An Roinn Oideachais agus Scileanna

Department of Education and Skills

Subject Inspection of Science and Biology
REPORT

Saint Joseph’s Secondary School
Navan, County Meath
Roll number: 64360Q

Date of inspection: 19 January 2010
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 Joseph’s Secondary School, conducted as part of a whole-school evaluation. 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 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 the science team. The board of management 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

All first-year students in St Joseph’s Secondary School study Science. At the end of first year, students can choose to continue studying Science and a high proportion of the year group usually takes this option. Until September 2009, Science and Home Economics were in the same option block. This meant that students had to choose between these two subjects for the junior cycle. It was reported by management that, in general, students of a higher ability chose Science. It is good to note that under the revised subject option structure, students now have the option of studying both subjects. It is an aspiration of management and of the science team that Science becomes a core subject for all students in the junior cycle.

In senior cycle, the school offers an optional Transition Year (TY) programme. Biology, Chemistry and Physics are available to students for the Leaving Certificate. Biology has been traditionally the most popular option with three class groups in each of fifth year and sixth year. There is one class group of Physics and one of Chemistry in each of these years. Commendably, students have the option of studying two of the three science subjects to Leaving Certificate level.

The timetabling of Junior Certificate Science is appropriate and management plans to increase the timetabled allocation for third-year classes from four to five periods per week. Three specialist science teachers make up the science department in the school. Deployment of science teachers is in line with their qualifications. Where possible, there is continuity of teachers from one year to the next in the junior cycle and again, in the senior cycle.

Very good specialist facilities are available for Science. The school has three laboratories which are clean and well maintained. Two of the laboratories are connected by a preparation area while the third laboratory has an adjacent preparation room. The science facilities are well organised...
and well maintained. Chemicals are stored appropriately and methods adhere to the advice provided by the Second Level Support Service (SLSS). Separate cabinets are available for the storage of toxics and flammables. Relevant health and safety resources are available. These include fire blankets, fire extinguishers and safety goggles as well as isolation switches for gas and electricity. Appropriate accident recording and reporting procedures are in place. The science team has developed a code of practice for the laboratories and this is displayed prominently in all laboratories as well as in student notebooks where it is signed by students and their parents.

The science department is well resourced. There are good information and communications technology (ICT) facilities available to teachers. These include internet access, a ceiling-mounted data projector, PC and screen in all three laboratories. The computer room and library are also available through a booking scheme. Resources are available on a requisition basis. In this regard, the science team acknowledged the generous financial contribution of the parents’ association.

Management is supportive of staff members’ continuing professional development (CPD) and a good level of past engagement with CPD is evident from the subject plan. Students’ work is celebrated through many stimulating displays in the classrooms and on the science notice board on the corridor. Displays contained a good mix of commercial posters as well as newspaper clippings and student-generated work.

**PLANNING AND PREPARATION**

Subject department planning is facilitated by management. Department meetings are held and minutes are recorded. The position of co-ordinator is rotated and duties include stock control, liaison with management and chairing department meetings.

There was clear evidence of collaborative planning. Subject department plans were provided for both Junior Certificate Science and Leaving Certificate Biology. These are comprehensive and outline the aims and learning outcomes for students in each year of their course. The curriculum content of the department plan reflects a good balance between the development of knowledge and skills. In line with good practice, the programmes of work outline the topics to be studied on a two-monthly basis. The learning outcomes are linked to activities and methodologies to be used as well as modes of assessment. There is scope to include a more defined time frame for each topic, for example, to include the number of weeks allocated to each topic.

It is commendable that all members of the science team have electronic copies of the programmes of work and this facilitates their updating and review. While the science teachers do review their progress in relation to the programmes of work, it is important that any revisions or amendments are discussed and shared at subject meetings and used to inform the further development of each programme of work. This practice further facilitates reflective practice.

Planning documentation indicated that there is scope for further information on the nature of the special educational needs of individual students. It is recommended that the science team explore how firm links can be built with the learning-support department.

Teachers’ individual planning was good and teachers maintain good records of work completed to date. Best practice was observed in one planning folder where individual plans were based on the science department’s long-term learning outcomes and outlined what students should be able to
do at the end of each lesson. Additional resources provided by teachers included copies of PowerPoint presentations, handouts, worksheets, individual lesson plans and end-of-topic tests.

**TEACHING AND LEARNING**

Good quality teaching and learning was evident during the evaluation. In all lessons visited, teachers shared the learning outcomes with students at the outset. Best practice was evident in those lessons where the learning intentions were revisited during the lesson and students were provided with opportunities to state what they had learned. There was good continuity with prior learning and lessons were consistent with the planned programme of work. Lessons were well structured and the pace was appropriate to each class group.

Classroom management was effective in all lessons visited. A clear code of conduct had been established and students responded positively to it. Learning activities were well managed and there was an appropriate balance between teacher instruction and student activity. Pair work and small group work were utilised in the many practical activities observed. Students worked with well-established routines for setting up and clearing away of apparatus. They were competent in carrying out the experiments and showed an appropriate level of skill. Students worked with due regard for health and safety precautions. Teachers regularly moved around the classroom checking, assisting and encouraging students in their work. Students shared results readily with the class and offered plausible explanations for them when questioned by the inspector.

The classroom atmosphere was positive and conducive to work. A good rapport was seen to exist between students and their teacher and between students themselves. Teaching was generally enthusiastic and students displayed enjoyment of the subject. Teachers regularly provided praise and affirmation for students’ contributions as well as efforts.

Instruction was clear and teachers demonstrated a high level of competence and skill in the subject area. Teachers paid good attention to the development of literacy in lessons and good efforts were made to ensure students’ understanding of key terminology. New words were noted on the board and students were encouraged to pay particular attention to their pronunciation. Mnemonics were used to assist students in the recall of labels. It is good practice that Junior Certificate science students have notebooks in which they compile a glossary of key terms and definitions. These lists should be shared with the learning-support department in order to further promote literacy among the students who are studying Science.

Teachers were generally aware of the varying abilities of the students in their classes. Differentiation strategies included extra teacher attention for students experiencing difficulties, and differentiated levels of questioning. It was reported by the members of the science department that they often share ideas and resources to assist students in need of extra support. This is good practice. Differentiation is an area which should be included on the agenda for team meetings and incorporated into the subject department plan. Some students are withdrawn from science lessons for learning support. There is scope to consider the practice of team teaching which would enable more students to remain in their mainstream science class while they benefit from the assistance of an extra teacher. Supports for the exceptionally able students observed included extra and more challenging assignments. This is an area which could also be further explored and developed. Useful information on raising awareness of the needs of exceptionally able students is available in the National Council for Curriculum and Assessment (NCCA, 2007) publication *Exceptionally Able Students: Draft Guidelines for Teachers*. 
In some lessons observed very good efforts were made to link the new material with students’ own experiences and to build on prior learning. Examples used included discussions around the swine flu, haemophilia and the use of household substances to test for acids and bases. This very good practice is encouraged as it enhances students’ understanding and supports learning.

A variety of resources was used to appeal to a range of learning styles. These included handouts, worksheets, video clips and appropriate material downloaded from various internet sites. Use of student-generated resources and teacher-generated resources provided good visual stimulation. In one instance the composition of the blood was simulated by biconcave discs and other particles floating in vegetable oil. This provided a good visual aid to the lesson as well as a stimulus for discussion. Other lessons made use of everyday resources such as house plants, wind-up toys, crisps and toothpaste.

A range of methodologies was used to engage students in their learning. Teacher demonstration was used effectively in a number of lessons. The use of spot demonstrations in a lesson on energy conversions was particularly effective. Good practice was also observed where students were asked to demonstrate an activity to their peers. This type of peer tutoring was seen to encourage student engagement and contributions. In a lesson on cell division students worked in pairs to correctly sequence the stages of mitosis. This was followed by a short video clip depicting the stages of mitosis in a cell, shown using the data projector. An appropriate level of teacher intervention was effective in reinforcing the key points of information. Student responses during the discussion session which followed indicated that meaningful learning had occurred.

In some lessons teachers ensured that the questions were appropriately differentiated for the variety of abilities in the class. Students were active in their own learning, in their questioning and in their responses to questions. When questioned by the inspector they demonstrated a good knowledge and understanding of the topic under study. Students’ written work indicated good progress and the majority of students were seen to be well organised and purposeful in their work.

Good use of ICT was observed in all lessons. In two of the lessons students were carrying out experiments on pH and temperature. In these lessons the use of data loggers ensured that the recordings of pH and temperature could be taken as frequently as five-second intervals and the results could be displayed graphically using the data projector.

**ASSESSMENT**

Homework and assessment policies have been developed and are implemented. Homework is assigned and monitored regularly. A range of assessment modes is utilised. Summative assessments are carried out at the end of each topic. In-house examinations are held at Christmas and summer while ‘mock’ examinations are held for students sitting the certificate examinations. Common tests are administered where feasible. It is recommended that consideration be given to the incorporation of a percentage of the overall marks in the in-house examinations for the completion of practical work or for the quality of mandatory practical write-ups in the common tests. Assessment outcomes are used to gauge students’ progress and to identify learning needs.

Results of in-house examinations are recorded electronically in the school and are also conveyed to parents. Feedback to parents is via the student journal, parent-teacher meetings and school reports. Achievement in certificate examinations in the previous two years has been very good.
Teachers keep very good records of students’ attendance and of their performance and progress. The records included achievement in assessments as well as homework which has been assigned and completed by the student. Notebooks observed were regularly checked and some contained examples of good formative feedback. This feedback is of particular advantage in promoting students’ learning and follows the practices of *Assessment for Learning*. To further reinforce learning, all students should be encouraged to regularly follow up on teacher corrections and annotations in their notebooks. It is recommended that the science department further explore the principles of *Assessment for Learning*. Information is available on the NCCA website (http://www.action.ncca.ie/en/afl).

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- Very good specialist facilities are available for the teaching and learning of the science subjects.
- Management is supportive of staff members’ continuing professional development (CPD) and a good level of past engagement with CPD is evident.
- Subject department planning is facilitated by management.
- There was clear evidence of collaborative planning among the teachers of Science and Biology.
- Learning activities were well managed and there was an appropriate balance between teacher instruction and student activity.
- Teachers regularly provided praise and affirmation for students’ contributions and efforts.
- Good use of ICT was observed in all lessons.
- A variety of resources was used to appeal to a range of learning styles.
- Homework is assigned and monitored regularly.

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

- It is recommended that the science team explore how firm links can be built with the learning-support department.
- Differentiation is an area which should be included on the agenda for team meetings and incorporated into the subject department plan.
- It is recommended that consideration be given to the incorporation of a percentage of the overall marks in the in-house examinations for the completion of practical work or for the quality of mandatory practical write-ups in the common tests.
- The science department should further explore the principles of *Assessment for Learning*.

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

*Published December 2010*
Appendix

School response to the report

Submitted by the Board of Management
Area 1: Observations on the content of the inspection report

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

- Resource Dept have been given a copy of Definitions, Formulae and Science experiments. These can now be used to help students who have difficulty with Science.

- 5% extra marks will be allocated to students at Summer and Christmas Examinations. All necessary Science Practicals must be up to date to qualify for this allocation of marks.

- Teacher from Science Dept is currently involved in Assessment for Learning In-service. This information and knowledge will be shared with other members of the Science Dept.

- Differentiation. Approximately 3% of Junior Cert Science students take Ordinary Level in the exam. Appropriate teaching methods, resources and tests are provided for this cohort of students.