Subject Inspection of Science and Chemistry 
REPORT

St Clement’s College 
Limerick City 
Roll number: 64220A

Date of inspection: 17 February 2011
REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN SCIENCE AND CHEMISTRY

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in St Clement’s College, Limerick. It presents the findings of an evaluation of the quality of teaching and learning in Science and in Chemistry 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 observed teaching and learning. The inspector interacted with students and the teacher, examined students’ work, and had discussions with the teachers. The inspector reviewed school planning documentation and the teachers’ written preparation. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal and 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

Whole-school support for the provision of the sciences is very good. Science is a core subject in junior cycle. Students study modules of Biology, Chemistry and Physics in Transition Year (TY). Biology, Chemistry and Physics are offered as optional subjects for Leaving Certificate, and Leaving Certificate Applied (LCA) students take elective modules in Science. This provision for science in all programmes is testament to the college’s practice of providing an opportunity to enhance the scientific literacy of all students.

Students have an input into the creation of the subject-option blocks to facilitate subject choice for the Leaving Certificate. Initial student choices are used to create a “best-fit” model for senior cycle subjects. This is good practice. Students are supported in making appropriate subject choices for Leaving Certificate. The level of uptake of Physics for Leaving Certificate is very good and that of Biology is satisfactory. In recent years students have not opted to study Chemistry. However, currently there is a class group in fifth year. The school is encouraged to explore further strategies that would encourage student uptake of Chemistry for Leaving Certificate.

Timetabled provision for the sciences is in line with syllabus guidelines. There is an appropriate class spread of contact time throughout the week along with a sufficient number of double periods in first and second year and for Leaving Certificate to facilitate practical work. This is very positive. However, third-year and TY students have single lesson-periods only. Management has stated that all junior cycle students will have a double period each week to facilitate practical work from September 2011. It is recommended in future timetabling that TY students would also have one double lesson-period each week for the duration of the science modules. This would facilitate the completion of student practical activities in a more meaningful way, as it would allow more time for investigation and discussion.
All class groups are of mixed ability. Each class group retains the same science teacher at junior cycle and the same teacher for each of the different science subjects throughout their studies for Leaving Certificate. This is good practice as it supports the continuity of students’ learning. Decisions regarding the appropriate level for students in certificate examinations are taken in the spring of the examination year. Continued monitoring of student uptake of higher-level Junior Certificate Science is advised to ensure that all students take the highest level possible, appropriate to their abilities.

To support those students who have learning difficulties, the special educational needs department provide differentiated worksheets to the science teachers which outline strategies on how best to enhance the learning of these students. To further assist in the provision of science-specific support to students with special education needs, it is suggested that the science department compile a glossary of key scientific-terms for use by the special education needs department.

The school is well resourced for the teaching of the sciences as it has three well-equipped laboratories. These laboratories and the preparation and storage areas are clean, bright, well maintained and well organised. Scientific posters and, in some instances students’ work is on display. The latter is particularly positive as it provides motivation for the students and acknowledges their achievements. The science laboratories benefit from a good level of information and communication technology (ICT) equipment.

There is a high level of safety equipment in the laboratories and preparation areas. Safety rules are on display in all laboratories. Very good work has been done to ensure the safe storage of chemicals. However, the chemical stores are not appropriately ventilated. The school is advised to address this issue. The school has a health and safety statement, which is regularly updated in a consultative manner. This is good practice.

Teachers are appropriately deployed and have been facilitated by management to attend science-specific in-service programmes over the years. The involvement of members of the science department in certificate examination work is positive. There is evidence of planning for the provision of co-curricular activities which are designed to extend and support classroom learning. This is good practice.

**PLANNING AND PREPARATION**

A science department is established in the school and one of the teachers acts as co-ordinator. It would be very worthwhile to select the co-ordinator on a rotational basis as a means of further enhancing leadership and organisational skills for every member of the department. It is clear from the records of this year’s meetings that the science department meets regularly and that collaborative decision-making follows discussion on science-related issues. It is suggested that the minutes of science-department meetings be retained from year to year, thereby developing a historic record of decisions made.

Programmes of work have been devised in the sciences. Those relating to Junior Certificate Science, TY Biology, TY Chemistry, TY Physics and Leaving Certificate Chemistry were examined during the inspection. Outline programmes of work have been agreed for each year group of junior cycle Science and Leaving Certificate Chemistry. It is recommended that the
following key qualities of good programmes of work are borne in mind when further developing
the subject plans. Programmes of work should identify, at a minimum, work to be covered on a
term-by-term basis. They should be grounded in learning outcomes and should be expanded to
identify specific resources and teaching methodologies to support the teaching of the various
topics. It is important to state that there is some evidence of the development of some of the
existing outline programmes of work in this manner. This is commended, whilst it is also further
encouraged. Other programmes of work are in need of further development.

There is evidence in both Chemistry and Biology that, in keeping with TY philosophy, students
are provided with the opportunity to learn about scientific issues outside the remit of the
certificate examination syllabuses. This is very good practice. However, it is clear from the
planning documentation that the current TY Physics plan does not include material that is outside
of the remit of the examination syllabuses. This should be rectified in future planning. In addition,
it is advised that all TY plans be extended to provide further detail on the topics being studied, the
timeframes involved and the learning activities associated with them.

Well-stocked laboratories provide evidence of successful planning for resources. This is enhanced
by the systems formulated by the science teachers and the science technician for the effective
management and deployment of these resources and facilities.

All lessons observed had been planned with care and effort. Preparation included consideration of
prior learning, the selection of relevant resources, the preparation of worksheets and the
homework to be assigned. All materials were to hand during lessons, thus facilitating smooth
transition from one phase of the lesson to the next.

**TEACHING AND LEARNING**

Lessons were well structured and many were student-centred. The aim of the lesson was outlined
to the students during the initial phase. However, to provide a worthwhile scaffold to support
students’ acquisition of new knowledge and skills, it is recommended that the structure and
intended learning outcomes of the lesson should be set out at the beginning of all lessons. These
could be written on the board and revisited during the recapitulation stage of the lesson to
ascertain the extent of students’ learning.

Frequently, teachers began the lesson with a recapitulation of topics students had already
encountered. This was achieved through questioning and correction of written homework. This
was worthwhile as it linked previous knowledge with the new material to be explored during the
lesson.

Questioning featured in all lessons as both a teaching and assessment tool. In one senior cycle,
lesson, a high tempo of questioning was undertaken by the teacher. This was suggestive of high
expectations with regard to student performance and it also ensured that the pace of the lesson
did not flag at any point. In general, teachers are encouraged to maintain a strong focus on advancing
towards higher-order questions as a means of ensuring that students’ understanding and analysis
of topics is extended appropriately.

There were a number of positive features in the methodologies employed. In one lesson, a video
clip on current electricity was used very successfully to introduce the topic and identify new
scientific terms. Short sections of the video clip were appropriately interspersed with questioning
of the students, thus allowing the teacher to ascertain understanding and consolidate learning. Such an approach provides visual stimulation in addition to enhancing students’ engagement.

In another lesson, a PowerPoint presentation was used effectively, in conjunction with questioning, to outline the significant points of the topic under consideration in addition to providing visual images. In this lesson, students copied the main points on the slides into their notebooks. Consideration should be given to the use of ‘note-making’ rather than ‘note-taking’. Students could work in pairs and write a summary of the main points of a particular sub-topic at appropriate stages of the presentation. This would have the effect of engaging students’ in their learning at a deeper level.

Student enjoyment of, and engagement in the lesson was most evident when they were active participants in the learning process. This was facilitated through questioning, pair work, which was observed in a minority of lessons, written work and student hands-on practical activities. The use of co-operative learning strategies is encouraged, particularly when students have various levels of previous learning due to coverage of the topic in another subject. In these instances students could facilitate peer learning.

Where experimental work was undertaken the students worked well together. The work was completed safely and efficiently. The students benefited from a high level of individual support from their teachers, who circulated throughout the room while the students worked. In one lesson, students were asked to investigate the relationship between current and voltage. The use of this investigative approach increased student motivation and provided opportunities for students to reflect on and evaluate their own work and progress. An enquiry-based approach to the teaching of Junior Certificate Science should be used to a greater extent.

A good focus on developing students’ understanding of key terms was observed in some lessons and students were encouraged to record these terms. This is a good strategy which should be used in all lessons.

There were also some very good examples of linking the lesson content to the everyday life experiences of the students, thus making the subject tangible and relevant. These examples included reference to the use of rock salt for de-icing roads and discussion on everyday uses of acids and bases. Overall, lessons proceeded at a smart pace, which resulted in a realistic amount of work being completed in the allocated time.

Classroom management was very good in all lessons observed. It was clear that an atmosphere of mutual respect had already been established and that the classroom atmosphere was pleasant, supportive and conducive to learning. Students were affirmed and encouraged in their work.

In the lessons observed, students were generally confident and capable in answering questions and, where undertaken, performed practical activities to a high standard, commensurate with their level in the school. Inspector engagement with the students demonstrated good levels of comprehension.

**ASSESSMENT**

Students’ progress is assessed on an ongoing basis. Formative assessment, for all classes, is carried out on an ongoing basis by questioning in class and by means of assigned homework.
Topic tests are administered to students regularly and the results are recorded. In addition to these tests, house examinations are organised at Christmas and in the summer, and students taking certificate examinations are set pre-examinations in the spring. The use of common assessments in junior cycle is commended as it complements the common science plan and provides for standardisation of learning across year groups. The inclusion of alternative modes of assessment is good practice and should be further developed.

The school conducts an annual analysis of its results in the certificate examinations. This is good practice. Monitoring of student participation at higher-level in the certificate examinations should form part of this analysis. The science department is encouraged to use this analysis to inform planning for teaching and learning.

Students’ copybooks and practical notebooks were generally neat in appearance. However, the standard of students’ written work varied. In some instances, it was of a very high standard. The practice in the science department in relation to the monitoring of homework also varies. For example, the copybooks of students in some class groups, while illustrating that significant numbers questions had been completed by students, bore little evidence of teachers’ correction of this work. On the other hand, in the copybooks and notebooks of other class groups some good examples of the annotation of students’ work were observed. The latter practice is very good. Teacher annotation that identifies to students the ways in which they could improve the standard of their work is further encouraged.

It is positive that the assessment of students’ progress and achievement in Science incorporates two examinable components of the syllabus, namely students’ practical work and students’ written work. The mark issued to students at key times during the school year, namely Christmas and the summer, is an aggregate mark. This is good practice as it provides a more accurate indicator of students’ actual achievement in the subject.

Parents are kept informed of students’ progress through twice-yearly reports and the parent-teacher meetings that are scheduled for each year group annually. The student journal is also used as means of communication with parents, when necessary.

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- Curriculum provision for the sciences is very good.
- The science facilities are of a high standard and are well resourced.
- Strategies that were successful in engaging students and promoting learning in the lessons observed included effective questioning, good use of PowerPoint and excellent use of a short video clip.
- A very good teacher-student rapport pertained in the lessons observed.
- Students’ skills in performing practical activities ranged from good to very good.
- The inclusion of practical work as an element of end-of-term assessment is good practice.

As a means of building on these strengths and to address areas for development, the following key recommendations are made:
• The chemical stores should be appropriately ventilated.
• Programmes of work, in some cases should be further developed to include timeframes, resources and teaching methodologies specifically linked to individual topics.
• The TY physics module should include material that is outside the remit of the Junior and Leaving Certificate syllabuses.
• The intended learning outcomes should be specified at the outset of each lesson and revisited during the recapitulation stage.

Post-evaluation meetings were held with the science department and 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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