Subject Inspection of Science and Physics
REPORT

Gort Community School
Gort, County Galway
Roll number: 91498C

Date of inspection: 25 February 2010
REPORT ON
THE QUALITY OF LEARNING AND TEACHING IN SCIENCE AND PHYSICS

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Gort Community School. It presents the findings of an evaluation of the quality of teaching and learning in Science and Physics 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 deputy principal. 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

The sciences are well supported on the curriculum of the school and the subjects are taught by a teaching team of eight fully qualified teachers. Science is a core subject in the school and at senior cycle level students may take Biology, Chemistry and Physics as well as Agricultural Science. Due to resource constraints the school does not currently have a Transition Year. Almost all science classes are of mixed ability with the exception of one first-year lower-ability group. For this reason differentiation and other approaches to mixed-ability teaching are relevant to all science classes. Classes in all years are provided with double class periods for student practical work. However the current provision of a second double-class period for the senior science subjects is not necessary and should be dispensed with.

The school assures good practice in advising students with respect to senior cycle subject choices. Biology and Agricultural Science are the more popular choices at senior cycle level but with significant numbers also choosing Physics and Chemistry. In the case of Physics there is a welcome increase in the numbers of students taking that subject in fourth year. Science and Physics are well provided for in terms of time allocation and the suitability of class size for student practical work.

The school is well equipped for information and communication technology (ICT) with a well-developed network and ready access to it by teachers. The school is about to be equipped with high-speed broadband and data projectors will shortly be in each classroom. However in the case of Science and Physics, the use of ICT in teaching and learning is still at a developmental stage. Teachers should take full advantage of their access to ICT and to the freely-available and high-quality science teaching software available to enhance the teaching and learning experience of their students.

The school has adequate laboratory provision with four adjacent science laboratories and a demonstration room. The laboratories are well-maintained and used exclusively for science
classes. Students have access to the laboratories for practical work and the teachers co-operate well in their use and in sharing equipment between them. The school’s safety statement is well presented, is up to date and it includes the science teaching areas. As part of the school’s health and safety procedures and to support the regular review of its safety statement, the science staff should carry out annual health and safety audits of the science laboratories. The work should be informed by the Department of Education and Science and State Claims Agency publication *Review of Occupational Health and Safety in the Technologies in Post-primary Schools* (page 25) and the Department of Education and Science publication *Safety in School Science*.

Members of the science staff have undergone training in the science area including the Discover Sensors programme. Given the size of the school’s teaching team support for new teachers has a special significance. To develop the current provision for the induction of science teachers new to the school, material in the science department folder should be adapted and extended so as to provide information on such areas as linkage between the department and the special-needs and learning-support department; the designation and principal items of equipment in each laboratory; assessment practices within the science department; and other resources in the science department.

Members of the science staff have been very active in the area of co-curricular activities in support of science in the school with regular involvement in Young Scientist and in Scifest. Evidence was also seen of student project work in one lesson observed.

**PLANNING AND PREPARATION**

The schools’ structures for coordination of science are good. There are a number of people that carry out coordination activities. The responsibilities of the coordinator for science who is a post-holder include coordinating the updating of the subject plan, convening meetings of the science team, and arranging attendance at in-service and the purchase and maintenance of science equipment. The coordinator has a general liaison responsibility for the science area. There are also coordinators for each of the senior sciences. These structures are good in that they take account of the size and complexity of the school’s science provision. The school should continue with the current arrangement but should rotate responsibilities for the coordination roles with a two-year cycle where this is feasible.

The science department has done good work in the area of subject planning. The subject team works well together and meets on an annual or bi-annual basis. Up to the present, curricular planning and laboratory organisation have been the principal purposes of collaboration and of departmental meetings. There is a need to build on the good work done to date. This should include developing the areas of curricular planning and of joint planning for teaching and learning. Planning for the further incorporation of ICT in teaching and learning and in the running of the department should also be prioritised. A further area in need of development, as evident from the teaching and learning observed in the course of the evaluation, is planning for addressing the needs of mixed-ability classes. In order to advance the department’s planning priorities the range of issues addressed at subject-planning meetings should be extended to include reflection and review of its current situation and its priorities for further development. Departmental meetings should also discuss teaching methodologies and records of meetings should be included in the subject folder.

The subject planning documentation reviewed as part of the evaluation indicated that a substantial amount of work had been carried out in curricular planning as a support to teachers’ individual
class planning. In particular in 2005/06 the subject department agreed on broad teaching and learning strategies for use with first, second and third-year classes. The plans also include outline plans for physics, chemistry, and biology as part of junior science. These plans refer to the broad topics, the text references, the time allocation teaching materials required, and also assessment. They provide a very good basis for further development. Similar work has also been carried out in relation to physics. The extent of curricular planning should be broadened and deepened so as to provide a greater support for the work of individual teachers. Common agreed content for each year should be laid out as teaching plans under learning objectives to be achieved for each topic heading. In doing this the overarching aim should be to ensure continuity and consistency in students’ experience of Science. Further work in the area of planning should be in the context of the use of learning objectives.

The department’s planning process also needs to address learning and teaching more explicitly. Given the wide range of students’ abilities there has to be a greater emphasis on the development among teachers of the skills and practices of mixed-ability teaching. The use of learning objectives in teaching and learning and differentiation in relation to teaching, curriculum and assessment will be central to this. Teachers are directed to the Special Education Support Service (SESS) publication Science Differentiation in Action available through the SESS website. Supporting subject-department planning should be whole-school inputs on areas of need such as assessment for learning, mixed-ability teaching and the whole-school input on differentiation that the school received about two years ago. Such inputs should be followed up by action planning and implementation at the subject department level.

The planning and preparation of the science and physics lessons observed was very good as was the provision of resources for the lessons.

**TEACHING AND LEARNING**

Teaching and learning was good in almost all science and physics lessons observed. Where very good practice was in evidence, lessons were introduced with clear aims written on the board. In one lesson this was done in terms of the desired learning objectives to be achieved by the lesson. The considerable effectiveness of this would have been increased further if at the end of the lesson the same learning objectives had been used to review and summarise the lesson, for student assessment, and for planning further lessons. The learning objectives of a lesson may also be differentiated to give a range of objectives that address the learning needs and the abilities of each student. The science teachers should aim to do this in all lessons, supported by their joint curricular planning in order to better take account of the mixed-ability nature of classes. Other complementary ways in which this can be achieved are through the use of keywords in all lessons and through labelling items of apparatus.

In most science and physics lessons a range of teaching methodologies was used so as to accommodate the range of learning styles of students in classes. Examples of teaching methodologies used included use of worksheets by students, questioning of students, use of PowerPoint presentation, teacher demonstrations and student activity, and use of models. Other methodologies used were teacher demonstrations and student practical work and students writing down material from the board into their notebooks. It was evident that students in some classes had an involvement in projects thus enabling them to develop a wider range of skills. Where appropriate a range of teaching methodologies should be used in each lesson. In some classes a greater range of question types could have been used rather than continual questioning of the class as a group.
While in most science and physics lessons there was a balance between the activity of students and teacher, some lessons were almost completely teacher focused. Examples of this were where the teacher was talking for almost the entire lesson. In such situations there is a danger of passivity on the part of students that can lead to reduced student participation and learning. A variety of types of question should also be used in securing greater student participation in lessons.

In all science and physics lessons there was a good atmosphere where students were affirmed and felt free to contribute. In almost all lessons students were attentive. In those lessons where this was not the case there was a need for clear class rules to be agreed to and followed so as to ensure that students in these classes were learning.

Student practical work that was seen was well organised and engaged the students. It was noted that, at least in some classes, students’ practical records were not in the students’ own words. In order to teach students how to handle the preparation of records of their work, the key skills of drawing diagrams and preparing accounts of practical work undertaken should be emphasised in first-year lessons. It is suggested also a second-year project be planned to allow students to practice the skills involved in their third-year state examination project.

The physics lessons observed were well planned and carried out and they engaged the students. The school’s practice in relation to the Leaving Certificate physics programme is to have demonstration physics practical work only in pre-Leaving year and up to the completion of the students’ mock examinations in Leaving Certificate year. Following their mock examinations students carry out all of the practical work in the last few weeks of sixth year. Given that physics is a subject that has an intimate connection between its theory and its practical demonstration, the student practical work that is an integral part of the programme should be covered over the two years of the programme. This can be done readily through having the students carry out the practical work in association with the class coverage of the relevant theory.

From their attention, engagement, their answers to questions and the questions they asked it was evident that almost all students in almost all classes were learning.

**ASSESSMENT**

The school has a homework and assessment policy that provides a basis for the development by the science department of its policies in these areas. Students’ work is assessed through classroom questioning, observation and monitoring of written work. Student were assigned homework in almost all classes and while there was assessment of students in most lessons this is an area of learning that should be addressed further at a subject department level. The school and the science department should keep student assessment outcomes in the state examinations under review and should target increasing the number of students achieving higher grades.

Students have notebooks for class notes and homework, and they keep records of practical work carried out. The teachers are commended on the systems that they have individually developed for these and on the records kept by them of students’ attendance, homework, and assessment marks. While teachers regularly monitor students’ notebooks, there is a variation in the extent to which it is done and in the level of follow up. Where students’ written work is being assessed, whether through class tests, homework, or practical write-ups, the science department should have a common practice for monitoring this work that would include giving feedback to students.
that, as well as commenting on their work, also indicates what they should do to achieve better outcomes. The Assessment for Learning section of the NCCA website gives information on this. The department should consider having a common approach to the role of student notebooks and practical records and teachers should as a rule follow up on incomplete work or on other comments made on students’ work.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- The sciences are well supported on the curriculum of the school.
- The school assures good practice in advising students with respect to senior cycle subject choices.
- The school is well equipped for information and communication technology (ICT) with a well-developed network and ready access to it by teachers.
- Members of the science staff have been very active in the area of co-curricular activities in support of science.
- The schools’ structures for coordination of science are good.
- Teaching and learning was good in almost all science and physics lessons observed.

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

- Subject planning in the science department should include developing the areas of curricular planning and of joint planning for teaching and learning.
- The science department’s ICT resources should be gathered together through use of a common folder on the school’s intranet so as to support teachers in the use of ICT in their classes.
- Given the wide range of students’ abilities in science classes there has to be a greater emphasis on the development among teachers of the skills and practices of mixed-ability teaching.
- Given that physics is a subject that has an intimate connection between its theory and its practical demonstration, the student practical work that is an integral part of the programme should be covered over the two years of the programme.

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

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