

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

**Subject Inspection of Science and Chemistry
REPORT**

**Portumna Community School
Portumna, County Galway
Roll number: 914130**

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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 Portumna Community School. 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. 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

Portumna Community School is a co-educational community school located in the town of Portumna, Co. Galway.

The school offers a broad range of science subjects that is comprised of Junior Certificate (JC) Science, Leaving Certificate (LC) Agricultural Science, LC Biology, LC Chemistry, LC Physics, Transition Year (TY) Science, and Leaving Certificate Applied (LCA) Science. The provision of this wide range of subjects shows good support by the school for the study of science subjects.

There are good supports in place that help students when they are making their subject choices for junior cycle and for senior cycle. These supports include information from subject teachers, individual meetings with the school's guidance counsellor, whole-class guidance counselling, and information nights for parents. It is noted that the science teachers attend the information nights for parents and that they set up and perform demonstration experiments to give parents a sense of what is involved in studying science subjects. The teachers' commitment to this work is to be commended. The subject option bands from which students select their subjects are created from students' preferences and this is best practice. Science subjects are core components of the school's Transition Year programme and exposure to these subjects helps to inform students' subject choices for senior cycle. This is to be commended.

At junior cycle, Science is a core subject in first year. In second year, Science is among the optional subjects from which students select their subjects for junior cycle. Almost all students select Science and this demonstrates positive attitudes among students to studying it. The uptake of science subjects at senior cycle is high. This shows that students have positive attitudes to choosing science subjects at senior cycle.

The time allocation for Science consists of one double lesson period and two single lesson periods weekly and this meets with the recommendations of the syllabus. The time allocation for Chemistry consists of one double lesson period and three single lesson periods weekly and this meets with the recommendations of the syllabus.

There are good practices in place that support the induction of newly appointed and trainee teachers. These include the availability of a school information booklet, meetings with the principal, induction of teachers by a post-holder with responsibility in this area, and ongoing support from subject colleagues.

All science classes and chemistry classes are of mixed ability. The school strives to ensure that all class groups retain the same teacher during their programme of study. This practice supports continuity of learning and is to be commended.

The school supports students with special educational needs by provision of resource teaching and learning support. Where required, a special needs assistants work with students during science lessons. Teachers liaise informally with the school's learning-support co-ordinator and the relevant year head to ensure that students gain the support that they require. In continuing to support the science teachers in developing further strategies for use with students with special educational needs it is recommended that the school engage with the Special Education Support Service (SESS), <http://www.sess.ie>.

It is noted that the school has a cohort of international students for whom English is not their first language. In the area of language support, resource materials are available through Integrate Ireland Language Training (IILT), <http://www.iilt.ie>.

There are three science laboratories and one demonstration room in the school. The science laboratories have adjoining preparation areas. The laboratories are clean, bright, and generally well maintained. A sense of a scientific learning space is generated through displays of scientific equipment, glassware, posters, charts, and students' work. Senior school management described plans for the ongoing modernisation and maintenance of the science facilities and its commitment to providing optimal teaching and learning conditions is to be commended. The science teachers have done good work in organising and storing chemicals. They are reflective in their practices and have identified the need to develop an inventory of chemicals and equipment. This is to be encouraged as it will assist in managing resources and in ordering replacement equipment and chemicals.

The school, appropriately, has a health and safety statement. The school has identified review of the statement as a priority and preliminary work has begun on this. The science teachers are involved in reviewing their own subject areas and this is appropriate. Annual review of the health and safety statement coupled with review as needs arise is good practice and is to be encouraged.

The information and communication technologies (ICT) resources available to the science teachers include desktop computers, a data projector, internet access, and data logging equipment. Some teachers have developed an electronic collection of supporting notes and resources that they use to support their teaching. During interview some teachers also described the use of various ICT-based learning tools in the teaching of science subjects. Good use was made of ICT in lessons that were observed. There is enthusiasm among the science staff to further integrate ICT in the teaching and learning of science subjects and this is to be encouraged.

The school provides good support for the science teachers in their continuing professional development. Teachers have been facilitated in attending all relevant in-service courses and whole-staff in-service courses have been organised in areas such as the Transition Year programme and school development planning. The science teachers are proactive in engaging in ongoing professional development and this is to be commended. They have engaged with the Junior Science Support Service (JSSS) through an in-school visit by JSSS personnel, they have sought and availed of support and in-service education in a number of science subjects and one of the teachers has undertaken action research with the Biology Support Service, <http://biology.slss.ie>. Recently, the school was selected for participation in an international project titled Gender, Innovation and Mentoring in Mathematics and Science, (GIMMS). The purpose of the programme is to explore innovative methods of teaching science subjects and to address the issue of gender imbalance among students in their choices of some science subjects. The science teachers' dedication and commitment to extending their professional experience for the benefit of their students is to be highly commended.

PLANNING AND PREPARATION

The science teachers work well together in a collegial manner that is characterised by collaboration and co-operation. They meet frequently, formally and informally, to plan for the teaching and learning of their subjects. Minutes of formal meetings are kept and this good practice helps to ensure that any issues that arise during meetings are highlighted for progression and resolution.

The teachers share a sense of collective responsibility for the successful operation of their subject department. This means that each teacher takes responsibility for any operational issue as it comes to his or her attention. Discussion with the science staff during the evaluation explored the possibility of developing the role of a science convenor. There was enthusiasm for the proposal as it was seen as supportive of the work of managing the science department and planning for the teaching and learning of science subjects. Thus, in building on the good work done by the science teachers in managing their subject department and on their high level of co-operation it is advised that they develop the role of subject convenor to co-ordinate ongoing progress in subject department planning.

The TY Science plan was viewed. In particular, it describes good practice relating to a variety of assessment modes used in various elements of TY Science. In a minority of topics, the plan focused particularly on material drawn from the relevant senior cycle syllabus. It is important to maintain a balance within the TY programme between the need to prepare students academically for senior cycle and the need to extend students' learning experiences without over reliance on material from senior cycle syllabuses. It is recommended that the school address this issue and it is suggested that the school's involvement in the GIMMS project could usefully support further development of innovative elements in TY Science.

A copy of the JC Science folder was presented for inspection. The science plan is an evolving work in progress and good work has been done in compiling the current document. Examination of the document showed that the science teachers have identified a number of initiatives to further support the teaching and learning of science subjects and have implemented some of these initiatives. The science teachers are enthusiastic to continue to build on their planning work by further developing the science plan. They identified the development of a comprehensive plan as supportive of continuity of learning for students and as an aid for new or trainee teachers. Further development of the subject plan is recommended, as it will support the teachers' work in delivering a high-quality science education for their students by enabling them to consider, share and document their good practices. It is advised that on completion, the content sequence and resource sections of the plan be shared with students as this will support them in planning their work and will be of benefit should they be absent from school.

In some instances teachers presented individual planning files for inspection. Where this occurred it was noted that the files contained a wide range of teaching resources, detailed and comprehensive schemes of work that outlined learning objectives for lessons and referenced these objectives to the syllabus, teacher and student activities and consideration of safety issues and homework. The good work done by teachers in developing these planning files is to be highly commended and this work could beneficially inform the ongoing development of the subject department's collective science plan.

TEACHING AND LEARNING

All lessons were appropriate to the relevant syllabus. A high level of individual lesson planning and preparation had been undertaken for the lessons that were observed. Some teachers had prepared individual lesson plans and these comprehensively and clearly outlined the intended teaching and learning activities. Teachers had prepared a range of appropriate supporting resources for use in the lessons that were evaluated. All requisite materials were readily to hand. Teachers showed high levels of subject matter expertise in the topics that were under study and this demonstrates a high level of lesson preparation.

A variety of teaching and learning methodologies was used in the lessons that were observed. This range of methodologies included use of directed questioning, written exercises, teacher-led explanation and exposition, use of the board, use of ICT, recap and reinforcement, student note taking, overhead projection slides, use of models, discussion with students, and student performance of experimental work.

Best practice was observed where teachers began lessons by sharing the intended learning objectives with students. This practice helps to ensure that students focus on the key learning points and it is effective in assisting students to prioritise the information that they glean during lessons.

In almost all lessons, directed questioning was the main questioning style that was used by teachers. It was effective in engaging students in considering the questions posed by their teachers and in enabling teachers to gain feedback from individual students on their knowledge and understanding. While acknowledging the value that global questioning can lend to building student participation it is advised that directed questioning be adopted as the main questioning style.

Good practice was observed in lessons where there was frequent recap and reinforcement of students' learning and this was achieved orally and through use of focused, written exercises. Teacher-led exposition and explanation was clear and effective in developing students' knowledge and understanding of the topics under study. The use of overhead projection slides and the board helped teachers to clearly highlight key learning points and note taking by students appropriately ensured that they had a record of these points. Teachers' use of models in lesson activities added beneficial visual and tactile dimensions to students' learning. The use of ICT presentations was clear and helped to present lesson content in a visually stimulating and colourful manner. Best practice was observed where teachers highlighted new scientific terms and created learning opportunities for students to become familiar with these terms.

Teachers appropriately emphasised safety in the performance of practical work. Good practice was noted where individual risk assessments had been performed for each mandatory experimental activity in Chemistry. This work helps to assure that appropriate safety precautions are observed when undertaking experimental work. In all cases, students performed their experimental work safely. They worked well together and this demonstrates good team working skills. While students worked, their teachers circulated among them offering advice and guidance on an individual basis. This approach to meeting students' individual learning needs is to be commended. Best practice was observed where students were involved in setting up for and tidying up after their experimental work. This helps students to plan for their work and encourages them to develop a sense of responsibility for it.

In all of the lessons that were evaluated there was good rapport among students and their teachers. This was evident from the relaxed, conversational tone that teachers adopted with students and from the open and respectful manner in which students engaged with their teachers. Students were addressed by name and their answers and responses were accepted and affirmed by their teachers. These practices were supportive of a positive learning atmosphere and ensured that positive discipline was maintained in all of the lessons that were observed.

Students were engaged in their learning and this was evident from observation of their level of participation during lessons. Students' responses to questions posed by their teachers, questions asked by students and interaction with students showed that they had generally good levels of knowledge and understanding of the topics under study. Discussion with students during the evaluation revealed that they have generally good levels of interest in and positive attitudes to the study of science subjects.

ASSESSMENT

Students' progress is assessed regularly and reports are sent home periodically. These practices are appropriate. There are good structures in place that support communication between the school and parents. These include use of students' journals, formal examination reports, parent-teacher meetings, information evenings for parents, and meetings by appointment with school staff.

Samples of students' copybooks were viewed. It was evident from almost all copybooks that homework is a regular feature of students' learning. The school has identified the development of a formal homework and assessment policy as an action item to be developed within its current development planning initiatives. This is to be encouraged. Within this context, it is recommended that the science teachers develop a formal subject-specific homework and assessment policy. Such a policy should include details of the frequency and the types of homework and assessment to be used. In addition, the types and frequency of feedback to be given to students on their work should be outlined. This will build on the various good practices among the science teachers of monitoring, correcting, affirming, and commenting on students' work. Further developing their use of assessment for learning (AFL) was identified by the science teachers during a recent JSSS in-service and this is to be encouraged as it will help students to improve their learning.

Examination of students' experimental copybooks revealed that they have completed a generally satisfactory amount of experimental work. In a number of instances, it was noted that that the amount of experimental work completed by students was less than what would usually be completed at that particular point in their course. It is advised that this be addressed as a priority as students are required to complete all mandatory experimental work prescribed by the syllabus. Students get feedback from their teachers on their experimental work and on their practical skills mainly through verbal feedback while they perform the experimental work and comments by teachers when marking their experimental copybooks. Further strategies that give feedback to students on the range of practical skills gained during their course of study could be included within the science department's homework and assessment policy. Some useful advice relating to formative feedback may be found at <http://www.ncca.ie> and advice relating to assessment of students' practical work may be found at http://www.juniorscience.ie/jsss/Files/SE_Rubric.doc.

The science teachers have developed the practice of using a common examination at the end of first year. This is good practice as it supports the subject planning process by enabling comparison of student attainment across the year group. Comparison of student attainment enables teachers to share comparable experiences of teaching first-year Science. It was noted from the teachers' science plan that they intend to extend the use of common assessment to all year groups and this is to be encouraged.

Students participate in a range of science-related extra-curricular and co-curricular activities such as Science Week, forensic science, lectures by speakers on science topics, ecology and educational field trips, science quizzes, trips to third-level education colleges, and links with other subject areas such as History and Guidance. The science teachers' work in supporting students' participation in these activities is acknowledged and is to be commended.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- There is a committed science staff that strives to deliver a high-quality science education for all students.
- The science teachers work in a collegial and collaborative manner.
- A broad range of science subjects is available to students.
- There was a high level of individual lesson preparation.
- A variety of teaching methodologies was used.
- Discipline was sensitively maintained in all lessons that were evaluated.
- Students showed good levels of interest in Science and in Chemistry.
- Students were engaged in their learning.
- The uptake of science subjects is high.
- There is enthusiasm to further integrate the use of ICT in the teaching and learning of science subjects.
- There is good support for the science teachers' continuing professional development and they are proactive engaging in ongoing professional development.
- There are good practices in use that support the induction of newly appointed and trainee teachers.
- The science teachers' work in supporting students' participation in a range of science-related extra-curricular and co-curricular activities is acknowledged and is to be commended.

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

- Further development of the subject plan is recommended, as it will support the teachers' work in delivering a high-quality science education for their students by enabling them to consider, share and document their good practices.
- It is recommended that the science teachers develop a formal subject-specific homework and assessment policy.
- In continuing to support the science teachers in developing further strategies for use with students with special educational needs it is recommended that the school engage with the Special Education Support Service (SESS), <http://www.sess.ie>.

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.