Subject Inspection of Science and Biology

REPORT

St. Joseph’s Secondary School
Rochfortbridge
Co. Westmeath
Roll number: 63310T

Date of inspection: 7 October 2009
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, Rochfortbridge. 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 subject 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. Joseph’s is a co-educational secondary school with a current enrolment of 729 students. The school provides the Junior Certificate (JC) programme for junior cycle students. Senior cycle students are offered an optional Transition Year (TY) programme before moving on to the Leaving Certificate programme. Three Leaving Certificate programmes are offered to students, the Leaving Certificate (Established) (LC), the Leaving Certificate Vocational Programme (LCVP) and the Leaving Certificate Applied (LCA) programme.

Science is a core subject for all Junior Certificate students and there are six mixed-ability class groups in each year. First-year classes are allocated four periods per week, including a double period for all but one class. This time allowance is in line with syllabus recommendations, but it is important that all classes receive a double period to facilitate investigative laboratory work. Second-year and third-year classes are allocated five periods each week, in the form of one double and three single periods. This generous allocation is above syllabus recommendations.

On entering senior cycle, students are given the option of following the Transition Year (TY) programme. Students availing of this offer are provided with a double period each week for Science and a number of discrete modules in Biology, Chemistry and Physics are provided during the year.

Students entering fifth year are offered Biology, Chemistry and Physics as optional subjects. Uptake in all three subjects is encouraging with Biology being particularly popular. It is demonstrative of commendable commitment to the sciences that the school provides all three subjects at senior cycle. Each Biology class is allocated five periods per week, mostly in the form of two double periods and one single period, a time allocation which is in line with syllabus recommendations.
All science students have weekly access to a laboratory and in all but a few cases classes are appropriately distributed throughout the week. In these instances, timetabling a class group for two separate time slots on the same day or timetabling a double period across a break was unavoidable.

There are currently five teachers of science subjects in the school and they are all deployed in line with their qualifications. Teachers retain the same class groups from first to third year and from fifth to sixth year. This is very good practice as it facilitates long-term planning and ensures continuity in both teaching and learning. School management actively supports the attendance of science teachers at relevant continuing professional development (CPD) courses. In addition, one member of the science team has gained expertise through working with the Biology support service. In light of the considerable changes in curriculum content and delivery over recent years, it is suggested that the members of the department should consider joining the Irish Science Teachers’ Association and availing of the various supports it provides. Management are willing to defray the cost of membership. The work of the science teachers is supported by a science technician and management is commended for the provision of such a significant resource, demonstrating the commitment of the school to the sciences.

The science department, with management support, encourages involvement by students in co-curricular and extracurricular activities. These activities include participation in the BT Young Scientist and Technology Exhibition and SciFest. Other activities facilitated by the science department are the organisation of visits to relevant industrial sites, the ploughing championship and participation in Biology laboratory revision days in NUI Maynooth. The science teachers are to be praised for their work in these areas as it contributes to making the sciences more stimulating, exciting and interesting for students.

Two separate laboratories, each with its own storage and preparation area, and a number of classrooms are used for science and biology classes. The laboratories are well equipped and adequate for their purpose and the storage and preparation rooms are adequately stocked. Access to the laboratories for science classes is maximised when timetables are being prepared. Teachers have demonstrated flexibility in the manner in which access arrangements are managed, although it is important that teachers always preferentially use a laboratory if one is available.

Charts and posters are displayed in both laboratories, including some student-produced work, helping to create an attractive and stimulating learning environment. It is suggested that displays are changed and updated occasionally, in line with topics being taught and also to display recent student project work. In addition, it is essential that, in the case of one laboratory, a periodic table is placed in a prominent and easily visible location. Data projectors are available in both laboratories. In both cases, the projectors should be adjusted in order to optimise the quality and placement of the images projected.

A range of safety equipment was seen in the laboratories, including first aid kits, fire extinguishers and appropriate safety notices. It is recommended that, in order to enhance health and safety provision, simplified safety notices be prominently displayed in the laboratories. The school also has a health and safety statement which was drawn up with appropriate consultation. This statement is reviewed annually, which is good practice.
PLANNING AND PREPARATION

An science department is in place in St. Joseph’s Secondary School. Formal department meetings take place approximately three times each year and informal meetings take place on an ongoing basis. A co-ordinator ably manages the work of the department and a good level of collegiality and mutual support was evident within the science team. It is recommended that the post of science co-ordinator be rotated among the members of the department on an annual basis, in order to afford each member an opportunity to exercise leadership and to ensure that the workload is shared among the department members.

Comprehensive science and biology folders were presented during the evaluation. These folders were based on the School Development Planning Initiative (SDPI) templates and, in addition to the curricular planning documents, they contained extensive sets of teacher-developed resources. The members of the science department are commended for the preparation of these very good resources.

Curriculum planning has progressed significantly and common written programmes of work were presented for Science, Biology and the TY modules. The content of the Junior Certificate science course has been broken down into half-term or two-monthly sections, expressed in the form of desired learning outcomes. This very good practice facilitates the common assessment of junior cycle students. It is recommended that these learning outcomes are now used to define relevant evaluation criteria for the different year groups of junior cycle and, thus, to bring about a closer link between what is taught and what is assessed.

A similar plan is in place for the Leaving Certificate biology course, based on the chapters of the text book that is used. It is recommended that this plan be re-drafted in terms of learning outcomes, as with the science plan, and further developed in a corresponding manner. In addition, it is recommended that the Biology syllabus, rather than the text book, is used as the source document. It is suggested that practical work be highlighted in both plans in order to facilitate the sourcing and preparation of necessary resources and equipment in a timely manner.

A variety of TY science modules have been planned for and successfully implemented. These modules, which have significant biology content, are activity based and are in keeping with the ethos of the TY programme.

Short-term planning was evident in the lessons observed. Teachers were familiar with the topics taught and prior preparation of the resources, materials and apparatus required for demonstration and student-centred investigative work was also evident. Such short-term planning and preparation is commendable and ensured that lessons were of a generally good quality.

TEACHING AND LEARNING

Students’ behaviour was very good and they engaged very well in the classroom activities. In general, they worked hard and participated positively in all classroom interactions. Teachers adopted a professional approach to their work and worked to maintain an atmosphere that was conducive to learning, in the lessons observed. A very good rapport between teachers and students was evident. This is praiseworthy.
A differentiated approach to teaching was observed through the level of individual attention afforded to students. In most instances, teachers moved around the classrooms assisting and supporting students and all students were encouraged to perform to the best of their abilities. There were occasions, however, when a greater level of movement would have contributed to better inclusion and support of students and would have encouraged more active engagement.

A variety of topics was taught in the lessons observed. The topics were appropriate to the syllabuses and in keeping with subject department planning documents and included heat transfer, density, motion, magnetism, ecology, the heart, and plant physiology. A variety of methodologies was employed in teaching these topics, including questioning of students, student writing, discussion, student practical activity, teacher talk, use of the classroom board and information and communication technology (ICT). The methodologies were chosen to stimulate student interest and were appropriate to the material being taught. In most instances there was a good balance between student-centred and teacher-centred phases in lessons.

The use of appropriate scientific terminology was good in all lessons observed. However, it is recommended that greater use be made of the classroom board to emphasise keywords. Reference was made, on occasion, to appropriate passages in textbooks and was used to reinforce learning. Otherwise, textbook use was minimal and consistent with good practice.

Questioning of students was used extensively to establish levels of prior knowledge, to assess the quality of students’ learning and understanding on an ongoing basis and to assist in the exposition of new material. Lower order questions were used to test recall and in the review of prior learning at the beginning of lessons. More challenging higher order questions were used, at various stages in lessons, to encourage students to think more deeply and solve more difficult problems. Some excellent examples of the use of directed questions were observed, where students were given time to formulate their answers and were encouraged to put up their hands before a respondent was chosen. On occasion, though, questioning was less effective. For example, a tendency to allow one student to dominate the classroom interaction or permitting students to respond in a random manner must be avoided. The use of directed questions, as described above, will reduce such problems while also allowing the teacher to maintain greater control of the pace of the lesson and of teacher-student interactions in general.

The quality of lesson structure was variable. Good practice was observed where lessons opened with a review of previously learned material and was followed by the outlining to students of the proposed learning objectives for the lesson. New material was then taught in an appropriate manner and opportunities were provided for students to put their learning into practice. Lessons ended with a review of what had been taught, with reference to the lesson objectives, and homework was then assigned. This homework was designed to reinforce students’ learning. It is recommended that this practice of sharing lesson objectives with students at an early stage in the lesson be adopted by all teachers and that, similarly, carrying out a review of the lesson, in terms of these objectives, be carried out towards the end. This practice will give direction to teachers, facilitate them in monitoring progress and will also provide an opportunity to assess their learning at the close of the lesson. In summary, it is recommended that the members of the science department, as a group, explore the area of lesson structure. It is important that the science teachers determine and share good practice and agree a common approach to implementing it.

Effective use of available ICT equipment was observed in a number of lessons, with good use being made of laptop computers and data projectors. In one lesson, PowerPoint presentations prepared by students were effectively used to review the lesson topic and to affirm the work of students.
Practical work was well managed and was carried out efficiently and safely. Students demonstrated a good level of skill when carrying out their various tasks. Best practice was seen where bench work was preceded by a plenary session during which teachers ensured that students were fully briefed on the work to be carried out. In some instances, a second plenary session was facilitated following the main activity, when students were given an opportunity to review their work and rationalise their findings. It is recommended that this good practice is carried out by all teachers. Health and safety issues were well managed during practical activities. The wearing of eye protection by students was observed in one instance and, in another lesson, a risk assessment was carried out prior to the practical activity. Such attention to health and safety is commendable.

ASSESSMENT

Arrangements for assessing and monitoring student progress and achievement in St. Joseph’s Secondary School are good. Ongoing assessment by teachers of the level of student understanding is carried out through questioning, examination of homework and general observation of students, as observed in class by the inspector. Students demonstrated a positive attitude towards Science and Biology as evidenced by the level of engagement and interest observed during the lessons. There was evidence of good learning on the part of students. They successfully carried out the different tasks assigned to them during the lessons and they displayed a good level of knowledge and understanding during the course of lessons and during interaction with the inspector.

Most teachers frequently affirmed students for their efforts during class and they responded to this in a positive manner. However, it is equally important that they are affirmed and encouraged in relation to written work. An examination of student laboratory notebooks indicated that the quality of much of the students’ work was good, but that, overall, there was some variation. In a number of notebooks the quality of work showed no progressive improvement over time. Therefore, it is recommended that teachers positively annotate students laboratory notebooks, workbooks and other written work on a regular basis and advise students on how their work may be improved, where necessary.

A comprehensive assessment and reporting system is in place to assess student progress and to report to parents on students’ progress. Parents of students in first, second and fifth year receive progress reports on four occasions each year: at Halloween and Easter and following Christmas and summer formal assessments. Parents of third-year and sixth-year students receive three reports: at Halloween, following formal assessment at Christmas and following mock examinations in the spring. TY students are assessed on the basis of completed assignments and project work at Christmas and prior to the summer break and reports are issued on both occasions and at Easter also.

Good practice in relation to recording student attainment and attendance by teachers was evident in most cases. Roll call was taken at the beginning of most classes and some teachers recorded comprehensive data on the performance of students in class and details of work covered. It is recommended that all teachers keep adequate records for the purpose of building up a profile of each student.
SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- The sciences are well supported in St. Joseph’s Secondary School, with good provision of resources and time allocation.
- Teachers demonstrated a professional approach to their work, which was evident from the preparation and planning for lessons and the quality of classroom interactions with students.
- A disciplined learning environment was observed, with students motivated and eager to engage in learning processes.
- A range of carefully considered teaching methodologies was used to good effect. This stimulated interest and helped to motivate students.
- Effective use of information and communication technology (ICT) equipment was observed, with good use being made of laptop computers and data projectors.
- Practical work was well managed and was carried out efficiently and safely.

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

- It is recommended that, in order to enhance health and safety provision, simplified safety notices be prominently displayed in the laboratories.
- It is recommended that the post of science co-ordinator be rotated among the members of the department on an annual basis.
- It is recommended that planning documents, where necessary, be re-written in terms of learning outcomes and that learning outcomes are used to define relevant evaluation criteria.
- It is recommended that more thought be given to the structuring of lessons. It is recommended that the practice of sharing lesson objectives with students at an early stage in the lesson be adopted by all teachers and that a review of the lesson, in terms of these objectives, be carried out towards the end.
- It is recommended that teachers positively annotate students’ laboratory notebooks, workbooks and other written work on a regular basis.

Post-evaluation meetings were 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, November 2010