

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Science and Biology
REPORT**

**Meán Scoil an Chlochair
Kilbeggan, Co. Westmeath
Roll number: 63221U**

Date of inspection: 19 October 2010



**A N R O I N N | D E P A R T M E N T O F
O I D E A C H A I S | E D U C A T I O N
A G U S S C I L E A N N A | A N D S K I L L S**

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 Meán Scoil an Chlochair, Kilbeggan. 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

Meán Scoil an Chlochair is a co-educational post-primary school with a current enrolment of 404 students. The school provides the Junior Certificate programme for junior cycle students. Senior cycle students are offered a choice of following the Leaving Certificate (established) programme or the Leaving Certificate Vocational Programme (LCVP).

Whole-school support for the sciences is strong, as evidenced by the fact that Science is a core subject for all junior cycle classes and that all of the science subjects, Agricultural Science, Biology, Chemistry and Physics, are available to students at senior cycle. The school's Transition Year (TY) cohort also follows a programme in the sciences. The work of the school in maintaining such a wide range of science subjects on the curriculum is commendable.

Transition Year and third-year students are well supported by the Guidance counsellor and by subject teachers in choosing their subjects for fifth year. Parents are also involved in this process. Students are initially provided with an open choice of subjects. Subject lines, reflecting the initial choices and designed to maximise the number of students receiving their favoured subjects, are then offered to students from which they make their final choice. The number of students choosing Biology is very encouraging.

Time allocation to Science and Biology is in line with syllabus recommendations. All junior cycle science classes, which are mixed ability, are allocated four periods per week, including a double period. Biology classes are also mixed ability and are allocated one single and two double periods each week. Timetabling a small number of double classes across morning breaks should be avoided. Otherwise, class periods are well distributed throughout the school day and week.

There are currently nine teachers of science subjects in the school and all are deployed in line with their qualifications. Seven teachers are currently teaching Junior Certificate Science and Leaving Certificate Biology. It was evident during the inspection that the science teachers are keen to promote positive attitudes towards the sciences and to encourage students to achieve to

the best of their abilities. Teachers are allocated to classes on a rotational basis and continue with their assigned class groups throughout junior or senior cycle, a good practice which facilitates long-term planning.

School management has demonstrated strong and active support for teachers' continuing professional development (CPD). All nine teachers are members of the Irish Science Teachers Association (ISTA) and the board of management generously funds teachers' annual subscriptions. Four teachers have also completed an online course in laboratory health and safety. In addition, teachers have, as relevant to their subjects, attended various in-service courses in Science, Biology and in areas such as differentiation, co-operative learning, mixed-ability teaching, special needs, effective homework and assessment and promoting positive behaviour in the classroom.

Current laboratory facilities comprise a laboratory which has been recently refurbished and an older laboratory which is in need of refurbishment and which can only be used to a limited extent for practical work. In addition, the school's home economics kitchen is also used, to a limited extent, to accommodate biology practical work. These facilities are very well organised and best use is being made of them in order that all students have laboratory access at least weekly. The collaboration and planning among teachers to maximise access for all class groups is commended. There is a store room adjacent to the two laboratories. This room is neat and well ordered. However, it is recommended that the storage of chemicals be managed in accordance with the scheme detailed on the website of the physical sciences initiative at http://chemistry.slss.ie/ch_safetydocs.html. A display of relevant charts and posters helps to create an attractive and appropriate learning environment in the laboratories. It is recommended that student-produced material and project work be included in order to motivate and encourage students further.

The school's information and communication technology (ICT) infrastructure has undergone significant development in recent times and laptop computers and data projectors were used effectively in all laboratories and classrooms visited.

The provision for the sciences in Meán Scoil an Chlochair is complemented by a range of extracurricular and co-curricular activities including involvement in Science Week activities, entry to science competitions such as SciFest and the Young Scientist Exhibition, ecology field trips and visits to relevant out-of-school events and exhibitions. Speakers are also invited to address students on science-related topics. These activities are available to students in all year groups, as relevant to their studies. The formation of a science club is currently under way. It is intended that this club will meet weekly and develop students' interest in, and aptitude for, the sciences. This positive and supportive development is highly commended.

The school has a health and safety statement which was drawn up with appropriate consultation and is reviewed annually, in keeping with best practice. Safety equipment available in the laboratories includes first aid kits, gas isolation switches, fire extinguishers, fire blankets, eye protection and white laboratory coats. It is recommended that, in order to enhance health and safety provision, simplified safety notices be displayed in a prominent manner in the laboratories.

PLANNING AND PREPARATION

Separate biology and science departments are in place in Meán Scoil an Chlochair. Both departments are well co-ordinated and the co-ordination role is rotated amongst department members every two years, affording co-ordinators an opportunity to develop their leadership

skills. There is evidence of a high level of collegiality amongst the teachers in each department. Formal planning meetings are held each term and frequent informal meetings are held to manage ongoing issues. Co-ordinators' duties include convening department meetings, maintaining records of meetings, ensuring appropriate follow up takes place and ensuring, in conjunction with the school principal, that all necessary resources are in place.

The biology department has developed a detailed and up-to-date subject department plan, following the template of the School Development Planning Initiative (SDPI). Common syllabus-referenced and appropriate schemes of work for each year and level have been developed as part of the plan and are in use by all biology teachers. Folders of material relating to laboratory management, CPD, practical activities, assessment and revision have also been developed and, in addition, extensive folders of notes and resources in relation to all sections of the biology course have been compiled. Most of the resource material is available in a common folder on the school's server and it is the intention of the biology department is in the process of making the remainder of the material similarly available.

The science department has also compiled a detailed folder of relevant planning documents for the Junior Certificate science course, once again following the SDPI template. A schedule for the delivery of course content, appropriately referenced to the science syllabus, for each term of the three-year cycle in Science has recently been developed and implemented. The process of copying the large bank of resources, compiled by the members of the science department, onto a shared folder has also commenced recently.

The TY science programme content comprised an appropriate selection of modules in Biology, Chemistry and Physics. These modules are designed to engage the students with unusual and interesting topics, for example the chemistry of fireworks, forensic science and oncology, to present them in an interesting manner and to develop students' understanding and appreciation of the subjects. In order to enhance provision for TY, it is recommended that material relevant to Agricultural Science be included on the course and that a schedule for the delivery of all course content be prepared. More detail should also be included on teaching strategies, in the context of promoting alternative approaches to teaching and learning, and on assessment criteria and methods in order to clearly define desired learning outcomes and to describe the manner in which they are to be assessed. Detailed information is available from the Second Level Support Service (SLSS) website at <http://ty.slss.ie/aboutus.html>.

The biology department carries out a review and analysis of the outcomes for students in state examinations as part of the subject development process. Results in Biology have been very encouraging in recent years. The science department has just commenced a similar process of analysis and is encouraged to use the information gained to identify specific improvements in the teaching and learning process that, when implemented, will facilitate enhanced results in the Junior Certificate science examination.

Individual teachers' lessons were well planned and lesson plans were presented to the inspector for most of the lessons observed. The teachers were well prepared for class and due cognisance was given to the needs and abilities of students in preparing and delivering lessons. Necessary electronic and other resources, including the apparatus required for demonstration and student-centred investigative work, were prepared in advance.

TEACHING AND LEARNING

Good quality teaching was observed in most of the lessons observed, with some very good practice in evidence in a number of instances. Teachers demonstrated a patient and caring student-centred approach and worked hard to create positive, supportive learning environments and to provide quality learning opportunities for students. Established routines were evident in all lessons and teachers had high expectations of students. Classroom management was almost always good and students behaved well at all times. Students were challenged by lesson content and they responded with enthusiasm. The quality of rapport between teachers and students was very good. The topics taught were in line with planning documents and included food testing, flame testing, ecology, photosynthesis, cell structure, genetics, nutrition and heat.

Almost all lessons were well structured. Best practice was observed in those lessons where lesson objectives, in the form of learning outcomes, were outlined on the board to students at the start of the lesson and were revisited at the close of the lesson, in order to review progress, consolidate learning and provide a basis for the assignment of homework. It is recommended that teachers consistently apply this practice of sharing and reviewing lesson objectives. The balance between teacher-led and student-centred phases in lessons was mostly good. However, in a few instances, a tendency towards prolonged periods of teacher input should be avoided. In these situations, it is recommended that lesson structure should be altered and teaching methodologies should be varied in order to maintain student engagement and active student participation should be planned for at shorter intervals during the lesson.

Teachers used questioning well in most lessons to establish levels of prior knowledge and to assess the quality of learning as lessons progressed. Throughout the course of two lessons, in particular, student input was actively sought through very effective use of questioning. Questions were used, in these lessons, to build on students' existing knowledge in the exposition of new material, to direct the development of the lessons and to speculate regarding the possible outcomes of problems posed. Questions ranged from simple, lower-order, recall-type questions to more difficult higher-order questions which encouraged students to think at a deeper level. In almost all instances, students responded knowledgeably and with confidence.

Effective use was made of laptop computers and data projectors in lessons to illustrate concepts and emphasise points of information. ICT was particularly well used in combination with other methodologies when, for example, a video on fireworks was accompanied by a work sheet to be filled in using information gleaned from watching the video.

Students of Science and Biology who have special educational needs are well catered for and the biology co-ordinator is also the school's learning-support co-ordinator. Teachers have a high awareness of those students with additional needs and teaching methods are appropriately adapted to support all students, including those with exceptional ability. The level of individual attention given to students facilitated a differentiated approach to teaching. This was achieved by the manner in which teachers moved around the classrooms assessing students' work, questioning them, assisting and supporting them, and encouraging them to perform to the best of their abilities. The effective use of work sheets also contributed to ensuring that all students were challenged and given opportunities to achieve success, at an individual level.

Student practical work was observed in a number of lessons. It is recommended that a short whole-class briefing session be held in advance of all practical work to explore the work ahead and pose those questions that will support an investigative approach while ensuring that students know what is expected of them when carrying out the activity. It is recommended that a similar

session is held following each activity in order to provide students with an opportunity to review their work and to discuss and rationalise their findings. It may be necessary, in some instances, to follow up with another lesson to emphasise and consolidate the learning that has occurred. Students demonstrated a good level of skill when carrying out their various tasks and they displayed a mature approach to their work. The good practice of students wearing eye protection while carrying out practical work was noted in one lesson. This practice, and the wearing of the available white laboratory coats, should be extended to all practical lessons.

Textbook use was minimal and consistent with good practice, with reference to appropriate passages in textbooks being used on occasion to reinforce learning. Previously assigned homework was checked at the beginning of almost all lessons and was corrected in most cases. Students were assigned homework at the conclusion of all lessons and were encouraged to note work given in their journals. This homework was appropriate to the lesson content and was designed to assist each student in learning and understanding the topic in question.

ASSESSMENT

A good system of formal assessment and reporting is in use in Meán Scoil an Chlochair. First-year, second-year and fifth-year students are formally assessed at Christmas and prior to the summer break and a progress report is sent to their parents on each occasion. Certificate examination classes are assessed at Christmas and by 'mock' examinations in the spring of their examination year and, once again, a progress report is sent to students' homes on each occasion. Additional testing is carried out at the discretion of individual teachers. TY students are assessed on the basis of their project work and their general effort and demeanour. All TY students receive a formal report at the end of the school year.

Common examinations are held at the end of each year for first, second and fifth years. It is recommended that course-delivery schedules are adapted to enable common assessments to be held for all classes at Christmas also. Additional objective information on students' progress will consequently be available to teachers, facilitating the earlier provision of tailored supports where necessary.

Good practice by teachers in relation to monitoring and recording student attendance and attainment was evident. Sufficient information is recorded to enable teachers to provide accurate and comprehensive reports at parent-teacher meetings, which are held annually for each year group.

The quality of learning, in almost all lessons, was good, as evident from level and quality of students' interactions with their teachers, the questions they asked and the quality of their answers when questioned, their overall level of engagement with the learning process. Students successfully carried out the different tasks assigned to them during the lessons observed and they displayed a good level of knowledge and understanding during interaction with the inspector.

Teachers used questioning, examination of homework and general observation of students, to assess students' progress during lessons. Students were frequently affirmed for their efforts. It is equally important that students' written work is affirmed and that their copybooks and laboratory notebooks are regularly monitored and feedback provided in order to encourage improvement. The quality of students' laboratory notebooks was very good in some cases. However, overall, the quality was uneven and the level of monitoring and provision of feedback was not consistent. It is recommended that teachers agree common standards for students' written work and implement a

common approach to monitoring and correcting this work and to providing quality feedback to students.

All students of Biology are encouraged to make use of self-assessment sheets, which are closely linked to learning objectives, on completion of every topic, thus enabling them to monitor their own progress and facilitating a degree of self-directed learning. In addition, the biology department implements a focussed and detailed programme of revision for sixth-year students. This work has contributed to the quality of results achieved by students in the certificate examinations. It is recommended that the science department similarly support students to achieve at the highest possible level.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- There is good whole-school support for the study of Science and Biology in Meán Scoil an Chlochair. The school supports a wide range of science subjects on the senior cycle curriculum.
- School management has demonstrated strong and active support for teachers' continuing professional development.
- The science and biology departments are well organised and ably co-ordinated. Planning for the provision of Science and Biology is evident and regular formal and informal meetings facilitate continuing development.
- Good quality teaching and learning were noted in all lessons observed. Lessons were mostly well structured, classroom management was good and there was a good rapport between students and teachers.
- Students were challenged by their teachers and they responded well. They engaged well in the learning process.
- A good system of formal and informal assessing and monitoring of students' progress and achievement is in place, especially in Biology. Parents are kept informed of students' progress on a regular basis.

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 material relevant to Agricultural Science be included in the TY course and that a schedule for the delivery of all course content be prepared. More detail should also be included on teaching strategies and on assessment criteria and methods.
- It is recommended that the science department use the information gained from reviewing and analysing examination outcomes to identify specific improvements that, when implemented, will facilitate enhanced results in the Junior Certificate science examination.
- It is recommended that lesson structure should be altered, in a few instances, to avoid prolonged periods of teacher input and to maintain student engagement and active participation.
- It is recommended that a short whole-class briefing session be held in advance of all practical work and that a similar session is held following each activity.

- It is recommended that teachers agree common standards for students' written work and implement a common approach to monitoring and correcting this work and to providing quality feedback to students.

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.