

**An Roinn Oideachais agus Eolaíochta**

**Department of Education and Science**

**Subject Inspection of Science and Biology  
REPORT**

**Our Lady of Lourdes Secondary School  
New Ross, County Wexford  
Roll number: 636300**

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**AN ROINN OIDEACHAIS  
AGUS EOLAÍOCHTA | DEPARTMENT OF  
EDUCATION  
AND SCIENCE**

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

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**SUBJECT INSPECTION REPORT**

This report has been written following a subject inspection in Our Lady of Lourdes Secondary School, 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 Biology and makes recommendations for the further development of the teaching of the 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**

Whole school support for the science subjects in Our Lady of Lourdes is very strong. Science is a core subject for both Junior Certificate and Transition Year (TY) and three science subjects are available on the senior cycle curriculum; Biology, Physics and Chemistry. In general, one or two class groups of Biology, one class group of Physics and one class group of Chemistry are timetabled every year. Students have a free choice of all subjects on the senior cycle curriculum each year and this is also commended. Biology is the most popular Leaving Certificate subject of the sciences and the majority of students choose this subject. Numbers choosing Chemistry every year are quite good, but Physics is less popular with small numbers choosing this subject. It has been necessary on occasion to timetable the fifth and sixth-year groups together to sustain the subject. It is planned to add extra innovative Physics activities, such as robotics, to the TY Science programme in order to encourage students to take this subject. Inservice in this topic has already been identified as being available in the local education centre. Both school management and the science department are commended for being able to sustain three senior science subjects with viable numbers on the school curriculum.

Approximately one third of the students in this school avail of the TY programme during which they study Science for the whole year. This allows students the valuable opportunity of keeping contact with the subject and sampling some elements of each scientific discipline in senior cycle before making choices for Leaving Certificate.

There is a maximum of twenty-four students in each class group studying the sciences. All class groups for the sciences are arranged on a mixed-ability basis, throughout both junior and senior cycle. Class groups retain the same teacher as they progress through junior and senior cycle.

The revised science syllabus is being implemented in first and second year with the older science syllabus in use in third year. This year's third-year classes will be the last class group to follow the older science syllabus.

The timetabling arrangements and time allocated for Biology is very good. All biology class groups are scheduled to have five class periods per week including one double period. All lessons with double periods take place in the laboratory.

There are some shortcomings, however, in relation to timetabling for junior Science. The second and third-year class groups have four class periods per week, meeting syllabus requirements, but the first-year class groups are only timetabled for three class periods per week for Science. Timetabling in first year, therefore, is one period per week shorter than syllabus recommendations and this should be reviewed for future years. In addition, all three first-year class groups and two of the second-year class groups are not timetabled for any double lessons. This impacts directly on the implementation of the Science syllabus as the course is activity-based in its design and emphasises practical experience of Science for the student. By not having the proper time afforded by a double lesson period there is not sufficient time for groups of students to engage fully in the process of planning and designing the investigation and there is the possibility that the practical activity would become more prescriptive than investigative in nature. All groups studying Science should be provided with one double lesson period per week.

There is only one laboratory in the school and this is used for teaching and learning in the four science subjects. This laboratory is quite spacious. It has been newly refurbished and has excellent facilities. Modern Information and Communication Technology (ICT) equipment in the laboratory includes a desktop computer, laptop computer, scanner, printer, data projector and the *Pasco* datalogging system.

Good attention is paid to matters of health and safety. Proper safety equipment is present in the laboratory. There is a separate locked chemical store and chemicals are segregated and stored according to best practice and health and safety guidelines. The Health and Safety statement is reviewed every two years into which the science teachers can make an input.

All class groups have access to the laboratory at least once per week. The timetable for the laboratory reveals that it is being utilised at maximum capacity as it is only 'free' for one single period each week. This has implications for access by teachers to undertake preparation work. In addition, the timetabling of double lessons for each class group next year will put further pressure on laboratory access. The science department and school principal have highlighted the need for a second laboratory and plan to apply for this addition to the school's facilities as soon as possible.

There are three science teachers in the school, all of whom teach junior Science and senior Biology. The attention given to Continuous Professional Development (CPD) is very good. Management supports teachers in their membership of the Irish Science Teachers Association. Most teachers have attended inservice training in both the revised science and biology syllabuses. Those who have not are receiving support from the Biology Support Service (BSS) in the implementation of the syllabus and this is commended. Some biology teachers attend cluster meetings of the BSS in the local education centre and are actively involved in the teacher design teams and active research projects or are involved in the pilot *Discover Sensors* project. This is of immense value to individual professional development and such participation is highly commended. This also provides a great source of useful ideas for teaching Science and Biology. Management is urged to ensure that some formal time is allocated to the department/whole school staff for the proper dissemination of this information to all teachers who would benefit.

## **PLANNING AND PREPARATION**

Formal subject planning has been incorporated into the School Development Planning (SDP) process for the past couple of years. Formal subject department meetings are held on three to four occasions during the year. Minutes are kept of these meetings during which items such as health and safety, equipment, laboratory rota and progress with the revised syllabuses are discussed. A 'diagnostic window' is used as a tool for analysis for some of these meetings to help determine things that are working well and the areas for development.

As well as formal meetings there is also much informal consultation on a daily basis among the three science teachers in the sharing of facilities and resources and generally as issues arise. There is an atmosphere of collegiality amongst the members of the science department.

Planning folders have been developed for both junior Science and senior Biology and these include agreed schemes of work for each year and lists of the mandatory practical activities as well as order forms for laboratory supplies. It is recommended, in order to build on these plans, that a list of available resources, a list of possible teaching and learning methodologies and a list of assessment tools would be integrated with the list of topics in the scheme of work for each year group.

Teachers have developed their own resource packs with a range of teaching and learning aids for use with various topics in both Science and Biology. Some audio-visual and DVD resources have also been obtained. The school's ICT facilities are used to source and develop visual resources and presentations. These can be used with the computer and projector for lessons that are conducted in the laboratory and as paper printouts for lessons conducted in general classrooms.

In all cases, teachers maintained records in their diaries of the topics and activities completed during each lesson. This information is valuable for planning for the following year. In order to develop on this system it is recommended that the science department would devote some time at their formal meetings specifically to exchanging resources and ideas. Teachers could, on a topic by topic basis, focus on pooled assets and engage in professional dialogue around those teaching and learning tools and assessment methodologies that proved successful for a particular topic. The science department could then go on to develop a central 'bank' of shared resources either electronically on the laboratory computer or in a filing cabinet or both.

Planning for the sourcing and management of laboratory equipment is to be commended. Management provides financial support for the provision of necessary materials on a needs basis. The school received an enhanced grant from the Department of Education and Science for the purchase of materials for the full implementation of the prescribed investigations in the revised junior Science syllabus. This grant has been fully utilised in purchasing sets of necessary apparatus. Ample resources for the completion of student practical work are readily available in the laboratory. The laboratory preparation room is very well-organised and a valuable 'resource box' system is in use allowing quick and easy access to materials.

There was clear evidence of considered and effective preparation for each lesson. There was thorough prior organisation of resources and sets of materials for student practical work which were laid out on each bench for student use. The handouts used during practical work were particularly suitable and aided the smooth flow of the lesson.

## TEACHING AND LEARNING

In all lessons visited a positive, calm and secure working atmosphere was successfully generated providing an environment suitable for learning. This is highly commended. Admirable student-teacher and student-student rapport led to a climate of mutual respect. In all cases the students engaged with enthusiasm and politeness. They were observed to conform to the high standards expected in terms of behaviour and participation in their lessons. Students were seen to be positively affirmed during their lessons on the basis of their own individual abilities and strengths and this undoubtedly encouraged positive student participation.

Lessons were well structured and paced to ensure continuity and progress. All lessons began with a roll call. Some of the lessons observed were conducted in general classrooms and those that were conducted in the laboratory were all based on student practical work. The good practice of building upon the students' existing knowledge of a particular topic and drawing examples from everyday observations to develop the topic was very well applied in all cases. This was combined with strong enthusiasm for the subject matter displayed by the teacher. All classes are arranged on a mixed-ability basis and this range of abilities was evident in each class visited. Teachers demonstrated an awareness of their students' individual capabilities.

During classroom-based lessons, particularly effective teaching and learning strategies were employed. There was excellent use of the blackboard to consolidate learning. For example, memory maps were generated and key points were noted as the lesson developed. Learner autonomy was promoted during these lessons. Students were given tips on how best to remember key words. There were excellent examples where learning was best facilitated when the students were encouraged to write notes on the topic in their own words while the teacher circulated to give individual assistance and to check progress. Students were encouraged to answer questions without copying the answer from the book and were constantly challenged to recall, recap and revise what they had just learned. Skilful questioning techniques were used to support the learning process. Students were actively listening throughout the lesson and were able to answer questions promptly and accurately. Overall, it was found that during these lessons the students were effectively challenged and were learning very well.

In some lessons, however, students were much less capable in accurately answering questions put to them and many of them did not demonstrate a sound understanding of the subject matter learned either on the previously completed topic or earlier topics. It was evident in these classes that students were not challenged in recall as much as they could be. For example, students were given handouts with notes and diagrams on many topics from their course, whereas they would learn more effectively if they were challenged to make out their own notes with key words or prompts only as assistance. Alternatively, students could be challenged to summarise what they have just learned. These methods would improve their learning skills. It is recommended that strategies such as these, that best support student learning and learner autonomy would be discussed among all members of the science department, as part of their formal meetings, and that these strategies would be implemented with all class groups in future.

In practical lessons, the methodologies employed reflected the aims of the relevant syllabus and student skill development was effectively promoted. Some of the investigations in Science were conducted using datalogging equipment. This is highly commended and it effectively integrates ICT and facilitates the interpretation of information in graphic format. The students displayed excellent laboratory skills and followed the scientific method accurately. Students worked well in their groups discussing the method and the outcomes of the investigation. In many classes,

students were encouraged to write up laboratory records on their own and were subsequently given constructive feedback on that work. However, there was evidence that with some class groups the students usually copied the method from the handout or the book. This should be avoided in future and development of report writing skills should be facilitated in all cases.

## **ASSESSMENT**

A good range of assessment strategies was used by the science department. Student progress was monitored through the use of questioning in class, the assignment and correction of homework, class tests and formal school examinations. In all cases, class tests were found to be frequently administered and this is commended. Students expect to be tested regularly and it was reported that they study well for these tests. All student tests are graded and a transparent marking scheme is applied. Students receive annotated feedback on all tests and they do their corrections carefully filling in the correct answer as appropriate.

In some cases it was reported that students are challenged to make short presentations to their peers on particular revision topics. They are evaluated on their ability to speak about the topic, their knowledge and the quality of the presentation. This is commended and could be extended to all class groups as an additional assessment tool adding greater variety to the process.

In most cases homework was regularly assigned and was corrected at the beginning of the next lesson. A review of student copies revealed that wherever written homework was given it was corrected regularly by the teacher. In addition, a comment was written giving positive affirmation for student effort and, where necessary, indicating areas for improvement. Feedback of this type is to be commended. However, it was found that the type of homework allocated and the frequency of allocation varied from class to class. The school has a homework policy in operation but this is due for review and it may be timely for this area to be discussed by the whole staff.

The non-examination class groups sit formal school-based tests in the summer and the examination class groups sit 'mock' examinations in the spring. Instead of formal tests at Christmas, the grade given is based on continuous assessment of student progress up to that point. In some classes, a portion of the grade allocated in the summer is given for practical work. These systems reward students for on-going work and are commended.

Record keeping was very good. Records of attendance were maintained for each lesson and in many cases teachers also recorded participation, punctuality and the completion of homework for the lesson. Careful records were also maintained of the outcome of class tests. These records help to provide a basis for informed comment on student progress to parents, who receive two reports during the year, at Christmas and summer in line with standard practice. A parent-teacher meeting is held annually for each year group.

## **SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- The science subjects receive strong support from management; Science is a core subject in junior cycle and Transition Year (TY), excellent efforts are made to sustain three senior cycle science subjects, class groups contain no more than twenty-four students, laboratory access is fairly good, financial support is provided for the subjects and both planning meetings and inservice training events are facilitated.

- The science laboratory is modern and very well-maintained. There are good ICT facilities and ample resources for the completion of student practical work. The preparation area is very well organised allowing ease of access to materials. The laboratory presents as an active area where student practical work is ongoing throughout the school day.
- Continual Professional Development (CPD) is strongly supported and actively pursued. Teachers of this school are involved in pilot projects and events at national levels.
- Attention to planning is very good. Resource packs with a range of teaching and learning aids for use with various topics have been developed, the ICT and audio-visual resources are constantly being built up and preparation for lessons is thorough.
- A positive, calm and secure working atmosphere was successfully generated providing an environment suitable for learning. Students conformed to the high standards expected in terms of behaviour and participation in their lessons.
- During classroom-based lessons some particularly effective teaching and learning strategies were employed.
- During practical lessons the methodologies employed reflected the aims of the relevant syllabus and student laboratory skills were very good.
- A good range of assessment strategies were in use and students received valuable feedback, both verbal and written, on their work.
- Record keeping was very good and valuable information was collated for feedback to parents.

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

- There are timetabling issues in junior Science that should be reviewed for next year. All year groups should receive four class periods per week for Science and this should include two class periods timetabled together as a double lesson to facilitate the proper treatment of required student laboratory work.
- Management is urged to ensure that some formal time is allocated to facilitate the proper dissemination of information gathered at CPD events to all teachers who would benefit.
- A list of available resources, a list of teaching and learning methodologies and a list of assessment tools should be integrated with the list of topics in the scheme of work for each year group.
- The science department should devote some time at their formal meetings specifically to exchanging resources and ideas and to the development of a central bank of shared resources for topics on both the science and biology syllabuses.
- There is a need to improve student learning in some classes. Strategies that best support student learning and learner autonomy should be discussed among all members of the science department and they should be implemented with all class groups in future.

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.