Subject Inspection of Science

REPORT

St Munchin’s College, Corbally
Limerick
Roll number: 64240G

Date of inspection: 24 February 2010
REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN SCIENCE

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in St Munchin’s College, Limerick. It presents the findings of an evaluation of the quality of teaching and learning in Junior Certificate Science and in the Transition Year (TY) sciences 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 laboratories and classrooms and observed teaching and learning in the sciences. The inspector interacted with students and teachers and examined students’ work. The inspector reviewed school-planning documentation. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal. 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

Science is in a strong position in St. Munchin’s College. All students study Science in junior cycle and in the TY programme, and Biology, Chemistry and Physics are offered as optional subjects for Leaving Certificate. To enhance the scientific experience for the students and to assist in providing a balanced experience in all three Leaving Certificate sciences, a recommendation was made during the chemistry inspection which was conducted in April 2008 that Chemistry, Biology and Physics should be concurrently timetabled in TY. It is good to note that the school has adopted this modularised approach to the delivery of science in TY. Overall, the uptake of the sciences for Leaving Certificate is good.

Appropriate provision is made for the subject area in all relevant curricular programmes. Timetabling, including that for practical work, is satisfactory across all years in the main. The time allocation for the Leaving Certificate sciences is not the same across the subjects and within the subjects on the timetables furnished for the inspection. When this was raised, management reported that where an imbalance occurred in any one year, it was rectified for the other Leaving Certificate year. In future timetabling, school management should ensure that there is a distribution of classes across the week for all class groups and the timetabling of double lesson periods across break times should be avoided as this practice can cause difficulties with regard to the running of student-practical sessions. The uptake at higher level in Junior Certificate is very good and students have generally performed well in the certificate examinations.

Science staff are appropriately deployed. However, to expand the professional expertise across the school, it is recommended that all teachers be provided with the opportunity to teach their specialist subject to Leaving Certificate honours level. This would also assist in the sharing of effective methodologies.
The school has two laboratories. Documentary evidence indicates that the science teachers have articulated their concern in regard to the disrepair of the laboratories. Aspects of the laboratory accommodation provided create difficulties for the teaching and learning of the sciences. For examples, students’ workstations in the larger laboratory have a limited number of gas taps and students’ workstations in the smaller laboratory have no electrical sockets. The school’s plans to refurbish or convert other rooms to up-to-date laboratories are acknowledged. It is important however, that the science department is consulted on the design of the revamped laboratories. It is suggested that the science department could conduct research into the range of refurbishments that has taken place in other schools with a view to finalising a plan that would most meet the needs of St Munchin’s College.

Class groups have adequate access to laboratories. To provide a more visually stimulating atmosphere, laboratory walls and the walls of students’ base classrooms should be used to a greater extent as teaching and motivational aids with a display of charts and students’ work.

A fine level of health and safety equipment is available in the laboratories. This should be enhanced by the presence of, for example, spillage kits and sand buckets. School management and staff should continue to ensure that the safety equipment is maintained at optimal levels in both laboratories. The display of science laboratory rules on the walls is good. In addition, students and their parents sign the rules indicating their compliance. This is good practice. It is recommended that students do not consume beverages in the laboratories. It is good to note that a mobile fume cupboard has been purchased for the chemistry laboratory. During the chemistry inspection in 2008, grave concern was expressed at the absence of gas and electrical isolation switches in the laboratories. While the school’s ongoing application for refurbishment was acknowledged, nevertheless it was strongly recommended that the matter be addressed at the earliest opportunity. This very serious issue has not been advanced to date and once again management is alerted to the seriousness of such a safety issue. It is therefore strongly recommended, once again, that the issue be resolved forthwith.

Equipment and materials are stored in an organised manner. This is laudable. Good work has been done on the storage of chemicals which are segregated in line with correct safety classification procedures. For continued ease of storage, individual chemicals should be appropriately colour coded. It was recommended during the chemistry inspection that the school should acquire a flame-resistant press for the safe storage of flammable chemicals. This has not been done and management should also pursue this acquisition as a matter of urgency.

Students are provided with additional learning support as needed and this is commended. To further support students’ learning, links between the science department and the language and learning-support departments should be enhanced. For example, a member of the special educational needs department could give a short input at some science-department meetings regarding methodologies that promote effective inclusion

Students and teachers have access to the computer room in the school. Teachers have access to laptops and both laboratories house ceiling-mounted data projectors, all of which support the teaching and learning of the sciences. In planning for the provision of resources in the new laboratories, the school is encouraged to explore the range of data-logging equipment available in advance of purchasing new equipment that most suits their needs.

Students’ experience a range of subjects in TY, thus assisting them in making informed choices for Leaving Certificate. This is good practice. It is good to note that subject-option blocks for Leaving Certificate are devised based on students’ preferences.
Teachers have had the opportunity to attend in-career development courses in the sciences and the school supports membership of the Irish science Teachers’ Association (ISTA). This is good practice. Documentary evidence suggests that the science department organises a range of co-curricular and extracurricular science activities to enhance students’ experiences in science. This is positive.

PLANNING AND PREPARATION

A subject co-ordinator for the sciences is in place. Documentary evidence provided during the evaluation indicates that the duties associated with this role include co-ordination of the first-year science programme. Collaboration occurs in a formal manner at the twice-yearly minuted meetings and these minutes are retained in the department folder. The development of a science policy is commended. This policy outlines the aims and objectives of science education in the school and the skills attained by students.

A science-subject plan, that lists topics to be covered each year on a term-by-term basis, has been devised. In accordance with advice given during the chemistry inspection in 2008, the science plan was reviewed and now incorporates a balanced exposure to Biology, Physics and Chemistry for students in each year of junior cycle. The inclusion of relevant website addresses and modes of assessment is good. Building on this good work, in line with the recommendation made during the chemistry inspection, all science subject plans should be further developed to identify successful teaching methodologies and align resources with specific topics. Science plans should be adhered to by all teachers. If the timing of some topics is found to be unsuitable, the science department should revisit the plans and adjust them in a collaborative manner.

Outline programmes of work have been developed for Biology, Chemistry and Physics in TY. The physics plan incorporates aspects of Applied Maths. This is positive. In line with the advice given above, these plans should be further developed to include teaching methodologies, and resources. While the programmes contain some Leaving Certificate material, students are furnished with the opportunity to study aspects of science not currently on the Leaving Certificate syllabus. This is good practice, as it is in line with TY philosophy and with the Department of Education and Skills circulars and guidelines. Building on this good work, teachers could also explore other strategies, such as thematic, historical or problem-solving approaches, so that the teaching of any Leaving Certificate material is significantly different from the way in which it is dealt with in fifth year and sixth year.

The prior preparation of handouts, video clips and student PowerPoint presentation provides evidence for the effective planning for lessons.

TEACHING AND LEARNING

Lessons were structured well and the pace was generally good. Lessons normally began by reviewing the learning of the previous lesson using questioning and this provided effective linkage between one lesson and the next. It is recommended that the learning intentions be clearly outlined at the outset of the lesson. These could be written on the board and revisited during the recapitulation stage of the lesson. In some instances, care should be taken in the planning of lessons to ensure that time is factored in for the review of students’ learning during a plenary
session. Teachers’ explanations were clear and they supported students as they worked individually.

A very good teacher/student rapport pertained in the lessons observed. Students participated well in the main and were actively engaged through questioning, student presentation and completion of student worksheets. Consideration could be given to employing strategies such as pair work whereby students could discuss the questions on the worksheet in advance of completing of their individual work. Peer assessment of students’ work is another strategy that could be used. This has the advantage of consolidating the assessor’s understanding of the concept under consideration. Where note taking is deemed necessary, it is recommended that time is given to all students to complete the activity in advance of the teacher moving on to the next segment of the lesson. Consideration could be given to ‘note making’ by the students, whereby they could work in pairs to record the main points of the topic from memory following whole-class discussion. This approach would facilitate students’ ongoing engagement in the learning process.

Questioning was effectively used to ascertain students’ previous knowledge of the topic and to further develop lesson content. Students’ contributions were affirmed and encouraged and teachers supported students in developing their answers. This is good practice.

Appropriate linkage was made with some students’ prior learning of the subject matter. The topics of the lessons observed, were made tangible and relevant for the students through discussion of everyday examples. For example, in a lesson on ‘solutions’, discussion developed around the types of solvents used to remove water-based paints and oil-based paints from paint brushes.

The board and information and communication technology (ICT) were both effectively employed to highlight the salient points of the lessons observed and to provide visual images. The use of written exemplars of scientific calculations was effective. A video clip was also successfully used to consolidate students’ learning of the law of the lever.

A very good approach observed in one lesson involved students presenting to their peers on a topic that they had researched using PowerPoint. It was evident from the presentation that the students had a good level of ICT skills and slides contained the salient points of the topic, enhanced in some instances by visual images. The teacher used aspects of the student’s content to link with previously learnt material and to consolidate their understanding. This was done in a seamless manner and is highly commended.

Observation of and interaction with the students indicates a good understanding and knowledge of science in the main. Attitudes to learning are positive as displayed by the level of interest and enthusiasm shown in the lessons.

ASSESSMENT

A range of assessment modes is used to assess students’ learning and progress. These include questioning in class, written homework, project work and formal examinations. Formal examinations are held at Christmas for all students and in the summer for all non-certificate examination classes while Junior Certificate and Leaving Certificate classes have pre-examinations. Common assessment is used in Science in first year. This is good practice and should be extended into second year to provide for further standardisation across year groups. It would also ensure consistency with regard to the implementation of the subject plan. The mode of
assessment employed in TY is excellent. A credit system is employed and students gain credits by completing assignments, projects and other activities.

An examination of students’ copies revealed that consolidation of in-class learning is facilitated through written homework in many instances. Where this was monitored and annotated, the work was of a higher standard. The monitoring of homework is good practice and its use is strongly encouraged across the department. Students’ project work was of a very good standard.

Students have laboratory notebooks/workbooks in which they record their investigative work. These practical books are of varying standards and some of these are good. There is some evidence of monitoring of this work by teachers which is laudable. It is recommended however that this be employed to a greater extent, in conjunction with annotating students’ work with comments on areas where they need to improve, thus incorporating Assessment for Learning (AfL) strategies. This would ensure that all students would achieve a good standard in their written work. It is also recommended that a percentage of marks be allocated for completion of the write-ups of the mandatory experiments in line with the practice in the Junior Certificate examination.

While acknowledging that school management conducts an analysis of the certificate examination results, it is recommended that the science department conduct an independent analysis and that the results of this work feed into the subject planning.

Parents are informed of students’ progress by means of reports, which are sent home on a number of occasions during the year, and at parent-teacher meetings. Communication is also maintained through the use of the students’ journal when necessary.

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- The provision for science education in St. Munchin’s College is very good.
- Students are provided with the opportunity to experience aspects of science that are not elements of the certificate examination syllabuses in TY.
- Some very effective teaching and learning methodologies were observed, including the use of video clips and students’ presentation of their project work.
- Very good relationships exist between the teachers and students in the school.
- The use of the credit system as a mode of assessment in TY is excellent.

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

- The installation of electrical and gas isolation switches and a flame-resistant press must be completed as a matter of urgency.
- Subject plans should be further developed.
- Learning outcomes should be stated at the outset of all lessons and revisited during the recapitulation period in order to ascertain students’ learning.
- The good practice of assessing students’ practical work/laboratory notebooks as a component of the end-of-term examinations should be introduced.
Post-evaluation meetings were held with the 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 appreciates the efficiency and courtesy of the inspectorate in carrying out their duties. The Board commends the work of the science teachers in the school in maintaining the excellent teaching of science in St. Munchin’s College. The provision of subject inspection reports is a means of affirming the excellent teaching practices and provision for science made in the school while also providing a means of improving and building on the strengths that have been established over the years.

Note should also be taken of extra-curricular activities such as field trips, involvement in the Young Scientist and quizzes during each academic year.

The school continues to have a large number of students who continue into third level courses in science. The school also has developed strong links with the University of Limerick for both Physics and Chemistry over the years.

The Board notes the comments in relation to the physical conditions of the laboratory accommodation in the report and is hopeful that the renovation plans which are with the Department of Education and Skills will be progressed quickly. These plans would provide us with up to date laboratory accommodation for all three sciences in renovating the existing facilities and providing much needed additional space both for student use and also for storage and preparation.

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

The school moved to teacher based classrooms in 2010/2011

A flame resistant press for the safe storage of flammable chemicals has been installed in the science labs.

The electrical and gas isolation switches were installed in both science laboratories in Summer 2010.

Subject plans have been further developed and the practice of assessing practical work and notebooks is being included as a component of in-house examinations.