

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**Monaghan Collegiate School
Monaghan
Roll number: 64830E**

Date of inspection: 11 February 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 the Monaghan Collegiate School. 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 three days during which the inspector visited classrooms and observed teaching and learning. The inspector interacted with students and teachers and examined students' work. 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. 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

Monaghan Collegiate School has one science laboratory and a demonstration room, both of which are bright and well maintained with an appropriate allocation of equipment for practical work. The laboratory has an adjacent preparation and storage area. The storeroom is tidy and well organised. Chemicals are organised according to the storage scheme suggested by the Chemistry Support Service. Appropriately, there is a separate lockable metal storage unit for flammable chemicals. The laboratory is equipped with broadband internet access as well as one desktop computer and data projector. The school also has a well equipped computer room which is available to teachers via a booking system in the staffroom.

A range of appropriate health and safety apparatus is available in the laboratory. This includes a fire extinguisher, fire blanket, safety goggles, white coats and emergency shut-off points for gas and electricity. A code of conduct for the laboratory is displayed prominently in the room. It is suggested that a copy of this document be added to student notebooks or the student journal as a contract to be read and signed by students and their parents.

The school has a health and safety folder which is in need of updating. It is recommended that the school develops a health and safety statement in line with the Safety, Health and Welfare at Work Act 2005. In addition, an accident reporting log to record breakages should be maintained in the laboratory. It is noteworthy that one member of the science team has completed an online health and safety course through the Second Level Support Service (SLSS). It is suggested that other members of the department might consider undertaking continuing professional development (CPD) of this type.

Science is currently a core subject in the junior cycle and science classes are of mixed ability. In senior cycle, the Transition Year programme (TY) is compulsory and students can then progress

to the established Leaving Certificate or the Leaving Certificate Vocational Programme (LCVP). Currently, students are offered Biology, Chemistry, Physics and Agricultural Science as Leaving Certificate subjects. It is commendable that management strives to retain both Physics and Chemistry on the curriculum despite a pattern of low uptake by students. The allocation of class periods to Junior Certificate Science and senior cycle Biology is appropriate and in line with syllabus guidelines.

As the school only has one laboratory, access for some classes is limited due to the numbers taking science subjects. A further contributory factor to this is that the laboratory is used as a base classroom by a member of the science team. During the evaluation some practical science lessons were conducted in classrooms and teachers were observed to bring the necessary materials and equipment to these rooms. It is recommended that management should formally timetable access to the laboratory to ensure that optimal use is made of the laboratory for the necessary investigative practical work in both the junior cycle and the senior cycle. It is important that all students have equitable access. The science team plans to develop kit boxes for the junior cycle science practicals. This would be good practice.

It is good to note that some members of the science team have attended the in-service courses for the Junior Certificate science syllabus. It is recommended that systems be put in place whereby teachers can share information gathered from in-service courses with those who did not attend. Further information should also be sought from the appropriate support services.

PLANNING AND PREPARATION

Management supports the planning process through the provision of time for meetings of the science team at the start and at the end of the school year. It is recommended that minutes be recorded for the science planning meetings and a copy of the minutes be provided to senior management. In addition, it is praiseworthy that the science teachers engage in regular informal meetings. The position of science co-ordinator forms part of the duties of a post of responsibility in the school.

A subject plan for both Junior Certificate Science and Leaving Certificate Biology was available during the evaluation. The science team has developed long-term plans which are syllabus-based and reflect the school development planning initiative (SDPI) guidelines. The plans observed contained a list of topics to be completed by each year group. These lists, together with the mandatory practicals involved, should be distributed to students in order to give them responsibility for, and a structure around, planning their revision. It is good practice that the curriculum content to be covered is expressed in terms of learning objectives which detail what students should know and be able to do in relation to each area. It is suggested that all members of the science team should use these plans as working documents, tailor them according to classes taught and continue to review and revise them on an annual basis. It is recommended that the programmes of work be extended to link the learning outcomes to appropriate methodologies and modes of assessment. As part of ongoing subject planning, there is scope for the members of the science team to discuss and share good practice on topics such as differentiation, active teaching methodologies and assessment.

It is noteworthy that a number of teacher-generated resources were used in the lessons visited. These were well chosen and enhanced the lesson content. It is recommended that such materials including handouts, worksheets and other documents be referenced in the subject plans and stored

in a central filing cabinet in the laboratory. Science teachers could then have ready access to these resources and as further resources are developed they could also be included.

The school has adopted an interesting approach to the provision of the sciences in TY. The programme contains a module of Chemistry and Biology. A comprehensive folder of resources for use in the TY programme was provided. Good opportunities have also been included to maximise student involvement in the learning activities. Documentation observed was in line with the ethos of the TY programme. However, there is no formal TY Biology plan. It is recommended that a TY plan for the sciences be developed using section two of the document provided by the Transition Year Support Service (TYSS), *Writing the Transition Year Programme*, which relates to writing plans for individual subjects or modules in the programme.

An analysis of the results achieved by students taking science subjects in the certificate examinations is carried out annually by senior management in the school. It is commendable that this contains comparisons with national averages. This analysis should be discussed at science planning meetings and used to develop an action plan for the subjects in the school.

TEACHING AND LEARNING

During the evaluation, lessons were visited in Junior Certificate Science, Transition Year Science and Leaving Certificate Biology. The lessons observed included plant reproduction, elements, compounds and mixtures, genetics and evolution. These topics were taught using methodologies which ranged from lecture style to those which incorporated a range of active teaching methodologies. In some lessons the teacher made good use of everyday materials such as potatoes, lilies and tulips as well as magnets. These helped promote student engagement and succeeded in making the lesson meaningful to students.

In all classrooms visited the materials and apparatus to be used in the lessons had been set out in advance. In most lessons visited, the good planning extended to an outline of the learning objectives at the start. This good practice gives a structured pattern for the lesson, assists in engaging students in their own learning and provides a framework for recapitulation at the end of the lesson. Other lessons, however, lacked this pre-planned structure, the pacing was inappropriate and there was no formal summation and consolidation of learning at the end. It is recommended that all teachers explicitly state the learning objective at the beginning of each lesson and ensure that lessons are delivered in a structured manner.

The most successful lessons made use of a range of appropriately incorporated methodologies and progression from one stage of the lesson to the next was seamless. These lessons included a good mix of active learning practices as well as whole class and differentiated teaching strategies. However, this was not the case in all lessons visited. In one instance, there was an over-reliance on the text book and teacher dictation while students remained passive for most of the lesson. It is recommended that all teachers should ensure that lessons have an appropriate balance between teacher instruction and student activity.

Lessons generally began with a roll call. Homework was usually checked and corrected at the beginning of the lesson. In one instance a number of students were more than ten minutes late for the lesson and they joined the lesson without challenge or explanation. As a result of their late arrival, they missed the correction of homework. As well as eroding lesson time such practices also provides an interruption to the flow of the lesson and is a distraction to other students.

Teachers should expect students to attend lessons on time and follow up in an appropriate way when this does not happen. For example, the school's code of behaviour may need to be applied.

All lessons observed involved mixed ability groups and in many instances the lesson was tailored to cater for a range of learning styles. Some differentiated teaching strategies included emphasis on pronunciation of key words, the spelling of key words and these were then noted on the whiteboard. Some science teachers had also developed differentiated worksheets which are very good practice. Differentiation is an area which should be discussed at science team meetings and incorporated into the planning for all lessons.

In some instances, teachers made effective use of a plenary session at the end of the lesson to draw together key points for the students. In two lessons the incorporation of a short video clip was also observed. In one lesson, this was used to clarify and consolidate learning. This approach should be more widely adopted.

Questioning was used as an effective teaching methodology in a number of lessons observed. It also served as a useful method of checking student learning as well as keeping students alert and focused on the task in hand. There is a need to guard against chorus answering and students should be discouraged from shouting out answers and comments during the lesson. Where questioning was most effective, strong links with prior learning were established at the start of the lessons. A mix of global and directed questions ensured that the lesson content was reinforced and higher-order questioning was used to develop students' skills of analysis and synthesis. This is good practice. In one instance, where the questions lacked a probing and thought provoking element, students were seen to be inattentive and less engaged with the learning. It is recommended that all teachers should use questioning as a strategy to regularly check that learning is taking place. There is scope for good practices around the use of questioning as a methodology to be discussed and shared at the science subject planning meetings as mentioned earlier.

The atmosphere was positive in almost all lessons observed. Best practice occurred where teachers affirmed students and discipline issues were dealt with sensitively. In one instance classroom management was less than effective. When this occurs, a review of the overall seating plan should be undertaken and the composition of student groups should be monitored in order to promote better student engagement with the lesson content.

Where practical activities were observed students displayed good routines for setting up and clearing away apparatus. They displayed appropriate skills and worked with good regard for health and safety measures.

ASSESSMENT

A range of assessment activities is utilised in Monaghan Collegiate School. Formative assessment practices utilised by the science department included questioning, homework, experiments, checking of exercise book work and observation of student activities.

Summative assessment takes the form of end of term assessments, mock examinations, and coursework investigations. End of term examinations take place for first, second and fifth years at Christmas and summer and the science department sets common tests where appropriate. The science department should consider the allocation of an appropriate percentage for coursework or the standard of practical books in these assessments. Assessments for certificate examination

classes take place at Christmas with mock exams in the second term. Results of these examinations are conveyed to parents twice per year in school reports. Formal communication with parents also takes place at the parent teacher meetings and informal contact takes place via the students' homework journal.

During the evaluation a range of mandatory practical notebooks, class work notebooks and homework exercise books was observed. In some senior biology lessons visited, students did not have their practical notebooks with them. Students should routinely bring all necessary notebooks to their lessons. It is evident that some teachers need to communicate stronger expectations to students in this regard.

A number of student notebooks for Junior Certificate science were observed. It would be beneficial to students to have a list of the mandatory practicals planned for their year group at the beginning of each year to encourage them to keep their records up to date. The science team should develop common strategies for the storage of the mandatory practical books. It is also recommended that its members develop common practices around the completion and monitoring of the practical notebooks. When agreed, these practices should be documented in an assessment policy for Science.

Notebooks observed displayed a range of abilities, which generally reflected the mixed ability nature of the classes observed. Some notebooks were maintained to a high standard and were checked and annotated regularly. However this was not the case in all notebooks. There is scope for practices such as the provision of formative feedback and assessment for learning to be incorporated into the department's assessment policy. It is recommended that the science team develops common correcting practices and puts in place some procedure for follow-up on corrections and comments made in all notebooks. This could be documented in the assessment policy for the science department and feed into an overall school assessment policy.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Monaghan Collegiate School has one science laboratory and a demonstration room, both of which are bright and well maintained with an appropriate allocation of equipment for practical work.
- A range of appropriate health and safety apparatus is available in the laboratory.
- An analysis of the results achieved by students taking science subjects in the certificate examinations is carried out annually by senior management in the school.
- The atmosphere was positive in almost all lessons observed.
- Where practical activities were observed students displayed good routines for setting up and clearing away apparatus.

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

- The school should develop a health and safety statement in line with the Safety, Health and Welfare at Work Act 2005.

- It is recommended that management should formally timetable access to the laboratory to ensure that optimal use is made of the laboratory for the necessary investigative practical work in both the junior cycle and the senior cycle.
- It is recommended that the programmes of work be extended to link the learning outcomes to appropriate methodologies and modes of assessment.
- It is recommended that a TY plan for the sciences be developed using the document *Part 2 of Writing the Transition Year Programme*
- It is recommended that all teachers should ensure that lessons have an appropriate balance between teacher instruction and student activity.
- It is recommended that all teachers use questioning as a strategy to regularly check that learning is taking place.
- The science team should develop common correcting practices for students' written work and put in place procedures for follow-up on corrections and comments made in students' notebooks.

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.

Appendix

SCHOOL RESPONSE TO THE REPORT

Submitted by the Board of Management

Area 1: Observations on the content of the inspection report

We accept fully the findings of the report, and confirm our deep disappointment that there are a number of areas of deficiency within the Science Department. We will make every effort to rectify the situation as soon as possible.

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

All the members of the Science Department have been fully briefed by the Principal on the content of the inspection report, and also challenged on the deficiencies noted. A Health and Safety policy has been put in place and all the other recommendations are being addressed through in-service training in school. A new Transition Year Coordinator has recently been appointed from the Science Department with a brief to look at the provision for Transition Year. The Principal appreciates the feedback and support of the inspectorate and looks forward to progressing the Science Department and the School over the next few years.