Subject Inspection of Chemistry
REPORT

St Aloysius College
Carrigtwohill, County Cork
Roll number: 62140P

Date of inspection: 27 April 2010
REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN CHEMISTRY

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in St Aloysius College, Carrigtwohill. It presents the findings of an evaluation of the quality of teaching and learning in Chemistry and makes recommendations for the further development of the teaching of this subject 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 teachers and examined students’ work. The inspector reviewed school planning documentation and teachers’ documentation. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal. The board of management of the school 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 the school. All first-year students take Science and this subject is optional thereafter. The uptake of Science in second year and in third year is very high. In that context the school should consider making the subject core for Junior Certificate. The Transition Year (TY) programme is optional. It is good to note that Leaving Certificate subject pre-selection does not occur in TY, allowing students an extra year of experience and of maturation before making their subject choices. All students take modules of Biology, Chemistry and Physics in TY. This is very good practice as it provides the opportunity to enhance students’ scientific process skills, while at the same time facilitating students in sampling each Leaving Certificate science subject. Biology, Chemistry and Physics are provided as optional subjects for Leaving Certificate. The uptake of these subjects is very good overall.

The commitment of management to the sciences is illustrated by the timetabling of the sciences in all of the school’s programmes and by the provision of the facilities which comprise two laboratories, a demonstration room, and storage and preparation areas. The school’s intention to have an additional laboratory in place for the academic year 2010-2011 is very positive.

The time allocation for the Leaving Certificate science subjects is in line with the class contact time recommended in the syllabuses. However, the time allocated to Science is low. This is because the school operates a year-long subject-sampling system for all optional subjects in first year and as a result less class-contact time is available for the optional subjects. The school should explore the possibility of addressing the shortfall in time in the second and third years of junior cycle. The operation of a subject-sampling system is beneficial because it assists students in making informed choices for the Junior Certificate. Timetabling otherwise supports the delivery of the sciences, with practical work being facilitated by means of double-lesson periods and almost all classes receiving an even spread of lessons over the week.
The laboratories provide visually stimulating learning environments. The laboratory which was augmented to a great extent by the display of scientific models and posters in particular provides a very positive learning environment. The display of students’ work is encouraged. The laboratories have good levels of scientific, and information and communication technology (ICT) resources. The provision of such resources supports the teaching and learning of the sciences. Access to the two laboratories is organised by the science teachers. This is good practice.

First-year students are divided into two bands based on ability and students are assigned to class groups within these bands on a mixed-ability basis. The uptake of Junior Certificate Science at higher level is very good as is the higher-level uptake for Leaving Certificate Chemistry.

The process in place for selection of the optional subjects is student-centred. Students have an input into the creation of the subject-option blocks for both the Junior Certificate and the Leaving Certificate. Students choose their optional subjects for Junior Certificate during first year and for Leaving Certificate during Transition Year. Students are supported in making appropriate subject choices. This is good practice.

The school has a health and safety statement which is regularly updated. This is good practice. There is also a good level of safety equipment in the laboratories. However, while some work has been done on the segregation of chemicals, it is recommended that all chemicals be segregated in accordance with the guidelines of the Department of Education and Skills and with best safety practice. These chemicals should be colour-coded for ease of safe storage and a list of the storage classifications should be available for consultation. In addition, a flame-resistant cupboard should be installed for safe storage of flammable chemicals.

Teachers are appropriately deployed and are encouraged by management to attend science-specific in-service programmes. In addition, whole-staff in-service on areas such as Differentiated Teaching and Learning Lesson Plans, and Co-operative Learning has been provided. Such commitment to the further enhancement of teaching skills is very positive.

A high level of provision is made for co-curricular and extracurricular science activities. For example, students participate in the TY Millipore Competition and aspects of the Young Social Innovator Competition. These projects form the basis for entries into the BT Young Scientist and Technology Exhibition. In addition, links to local chemical and pharmaceutical industries have been developed. The school has also worked to obtain the Green Flag environmental award. Those involved are praised for their commitment to facilitating these stimulating educational activities.

**PLANNING AND PREPARATION**

A very high level of formal and informal collaboration exists among the chemistry teachers. Evidence of the high level of co-operation is demonstrated by the development of common lesson plans for fifth year. This is facilitated by a weekly meeting of the chemistry teachers. In one instance, two class groups, that are simultaneously timetabled, undertake their weekly practical-laboratory session as one group and team teaching occurs to support students as they work. This beneficial strategy, which ensures that both groups have weekly access to the laboratory, provides further evidence of the very good level of co-operation that exists within the chemistry department.
Formal subject meetings have taken place prior to this year. It is noteworthy that the minutes of these meetings provide a record of decisions made. While acknowledging that the teaching team were focusing on enhancing their skills in their other teaching subjects, it is equally important that a minimum number of science-planning meetings should also take place in which the focus should be planning for teaching and learning. Well-stocked refurbished laboratories provide evidence of successful planning for resources. The work of the department is led by the subject co-ordinator, the position of which is rotated in accordance with good practice.

The science plan contains a list of chapters to be covered in each year of Junior Certificate. In addition, the science-planning folder contains lists of useful apparatus, certificate examination guidelines, sample graphic organisers for Science, and resources generated by the Junior Certificate Science Support Service. Building on this good practice, it is strongly recommended that the science plan be extended. In addition to the content to be delivered, the plan should specify suggested timeframes for topics, the learning outcomes to be achieved, the particular resources to be used, suggested teaching strategies and assessment modes. It is also recommended that this format be used as a template to further develop subject planning in the sciences.

Students study modules of all three senior cycle sciences in TY. This is good practice. The chemistry plan was furnished during the inspection in which the topics to be taught were identified. There is a good focus on the study of aspects of science that are not elements of the certificate syllabuses. This is positive as it is in line with the philosophy of the TY programme.

Individual planning is excellent in almost all instances. In these cases, the chemistry personnel have prepared extensive folders of resources to support teaching and learning. There was clear evidence of thorough planning and preparation for the lessons observed and the quality of this was very good in almost all instances. Advance preparation of PowerPoint presentations, equipment and handouts contributed to smooth transitions from one phase of the lesson to the next. Planning for lessons should also factor in time for recapitulation and this was observed in almost all lessons.

TEACHING AND LEARNING

In almost all lessons, a very good standard of teaching and learning was observed. In one lesson, the learning outcomes of the topic were shared with the students at the outset. This approach included identifying the intended learning outcomes of the lesson that was underway. It is recommended that this good practice be used in all lessons and that these intended learning outcomes be subsequently used to ascertain students’ learning.

Lessons were well structured and the pace was appropriate in almost all instances. Some lessons comprised a range of activities and this approach to lesson structure enhanced students’ interest and participation. In almost all instances, teacher explanations were clear. A very good focus on examinations and examination strategy was observed in one revision lesson. In this lesson, teacher demonstrations were used very effectively to illustrate the concepts under consideration and to consolidate students’ learning. This active approach to reviewing previously learnt material is very good.

Continuity of learning was evident in the lessons observed. Good linkages were made to students’ previous learning in Chemistry and to their learning in other subjects. For example, in one lesson, discussion on the biological decomposition of hydrogen peroxide was used effectively as an
introduction to decomposition using a chemical catalyst. The relevance of topics to everyday life was highlighted in some instances, thus making the subject matter of the lesson concrete, tangible and ultimately interesting. In one lesson, a video clip was effectively used to show the application of separation and identification techniques for substances in everyday life. The chemistry department is encouraged to extend the use of such useful resources which support the teaching and learning of Chemistry.

As almost all of the lessons observed progressed through oral questioning and discussion, it was appropriate that considerable use was also made of the whiteboards and PowerPoint presentations in the laboratories as visual reinforcements. Questioning was also effectively used as a means of recapitulation and to ascertain students’ learning. In one lesson, a PowerPoint presentation was very effectively used in conjunction with teacher demonstration. In addition, class discussion and student questioning were appropriately interspersed throughout the presentation, thus ensuring students’ ongoing engagement and participation in learning. However, in another instance, a very significant portion of the lesson was based on the delivery of a PowerPoint presentation along with teacher explanation. In this instance, the quality of the presentation could have been improved by reducing the number of slides and adapting the content to meet the needs of the students. In the same lesson, the use of a video clip showing participants as they run a marathon provided a tangible illustration and explanation of the process of separating different substances using chromatography. In another lesson, students were asked to predict the rate of reaction and to justify their prediction when different forms of calcium carbonate were used in a reaction. This is very good as it encourages higher-order thinking among the students.

A good and, in almost all instances, a very good teacher-student rapport was evident in the classroom interactions. Classroom management was effective and students were courteous and respectful of their teachers and their fellow students. Good teacher feedback and affirmation of students’ efforts led to a very positive classroom environment. In the main, students responded well and it was evident that the teachers’ enthusiasm for the subject is shared by almost all of the students. Students perform well in the certificate examinations. Overall, a good standard of learning was evident in the lessons and in the main students displayed a very good knowledge of and engagement with Chemistry.

**ASSESSMENT**

Normal modes of assessment are used in St Aloysius College. Ongoing evaluation of students’ learning takes place by means of questioning in class and topic tests. In addition, all students have twice-yearly formal examinations. Results from the end-of-term examinations and continuous assessment are aggregated to form the final mark which is included in the report home. A good level of contact is maintained between the school and parents.

A range of modes of assessment is used to ascertain students’ progress in TY Chemistry. Students complete an essay entitled *The Importance of Polymers in the Twenty-first Century*, compile practical reports and have a written assessment, all of which contribute towards their overall final marks. This approach to establishing students’ progress is very good practice.

Students’ notebooks in which they record their mandatory experiments are of a very good standard. The practice of monitoring and annotation of the students’ work is very good as it provides for useful feedback to the students. Students following the Leaving Certificate
programme had completed a good number of written questions, including questions from the certificate examinations. These were monitored by both students and teachers and were of a good standard.

Management conducts an annual analysis of the certificate examination results, comparing the outcome of the school’s results in the subjects with national norms. It is recommended that the science department undertake this analysis in the science subjects as this would assist in planning for teaching and learning.

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- A very high level of formal and informal collaboration exists among the chemistry teachers.
- Team teaching is organised to benefit students in their practical work.
- There was a good focus on the study of aspects of science that are not elements of the certificate syllabuses in the TY programme.
- Overall, a very good standard of teaching and learning was observed.
- A range of modes of assessment is used to ascertain students’ progress in TY Chemistry.

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

- It is recommended that all chemicals be segregated in accordance with Departmental guidelines and a flame-resistant cupboard should be installed for safe storage of flammable chemicals.
- It is strongly recommended that the science plan be extended to include suggested timeframes for topics, the learning outcomes to be achieved, the particular resources to be used, and the suggested teaching strategies and assessment modes to be utilised.

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

*Published, February 2011*
Appendix

SCHOOL RESPONSE TO THE REPORT

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

Overall the board of management is very happy with the contents of the inspection report. The board commends the teachers involved. We would like to comment on the following issues.

1. One of the teachers involved was undertaking the Post Graduate Diploma in Education in UCC. This teacher has a Doctorate in Chemistry and has lectured extensively at third level. The teacher devised an innovative transition year module based on her own areas of expertise. Student teachers are learning to teach over the course of a year. They are visited at least five times and their teaching skills are enhanced over the course of the year. Hence, the standard of teaching exhibited by a student teacher could not be considered a fair reflection of the overall standard of teaching in a school.

2. We have found that the subject sampling model used in the first has proved very beneficial to make informed subject option choices for the later years.

3. In previous years many subjects planning meetings would have taken place during teacher’s free time. National Industrial Relations issues made this impossible during the last school year.

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 new science laboratory is now fully operational. Two flame-resistance cupboards have been purchased and are now used for the safe storage of flammable chemicals. A third customised flame-resistant cupboard has been ordered. Work on the segregation of chemicals is on-going. Formal Science Department meetings will be scheduled as often as possible during the year.