

**An Roinn Oideachais agus Eolaíochta
Department of Education and Science**

Subject Inspection of Science, Biology and Agricultural Science

REPORT

**Comprehensive School, Tarbert
County Kerry
Roll number: 81006S**

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**REPORT ON THE QUALITY OF LEARNING AND TEACHING IN SCIENCE,
BIOLOGY AND AGRICULTURAL SCIENCE**

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in the Comprehensive School, Tarbert. It presents the findings of an evaluation of the quality of teaching and learning in Science, Biology and Agricultural Science 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 all written preparation presented. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal, deputy principal and the teachers of these subjects. The board of management of the school was given an opportunity to comment on the findings and recommendations of the report; the board chose to accept the report without response.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

All junior students in first and third year are studying Science. The majority of second-year students also study this subject. There is an allocation of one double lesson and two single lessons for all students studying Science. This is consistent with the recommendations stated in the revised curriculum guidelines for Science. Classes are arranged on a mixed-ability basis with students generally retaining the same teacher for the duration of their junior science programme. Six teachers are involved currently in the delivery of junior Science in the school.

At senior cycle, students have a choice of entering the Leaving Certificate Applied programme (LCA) or the established Leaving Certificate, incorporating the Leaving Certificate Vocational Programme (LCVP) if they wish. The vocational specialism Agriculture/Horticulture is currently being studied by some of the LCA students and is allocated two double lessons in both years one and two of Leaving

Certificate. At present, one teacher is involved in the delivery of this programme. The established Leaving Certificate route offers students a choice of four senior science subjects, Biology, Chemistry, Physics and Agricultural Science. About half of the senior student cohort is currently studying Biology with over a quarter of the senior students choosing Agricultural Science. A smaller number of students are studying Chemistry and Physics currently in the school. An open choice is provided to students in relation to subject choice. Following this, a "best fit" model is applied and option blocks created. There is a time allocation of two double lessons and one single lesson for all senior science classes, which is within curriculum guidelines. Two staff members are involved in the delivery of the senior biology programme in the school, with one staff member involved with each of the other three science subjects.

The school has three laboratories. Two of the laboratories are beside each other and share the same preparation/storage area. These laboratories are designated for Chemistry and Physics. The remaining laboratory is at the other side of the school and is designated the biology laboratory. This laboratory has its own preparation/storage area. All laboratories are also designated for junior Science. The science team also uses one of the classrooms opposite the biology laboratory when access to the laboratory cannot be facilitated. Organisation within the laboratories is well advanced. This should be progressed by the team, with junior Science used as a basis for this work. Once completed, the science team can complete the organisation by incorporating the senior science subjects into the existing framework created. In addition, as part of this organisation it is recommended that the team will also have to consider how materials and equipment can be shared between the laboratories and develop strategies to facilitate this as part of their planning in the future.

Flameproof cabinets for the storage of chemicals in the main chemical storage area have been acquired. They should be set up in the chemical store and utilised as a matter of urgency. The disposal of old chemicals should be a priority of management in order to facilitate new materials and these new cabinets. In addition, the ventilation within this chemical store should be improved. The school has a health and safety statement, which is reviewed annually and involves the science staff in the process. Fire extinguishers, safety blankets, safety glasses and laboratory coats were observed in the laboratories. Safety signage was also on display in the laboratories. The guidelines on safety, *Safety in School Science* and *Safety in the School Laboratory*, published by the Department of Education and Science, were on display. Additional copies can be downloaded from the internet at <http://www.psi-net.org/chemistry>.

The laboratories are well maintained, though some will require some modernisation. Posters were present on the walls. Some of these were of student origin, which was good to note. The science team members organise among themselves a rota for laboratory access at the start of each academic year. This has been operating satisfactorily, though there needs to be more equitable distribution of laboratory access achieved across all the sciences. However, there is good collaboration between the science team for laboratory access when required, which is to be commended. In the main, the laboratories are used exclusively for science subjects, which is good practice. A specific budget for the sciences is not awarded, though management stated that finance is available as the need arises. As part of the current organisation process, an audit of equipment should be effected, with obsolete or broken items disposed of and replacements sought.

The science team has access to a data-projector and laptop computer. These were used to a very high level during the inspection. The science team should strive, as part of their planning process, to acquire another data-projector and laptop computer, which would alleviate the need to transport the existing set across the school. All three laboratories have internet access. In addition, overhead projectors, television, video and DVD players are available for use in the laboratories. As part of the science team's planning, consideration should be given to acquiring some of these as permanent resources for the sciences.

Ecological fieldtrips, genetic workshops, attendance at quizzes and other science events are some of the experiences students have been afforded through their study of these subjects. The continuation of such activities is to be encouraged by the science team. In addition, in-service training in both junior Science and Leaving Certificate Biology has been availed of by the team. Continued opportunities for continuing professional development (CPD) should be sought by the team. In addition, school management stated that the school's board of management will also consider subsidising relevant study by teachers, which will benefit the teachers and the school.

PLANNING AND PREPARATION

The process of school development planning is well advanced in the school. There is a voluntary co-ordinator in place for the sciences whose role is to organise meetings, manage resources, disseminate information in relation to competitions and other events and facilitate the completion of the planning folder. The rotation of this role should be considered by the team, which will allow all members have an opportunity to experience this role. Management tries to facilitate one formal planning meeting per term for the science team. However, on occasion this does not occur due to timetabling difficulties. Through discussion between management and the science team, every effort should be made to preserve these planning meetings. Minutes are recorded for some of these meetings. The practice of setting agendas and recording of minutes should be a component of all meetings of the team. In addition, many informal meetings occur between members of the science team on an on-going basis and facilitate continued development of the sciences. Specific subject areas within the sciences have also held planning meetings, which has allowed for the development of planning within the subject areas and is to be commended.

Comprehensive common planning was in place for the subjects inspected, which is good practice. The development and review of the planning documents completed needs to be an ongoing component of the science team's planning for the future. Areas such as resources in the laboratories, support and planning for mixed-ability classes and students with special educational needs, in-career development and the continued integration and development of ICT into subject delivery could be discussed by the team. Useful to this work would be the relevant syllabuses and teacher guideline documents which can be located on the following websites: www.bsstralee.ie and www.juniorscience.ie. In addition, the school development planning website, www.sdpi.ie and the second level support service website, www.slss.ie, could also be of assistance with further links to other relevant information sites.

Preparation for the classes observed was at a very high level. Included in the range of materials used were handouts for class assignments and homework, PowerPoint presentations and acetates to aid student learning and visualisation of a topic, equipment for student-centred investigative work, specimens for students to look at and discuss and organised board work which aided students in their note taking. All were utilised to good effect within the lessons observed. The team should devise strategies for the sharing of these resources which have been prepared individually and found to be effective in the teaching of certain topics. This would be very good practice.

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TEACHING AND LEARNING

The topics being studied in the lessons observed were the defence system, distillation, heat, ecology, beef and beef breeds, and revision of density and mass. In all classes, students sat at pre assigned seats, which is good practice. An attendance roll was taken and the classes began promptly. Students had copies, textbooks, laboratory copies and, where relevant, examination papers. There was a good rapport in evidence between the students and the teachers, which aided the teaching and learning process. Good discipline was a feature of all observed lessons with effective classroom management also evident.

Oral questioning was observed in all lessons. In addition the integration of effective questioning throughout the lesson was a feature of most lessons observed, which is good practice. In the main, questions were directed to named students with affirmation given, which is good practice. Recall type questioning of previous work completed was dominant, though there were good examples of probing and higher order questioning of the students, which is to be encouraged. Questioning was also used successfully to aid weaker students in their learning process, which was good to observe. Students should close all books and notes prior to questioning to ensure that their learning is being assessed through the process.

The correction of previous homework formed part of some lessons. This was done orally in class with students invited to contribute their answers. The teacher also checked the completed work and signed and dated it. On completion of the majority of the observed lessons, homework was assigned. This involved the students learning new material and/or answering questions from their textbooks or handouts. In one instance, students had to cut out and assemble a diagram of the apparatus used in class, which helped them in the visualisation of the work completed. Overall, the homework assigned was designed to assist the students in learning and retaining the topic, which is good practice.

Student engagement and learning was enhanced through the use of ICT, practical activities, demonstrations, use of video, use of worksheets and handouts. In addition, well-constructed board work served to help students visualise the material being studied and also provided a source of notes for the students to record and aid their learning. The use of more colours in some instances could be considered. Some form of print material was used in conjunction with the practical activities observed, either mandatory, non-mandatory or demonstration. These resources helped to focus student learning and were also used successfully in a number of instances to differentiate work in a very mixed-ability class. Where the retention of this print material is important for student learning, common strategies need to be explored by the team. The use of textbooks was observed. In the main their use was to supplement and reinforce the learning and teaching which had already been completed during the lesson, which is to be commended.

The pace of the lessons observed was appropriate to the type of class and the material being delivered by the teachers. All lessons had some form of theory delivery. Links with previous learning in the subject or with other subjects were established before proceeding to the new material, which was good to observe. Teachers used many different methodologies, including oral delivery, to explore and develop the topic under investigation. This improved student engagement with the material being delivered and resulted in a greater degree of understanding.

The student practical activities observed were well organised. Students were assigned to groups of a maximum of three students. The materials and equipment were available and organised. Prior to any activity, the safety aspects were discussed. In some instances, the team should explore the acquisition of some new and additional pieces of equipment. Students completed their assigned tasks with help and guidance provided by the teacher when required. During all the activities, the teacher circulated the room, monitoring progress and keeping the different groups on task. Students asked questions and in some lessons the teacher also used the opportunity to ask the students questions on the work they were completing. This is a good method of ascertaining student learning and is to be encouraged. In the main, students were afforded sufficient time to complete the relevant tasks. In some instances, time was used at the end of the lesson to consolidate the learning through a question-and-answer session. This helped students develop and order their experiences, which helped them with their write-ups and is good practice. Monitoring of student practical notebooks was noted and is encouraged. This component of student work could be incorporated into the scheme for assessment. Currently, several different approaches to the recording of student practical work have been observed. A decision on a common approach should be discussed among the team members as part of their planning. In addition, observation of student practical copybooks indicated the completion of a significant amount of practical activities, which is to be commended.

The displays in the laboratories contributed to the learning environment for the students. It would be important that what is on display within the laboratories reflects the topics being studied at any given time. In addition, the use of notice boards near some of the facilities to display science-related material is noted and is to be encouraged.

ASSESSMENT

Formal school examinations occur at Christmas for all students. Formal summer examinations are also held for non state-examination students. Pre-examinations are held each spring for the state-examination classes. Currently, an external examiner corrects the pre-examination scripts. Following these formal examinations, reports are sent to parents. In addition to reports, parent-teacher meetings are held for all classes annually. The student journal is also used as a means of communication between school and home.

Additional informal assessment of students' learning is conducted daily. This is achieved through homework and oral questioning at the start and during the lessons. This was observed in the lessons viewed. Continuous assessment also occurs, with class tests administered by the teacher on completion of a unit of work or a topic. The teacher retains records of all tests completed. In addition, common tests are given to junior science students with common marking schemes used, which reflects the team's common approach to planning. In addition, the science team should consider awarding all students marks for their practical notebooks as part of their overall grade in the subject. This could have the effect of providing the students with further motivation for engagement with the practical elements of the course. Further details of Assessment for Learning (AfL) methodologies to enhance the impact of formative assessment on students' learning are available on the National Council for Curriculum and Assessment (NCCA) website, www.ncca.ie.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- A good standard of teaching and learning was observed.
- The teachers take a professional approach to teaching, which is evident from the level of individual preparation and planning for the lessons observed, and the commitment displayed to the students.
- A significant amount of student practical work, both mandatory and non-mandatory, was recorded in the students' laboratory notebooks. Monitoring and annotation of this work is to be encouraged.
- A disciplined atmosphere was observed in the classrooms with students motivated and eager to engage in the learning processes.
- There was a good teacher-student rapport in evidence in the lessons observed.
- Some formal meeting times have been afforded to the sciences for planning. Regular utilisation of this time is important to further the planning process of the team.
- Teachers have attended in-service provided on the revised syllabuses of Science and Biology. Attendance at in-service is encouraged by management.
- Various field trips and science events have been attended by students studying the sciences in the school.

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

- The issues in relation to the chemical store, the ventilation, the disposal of unwanted chemicals and the setting up of the metal chemical storage presses needs to be a priority.
- The further development of the planning within each of the science disciplines and among the whole science team should continue. The area of practical work, the use and monitoring of practical laboratory notebooks, equipment, assessment, approaches to mixed-ability groups and use of different methodologies could be considered by the whole team going forward.
- The team should continue to ensure that all classes get equitable time in the laboratory through discussion and rotation of laboratories when and where appropriate.
- The continued development and expansion of ICT into the subjects is to be encouraged. The team, through its subject planning discussions with management, should pursue the acquisition of additional equipment.
- The current organisation of materials and equipment by topic should continue, with a strategy devised for recording new or replacement material and equipment needs within all the facilities.

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