

An Roinn Oideachais agus Eolaíochta

Department of Education and Science

Subject Inspection of Science and Physics
REPORT

FCJ Secondary School
Bunclody, County Wexford
Roll number: 63550Q

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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 FCJ Secondary School, Bunclody. 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 subject teachers. 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

FCJ Secondary School offers Science as a core subject at junior cycle. Science class groups have a maximum of twenty-four students in line with school policy. To achieve this classes are banded and mixed ability groups are formed from these bands. Currently there are seven Science class groups in each year of junior cycle. Classes generally retain the same teacher throughout junior cycle.

Science is a core subject on the optional Transition Year (TY) programme and is offered for two double periods per week. There is good balance between Physics, Chemistry and Biology as evidenced from the written programme in place. It is commendable that in line with recommendations from a TY programme evaluation, the school has now introduced subject specialist teaching into TY Science. The programme is well balanced between core material and innovative modules. It is recommended that, as a further enhancement to the programme, the Science department gives consideration to introducing a Science project module into TY. Projects developed would span various scientific skills and could lead to enhanced student entry into national Science competitions.

The school offers Physics, Chemistry and Biology at senior cycle. The uptake of senior Science subjects is very good. In the current school year, there is one class group in each of fifth and sixth-year Physics. Students are well supported in making informed choices regarding Leaving Certificate subjects. The subject options available and specific third-level requirements are explained to parents and students by the guidance counsellor during an information evening. Additional advice is given to students by the subject teachers, senior students and the guidance counsellor. Subjects are banded to facilitate optimum student choice and it is reported that at least ninety-eight percent of students get their desired choice. This is highly commended.

Time allocation to Science at junior cycle and Physics at senior cycle is generally satisfactory. However, first-year Science students are allocated three class periods per week while syllabus guidelines would recommended four class periods for each year group throughout junior cycle. This time allocation to first-year Science is further eroded by the fact that many class periods are of thirty-five minutes duration. Therefore, it is recommended that the school gives further consideration to increasing the time allocation to Science in first year. Each class group is allocated a double period, which generally takes place in a laboratory.

The Science department consists of six teachers, five of which teach junior Science and two teach senior Physics. Teachers are facilitated to attend in-service courses and it is commendable that all Science teachers attended recent courses provided by the Junior Science Support Service. In addition, some teachers have participated in courses including computers in Science teaching and the TY Design and Discovery course. It is commendable that the school pays membership to their professional organisation for all Science teachers.

There are four laboratories in FCJ Secondary School, three of which have storage/preparation facilities. The Biology and Physics laboratories have a shared preparation/storage facility, the general Science laboratory has none and the newer

chemistry laboratory has a separate facility.

The school health and safety statement is reviewed annually and was last reviewed in 2006. Science teachers were consulted in the process and there is a section on hazards in the Science laboratories. The laboratories visited have appropriate safety equipment in place. There are two chemical storage rooms, one of which is ventilated. It is recommended that the older storage room be upgraded in order to improve this facility in line with best safety practice.

It is commendable that each laboratory has been provided with a computer and data-projector in addition to broadband internet access. Data logging equipment is available. It is commendable that some teachers are attending ICT courses to broaden their skills and it is recommended that this practice be extended across the Science department. Modular courses on the use of ICT in the classroom are available from the Second Level Support Service. In addition, a central bank of ICT resources should be developed.

Students from FCJ Secondary School have participated in many extra-curricular and out-of-school activities, which include student participation in the BT Young Scientist and Technology Exhibition, Science Olympiads and attendance at Science-related lectures.

Planning and preparation

The school has a very good and commendable Science plan in place. The Science department has developed its own mission statement, which aims at all students enjoying Science and experiencing success. The plan is comprehensive and includes much useful information including teaching strategies, class organisation, cross-curricular links and assessment procedures and policies. It is inclusive in that it includes information on multicultural diversity and special education needs. The Junior Certificate Science scheme is part of this plan together with a work schedule for each year group. Senior Science subject schemes are included. There is a good section on health and safety. The work of the teachers in developing this plan is highly commended. There is scope for further development of this plan to include information on procedures to share best practice following courses attended, monitoring gender balance within senior Science subjects and monitoring the choice of levels of senior Science students to ensure that they choose a level that is within their potential to achieve.

Science co-ordination is carried out effectively. The duties of the Science co-ordinator include organising, chairing and recording minutes of subject planning meetings, updating the Science plan, overseeing the maintenance of Science laboratories and ordering materials. These duties are currently attached to an assistant principal post of responsibility. Science department planning meetings take place on four occasions during the year. Minutes are taken, are relayed to school management and are filed in the Science plan. In addition Science teachers involved in TY attend TY planning meetings.

The Science budget consists of relevant Department of Education and Science grants, a school contribution per junior Science student and a small student contribution per senior Science student.

There was good planning in advance of lessons observed. Teaching resources and practical equipment were ready and in some cases set up in advance. The lesson content was in general well planned and this contributed to the overall successful outcomes of lessons observed.

Teaching and learning

Lessons were well organised and had a clear structure. Students were aware of the objectives of lessons in advance. Many lessons began with recall of previously learned material and this was very often linked to new material taught.

A good atmosphere of learning prevailed in all lessons. The good rapport created a positive atmosphere for learning. Students generally demonstrated a great enthusiasm for their work. Affirmation of students' work was a noteworthy feature of many lessons observed.

Student activity was a key part of many lessons. In some cases, students solved pre-assigned problems on the blackboard, while others were encouraged to check and correct their own work. Teachers circulated giving individual help and support when needed. While participation levels were good in most lessons, it is important that efforts are made to enable all students to interact more fully in some lessons. This is particularly important when homework is being corrected or when material is being disseminated to students in the traditional way observed in some cases. It is particularly important that students are sufficiently challenged to reach their full potential.

Practical activities formed part of some lessons observed. Good safety procedures were in place with students wearing safety goggles and laboratory aprons when needed. Laboratory safety rules were clearly on display. There was an example where students were testing various water samples for hardness. A well-designed worksheet with sufficiently challenging questions was distributed in advance of the investigation. The importance of a 'fair test' was discussed. Students were guided and supported throughout the investigation and their knowledge of the procedures and outcomes of the investigation was very good as evidenced from the quality of their answers. There was another example where students were investigating the heating effect of an electric current. A historical approach was used to introduce the topic. Students efficiently set up the apparatus and initial unfamiliarity with aspects of the apparatus was quickly overcome. Very good enthusiasm for the task assigned had been created and the teacher's work is commended in this regard. It is important that laboratory time is managed efficiently so that investigations are substantially completed in the time available. Frequently, customised worksheets can be used more efficiently by students compared to using the traditional textbook recipe approach to practical activities.

Well-designed worksheets were distributed in some lessons. They served as a means of focussing students' attention on the material being investigated and discussed. It is recommended that this practice be extended across all lessons.

Effective use was made of questioning. Students' answers were frequently affirmed. Many lessons began with revision questions on material covered previously in class. Some questions were used to stimulate interest and motivation. In addition many questions were

asked by students to aid their understanding. Teachers used differentiation skilfully in posing questions and were constantly aware of the range of abilities in their class groups. These questions were well answered and in some cases were opened up to the whole class for general discussion. In some classes general questions were asked of the whole class, while more directed questions at named students would have been more effective. It is recommended that this approach be used at appropriate times.

Methodologies deployed included the use of the blackboard and data-projector in some lessons. There was an example where students were discussing the formation of solutions. A short animated video was used as an aid to students' understanding of the concept of 'dissolving'. This short intervention methodology was very effective and provided an excellent introduction to the well-organised practical investigation, which followed. While these methodologies were used very effectively in some lessons, on other occasions the use of more varied methodologies would have enhanced teaching and learning. There was an example of a previously held test being corrected with the aid of a PowerPoint presentation. In an effort to consolidate their understanding, it is recommended that a handout of the correct solutions be also given to students. In addition, it is recommended that methodologies be varied in some lessons from traditional blackboard, textbook and dictation to the wider use of ICT and the overhead projector so that previously prepared material can be used effectively to enhance lessons and to free up the teacher to reinforce learning.

Teacher demonstrations formed part of some lessons observed. In some cases students assisted, as for example when the rates of expansion of liquids were being compared. This had the effect of reinforcing learning. A good discussion on possible errors followed some of the Physics demonstrations. Relevant past examination papers were distributed to reinforce learning. Students exhibited good skills at problem solving.

The uptake of higher-level Science and Physics is very good. Student outcomes in terms of knowledge and skills are very good as evidenced by answers to questions posed in the course of this evaluation. Students were generally confident at answering questions on their work during the lessons observed.

Assessment

The school holds pre-Christmas school examinations for each year group. There are pre-Certificate examinations for third and sixth-year students. These are corrected in the school. Summer examinations are held for all non-examination classes including TY. In addition there is continuous assessment for TY students. It is commendable practice that the principal meets all students after examinations to discuss their performance. When necessary, specific students are referred to year heads and subject teachers for extra support.

The school operates good awards systems to acknowledge academic success. Certificates are awarded to students who come first in a subject in school examinations. In addition, academic awards are presented to students who come first in their class in the summer examinations or who get the best or outstanding results in the Junior or Leaving Certificate

examinations. This practice is commended.

Common Christmas examinations were set by the Science department for first-year students and it is commendable that this practice will be extended progressively. There is ongoing assessment and revision for all classes by means of short class tests and class questioning.

Reports are sent to parents after the Christmas and summer examinations and following the pre-examinations. In addition, progress reports are sent home when considered necessary by the dean of year or by parental request. There is a parent teacher meeting for each year group.

A general school homework policy is in place. In addition there is a specific homework policy for Science. This is highly commended. Homework is generally completed to a good standard and was assigned at the conclusion of many lessons observed.

Students with special needs are well supported by the Science department. The learning support teacher gives one lesson per week to Science students experiencing learning difficulties. Practices include the use of dictionaries to understand key words, cloze exercises to improve comprehension and learning strategies to improve answering examination questions. This work is highly commended.

Students keep records of their practical investigations in a laboratory notebook. The mandatory investigations and experiments in junior Science and senior Physics were recorded to a variable standard. Some teachers had provided annotated feedback. This is very good practice. However, regardless of this effort, some students had incomplete diagrams, graphs and results. It is recommended that the good practice of annotating practical notebooks be extended across the Science department and in addition that there is follow-up on corrections completed by students. The good practice of allocating a portion of the marks allocated to school examinations for practical work completed and recorded should also be extended to all in an effort to improve the quality of this work. It is commendable that checking and annotation of notebooks will form part of Science department policy into the future.

Summary of main findings and recommendations

The following are the main strengths identified in the evaluation:

- The school offers Science as a core subject at junior cycle and Transition Year.
- It is commendable that in line with recommendations from a TY programme evaluation, the school has now introduced subject specialist teaching into TY Science.
- The uptake of senior Science subjects is very good.
- Students are well supported in making informed choices regarding Leaving Certificate Science subjects.
- Each laboratory has been provided with a computer and data-projector in addition to broadband internet access.
- The school has a very good and commendable Science plan in place.
- Science co-ordination is carried out effectively.

- There was good planning in advance of lessons observed.
- Lessons were well organised and had a clear structure. A good atmosphere of learning prevailed in all lessons.
- Effective use was made of questioning.
- Students exhibited good problem solving skills.
- The uptake of higher-level Science and Physics is very good.
- Students were generally confident at answering questions on their work during the lessons observed.
- There are good assessment practices in place.
- The school operates good awards systems to acknowledge academic success.
- There is a specific homework policy for Science.
- Students with special needs are well supported by the Science department.

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

- The Science department should give consideration to introducing a Science project module into Transition Year.
- The school should give further consideration to increasing the time allocation to Science in first year.
- The older chemical storage room should be upgraded in order to improve this facility in line with best safety practice.
- The practice of participating in ICT courses to broaden skills should be extended across the Science department. In addition, a central bank of ICT resources should be developed.
- There is scope for further development of the Science plan.
- Further efforts should be made to enable all students to interact more fully in some lessons. It is particularly important that students are sufficiently challenged to reach their full potential.
- Laboratory time should be managed efficiently so that investigations are substantially completed in the time available. Customised worksheets should be developed.
- More directed questions at named students should be used more frequently.
- More varied methodologies should be used in some lessons.
- The good practice of annotating practical notebooks should be extended across the Science department. In addition there should be follow-up on corrections completed by students. The good practice of allocating a portion of the marks allocated to school examinations for practical work completed and recorded should also be extended across the Science department.

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

