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

# Subject Inspection of Science and Chemistry
# REPORT

## Coláiste Cholmáin
## Claremorris, County Mayo
## Roll number: 64610N

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### 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 Coláiste Cholmáin, conducted as part of a whole school evaluation. It presents the findings of an evaluation of the quality of teaching and learning in Science and Chemistry and makes recommendations for the further development of the teaching of these subjects in the school. The evaluation was conducted over one day 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 subject teachers.

### SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

The science subjects in Coláiste Cholmáin are Junior Certificate Science, Leaving Certificate (LC) Agricultural Science, LC Biology, LC Chemistry, LC Physics, Transition Year Science, Leaving Certificate Applied (LCA) Science and LCA Agriculture and Horticulture. This means that the school, relative to its enrolment, offers a very wide range of science subjects.

All class groups in Science and Chemistry are of mixed ability. Students retain the same science teacher during junior cycle. At senior cycle, students retain the same teacher throughout their study of Chemistry. These practices are beneficial as they support continuity of learning.

There is good support for the study of Science as all students study it at junior cycle. It is reported that a large number of students choose at least one science subject for senior cycle. The level of uptake of

Chemistry varies from year to year. However, the school provides classes even in years when a small number of students choose to study Chemistry. This shows good support for students who wish to study Chemistry.

Students select their senior cycle subjects based on an open choice. This is good practice. They are supported in making their choices by guidance counselling, advice and support from subject teachers, and information disseminated at an open night for parents. Discussion with the science teachers revealed an enthusiasm for students to study science subjects at senior cycle. The idea of further supporting and informing students by providing a brief information sheet on the content of senior cycle science subjects was met with enthusiasm.

Science is allocated one double class period and two single class periods weekly. Chemistry is allocated one single class period and two double class periods weekly. These allocations are appropriate and are in keeping with the recommendations of the respective syllabuses and circular letters.

There are two science laboratories and there is one preparation room in the school. These facilities were viewed. The laboratories are of older construction but are in generally good repair and are well maintained. Some water damage to the ceiling in one laboratory was noted. The school management is aware of this issue. It was reported that this issue does not impact on students' work in the laboratory.

The science teachers have done good work in organising the preparation room. It was noted that chemicals have been stored and labelled according to best safety practice and Department of Education and Science recommendations. The science teachers have developed a draft safety statement. The finalisation of this statement is encouraged. Appropriate safety equipment is available in the laboratories. There is an emphasis on safety in the laboratory and students are required to read and sign the laboratory rules. The science teachers' work in creating a safe teaching and learning environment is commended.

A large amount of information and communications technology (ICT) resources is available to the science teachers. All of the laboratories and classrooms that were visited during this inspection were equipped with a computer, data projector and broadband internet access. Teachers may bring their classes to one of the school's computer rooms for whole-class teaching. The science teachers have a shared drive on the school's computer network and this is used to exchange and share information and resources. Interview with the science teachers revealed that they regularly use this facility. Students may access selected information on the shared drive and this facility is commended as it provides students with a rich resource to support their learning in Science and Chemistry.

Equipment and materials are ordered on a needs basis and the science teachers report satisfaction with the level of resources available. The management of resources is facilitated through an ordering system. In developing this system, the science teachers are encouraged to explore the use of an annual stocktake.

Interview with the science teachers revealed their ongoing commitment to meeting the needs of all students and especially to supporting students with special educational needs. The science teachers are, appropriately, made aware of students with special educational needs. Two members of the science department are qualified in the area of special needs education. This means that there is a high level of expertise in special needs education available to the science teachers. Good work has been done by the science teachers in creating resources for students with special educational needs. One example of this good work is where summaries of chapters of the textbook have been recorded on tape and students with reading difficulties have used these tapes to assist them in their studies. The science teachers are supported in their work by ongoing informal liaison with the school's learning-support teachers. The learning-support teachers and science teachers exchange information in relation to strategies and methodologies appropriate to the needs of students with special educational needs. This practice is commended and the school is encouraged to formalise its mechanisms and arrangements for the exchange of such information.

There is good support for the science teachers' continuing professional development. They have been facilitated in attending all relevant senior cycle and junior cycle in-service education courses. Where

new teachers join the science department there is enthusiasm and support from school management for these teachers to undertake relevant in-service education courses.

**PLANNING AND PREPARATION**

The science teachers undertake their planning work in a collegial and collaborative manner. The atmosphere among the science teachers is characterised by professional respect, courtesy, and ongoing mutual support. They display very good teamwork and this is shown by the good work accomplished in creating a common plan for the teaching of Science. One teacher acts as co-ordinator for science subjects. This role is rotated among all the science teachers on an annual basis. Rotation of the role is valuable as it supports the collaborative manner in which the science teachers work and fosters collective responsibility for work in the sciences.

The science teachers meet regularly, formally and informally, to plan for the teaching and learning of science subjects. Minutes of these meetings are kept. This is good practice as it supports continuity of planning and serves to assure progression of issues.

A copy of the science plan and a copy of the chemistry plan were viewed. Good work has been done in developing these documents. The plans deal with the key aspects that affect the teaching and learning of Science and Chemistry in the school. They are comprehensive documents. In terms of content and timing, the subject matter under study in the lessons observed accorded with that described in the science and chemistry plans.

All lessons evaluated were appropriate to the relevant syllabuses. All lessons had been well planned and all requisite materials were to hand. The science teachers are commended for their high-quality work in planning and preparing for the teaching and learning of Science and Chemistry.

**TEACHING AND LEARNING**

A wide range of teaching methodologies was used effectively in the lessons observed. The methodologies observed included questioning, use of worksheets, use of notes, group work, student performance of practical work, use of ICT, use of whiteboard, discussion with students, and exposition and explanation by teachers.

The questioning styles used included directed and global questioning. Directed questioning was the main questioning style used. This is wholly appropriate as it enables teachers to assess students' understanding of the material taught and facilitates the involvement of all students in lessons. In this regard, a very strong feature of the lessons observed was the manner in which teachers strove to ensure the highest levels of participation and involvement of students.

Worksheets and notes were used to support students' learning and to highlight the key learning points for lessons. Group work was used to reinforce the material taught. It enabled students to learn from their peers and it provided a valuable opportunity for students to develop team-working skills. When students work in groups to answer questions, a useful way of further encouraging team work and of aiding learning is to assign each group the task of evaluating the work of another group. Where discussion with students was observed, best practice was noted where students' contributions were managed to ensure relevance to the lesson topic. Teacher-led exposition and explanation were clear and well paced. Students asked questions when they required clarification and teachers dealt with these questions in an affirmative manner. There was a beneficial emphasis on highlighting and explaining the key scientific terms used.

The whiteboard was used to highlight the main learning points for lessons. It was also used to demonstrate how to work through each step of a scientific calculation. This is good practice as it enables students to gain a clear understanding of how each component of the calculation is managed and it enables them to seek clarification for any part of the calculation with which they have difficulty.

In all lessons observed, ICT presentations were used effectively. The ICT presentations were used to clearly outline the detail and background of practical work and to demonstrate scientific phenomena. The use of these presentations enhanced lessons as they enabled the demonstration of phenomena that would not be possible using only a whiteboard. Where the use of presentations was linked to the

exposition of material, the lesson was enhanced because of the colour and clarity of the presentation. The fact that students may access selected files on the school's computer network means that they may potentially review presentations used during lessons. This facility supports students as they may use the presentations to aid revision and to supplement the notes made during lessons.

Where practical work was observed, it was well organised and performed safely. Students were engaged in the assigned work and worked well in their groups. During practical work, students were encouraged to hypothesise and to predict the outcome of experiments. This is constructive in aiding students to develop higher-order thinking skills. Students considered the possible sources of experimental error after they had completed their work. This enabled them to gain a greater understanding of the work completed and to develop their understanding of the readings taken. It was noted that students were involved in tidying up after their work. This practice is commended as it encourages students to accept responsibility for their work. Students write up their experimental work in their own words. This is advantageous as it helps students to develop their scientific literacy and it enables them to create a personal record of the work completed. In building on these good practices, students should be encouraged to include in their write up a brief description of the planning undertaken in advance of performing their experimental work.

Students benefited from a high level of individual attention from their teachers. In all lessons, teachers circulated among the students and provided individual guidance and assistance where needed.

The comfortable manner in which teachers moved among the students and worked with them showed the existence of a positive working atmosphere. The warm rapport between students and their teachers was supported by mutual respect. This resulted in well-managed lessons.

Students' ideas and contributions were accepted and affirmed by their teachers. Best practice use of affirmation was noted where each student's contribution was individually affirmed and where the affirmation given was specific to points raised by the contribution. This resulted in students gaining useful feedback.

A notable feature of lessons observed was a strong sense of enthusiasm. Teacher-led enthusiasm created a sense of purposefulness and served to motivate and focus students' work. Students' enthusiasm was well managed and where students' contributions could have diverted the learning focus by venturing off topic, the focus of the lesson was maintained with skill and sensitivity.

The visual environment in the laboratories is one of a scientific learning space. There are models, charts and some scientific equipment on display. The display of relevant models, charts and equipment is valuable as it enables teachers to use them as tools to help students learn better. The science teachers are encouraged to extend the display of posters and charts to all rooms in which the teaching and learning of science subjects takes place. Students could be involved in creating charts and posters, such as word banks and scientific diagrams, for display. The creation of these resources would support the work done by teachers and provide further learning opportunities for students.

Students were engaged in their learning in all lessons observed. They were participative in the assigned activities. Interaction between the inspector and students showed that they had generally good levels of knowledge and understanding of the topics studied relative to their year groups and abilities.

**ASSESSMENT**

Students are assessed regularly using a mixture of class-based assessments and year-group assessments. The results of these assessments are sent home periodically. These practices are appropriate. In continuing to build on the strengths of the assessment strategies used in Science and Chemistry, the teachers described enthusiasm to adopt assessment modes that give credit for the skills gained by students during experimental work. Developing strategies that reward students for the range of skills gained in their study is good practice and is encouraged.

The school recognises the important role that homework plays in students' learning and has created a whole-school policy to guide and support management, staff, students and parents in relation to homework. Samples of students' copies were viewed. These showed that students generally have a

good volume of work completed. Annotations in the copies viewed showed that teachers periodically monitor students' copies and that they provide affirmative comments and useful feedback to students on how to improve their work. The use of formative feedback is encouraged as it guides students in focusing on the key aspects where further development is needed. The copies viewed showed that some students should be reminded to correct their homework on an ongoing basis. Regular correction of homework with the inclusion of the correct answer where an error has occurred provides students with a useful learning and revision aid.

The work of the science teachers in supporting students' participation in science-related extra-curricular activities is acknowledged and commended. The science teachers have supported students' participation in activities such as the Green Schools programme, Young Environmentalists' competition, field trips, ecology trips, essay competitions, and a science competition for first-year students.

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- The science teachers are professional and dedicated in their work.
- The science teachers work well together in a supportive and collaborative manner.
- A wide range of teaching methodologies was used effectively in the lessons observed.
- Students benefited from a high level of individual attention from their teachers.
- Good work has been done in developing a comprehensive science plan and chemistry plan.
- There was a good rapport between students and their teachers and this supported a positive working atmosphere.
- Students may study a very wide range of science subjects.
- A large amount of ICT resources is available to the science teachers and these resources were used effectively in all lessons observed.
- There is good support for the science teachers' continuing professional development.
- The science teachers are committed to meeting the needs of all students and especially to supporting students with special educational needs.
- There is good support for students' participation in science-related extra-curricular activities.

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

- In supporting the science teachers' work with students with special educational needs, the school should consider formalising its mechanisms and arrangements for the sharing of strategies and methodologies between the science teachers and the learning-support teachers.
- In continuing to build on the strengths of the assessment strategies used with students, the science teachers' enthusiasm to adopt assessment modes that give credit for the skills gained by students through experimental work is encouraged.

Post-evaluation meetings were held with the teachers of Science and Chemistry and with the principal at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.