities in the subjects. It was clear that better able students had achieved a sufficient depth of understanding and knowledge of topics studied and will be capable of higher level in the subjects. A good level of skills and competencies was observed as students conducted practical work, particularly science process skills and skills of observation. An appropriate number of prescribed practicals was completed by each group. Good approaches to the writing of laboratory reports were observed and the quality of these was high.

ASSESSMENT

Teachers took cognisance of students' levels of involvement in lessons and monitored their work by circulating to check progress and to offer help when necessary. Examples of good work and generally good standards of presentation were seen in the written work inspected, including students' laboratory notebooks and their homework. Homework is given daily to consolidate work done in lessons and the work set was appropriate to the abilities of students. LCA students keep a portfolio of work containing a record of all laboratory practicals and work carried out in the various modules. Student written work is collected periodically and is checked and signed by the teacher. Developmental feedback was given on students' tests, homework and laboratory records in the form of affirming written comment and suggestions for improvement.

Class tests are given with good frequency, particularly for examination subjects. Formal school tests are administered at Christmas and summer and teachers endeavour to administer common tests or common questions to groups, when appropriate. The expansion of this technique is

encouraged. Students are awarded marks for the successful completion of practical work and the laboratory report, and this is commended. Consideration is being given to the introduction of a practical assessment of students' laboratory skills and this is to be encouraged. Parents receive formal school reports on their child's progress twice each year. A parent-teacher meeting is held annually for each year group.

A review of teacher records revealed that for a number of students absenteeism is high. It is important that this continue to be closely monitored by the school and that the school's attendance strategies be rigorously administered.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation of Science and Biology:

- The science subjects have a high profile in this school.
- A very positive response has been made to the recommendations contained in a previous subject inspection report.
- Initiatives are in place to promote the uptake of Science in first year and the interest in the sciences among all students in the school.
- The laboratories and preparation area are very well organised.
- Teachers in the school were found to be enthusiastic and progressive.
- An excellent range of modern ICT resources are present for student and teacher use, including a virtual learning environment for students.
- Collaboration and focused planning among science teachers has resulted in considerable development and cohesive practices in subjects.
- Very well developed subject plans are in place and are being implemented.
- Objectives were clear in all lessons.
- A very good standard of teaching and learning was evident.
- There was very good emphasis on student involvement in all lessons and a very good balance was struck between teacher direction and independent student or group learning.
- Students are challenged according to their individual ability in the subjects.
- A range of assessments is in use and very good assessment for learning strategies are employed in lessons.

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

- It would be preferable to have only one double lesson per week to increase the frequency of class contact between teachers and their class groups.
- The TY plan for Science should be developed to include a set of desired learning outcomes for students and more frequent written assessments. All science teachers should contribute to the evaluation and design of the TY Science plan each year.
- The absenteeism of some students should continue to be closely monitored by the school and the school's attendance strategies should be rigorously administered.

Post-evaluation meetings were held with the teachers of Science and Biology and with the 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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