

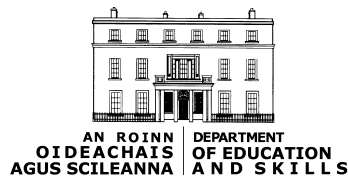
An Roinn Oideachais agus Eolaíochta

Department of Education and Skills

**Subject Inspection of Mathematics
REPORT**

**Mount Carmel Secondary School
King's Inns Street, Dublin 1
Roll number: 60853T**

Date of inspection: 7 May 2010



**REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN MATHEMATICS**

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Mount Carmel Secondary School, King's Inns Street, conducted as part of a whole-school evaluation. It presents the findings of an evaluation of the quality of teaching and learning in Mathematics and makes recommendations for the further development of the teaching of this subject 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.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

Mount Carmel Secondary School is a voluntary Catholic secondary school for girls with 299 students currently enrolled. Timetable provision for Mathematics is good. Concurrent timetabling is provided for mathematics lessons in all year groups except transition year (TY). This valuable arrangement provides students with the flexibility to change level if necessary. The school offers the Junior Certificate School Programme (JCSP). Students availing of this option are integrated across class groups and receive two additional mathematics lessons per week. This level of provision is highly beneficial to the students concerned.

The arrangements for level choice are good. In first year there is a higher-level class and two smaller ordinary-level classes. Students are assigned to these class groups on the basis of pre-entry diagnostic testing, communication with feeder primary schools and parent and student opinion. With the exception of TY, students are assigned to higher-level and ordinary-level class groups from second year onwards. TY is optional and there is one mixed-ability class group for Mathematics. Students who wish to change level are required to complete a request form designed for this purpose, parents sign this form and they are also consulted as part of the process. It is a mathematics department policy to encourage students to study the highest level possible for as long as possible. The student-centred approach taken in this regard is in line with very good practice.

The mathematics department comprises seven teachers. Teachers are deployed by school management in accordance with their qualifications and experience. Responsibility for teaching higher-level and ordinary-level class groups in junior cycle is rotated amongst all members of the teaching team. The responsibility for teaching higher-level Leaving Certificate Mathematics is rotated between two teachers. It is recommended that the team of teachers teaching higher-level Leaving Certificate Mathematics be expanded; this is necessary to ensure that the capacity to teach all levels is maintained within the subject department.

There is good access to information and communications technology for use in mathematics lessons. There are two computer rooms and a number of mobile data projectors that can be accessed through a booking system. In addition, three rooms fitted with interactive whiteboards are available for teaching and learning in Mathematics. Teachers have prepared a range of *PowerPoint* presentations for use in mathematics lessons and material from a variety of internet websites is also used. Very good use was made of ICT in many of the lessons observed and it was evident that ICT resources are shared amongst mathematics teachers; such collaboration is very worthwhile and should continue to be developed.

A wide range of resources is available for teaching and learning in Mathematics. These include tangrams, algebra tiles, 'pentominos', geometry equipment, overhead projectors and class sets of calculators. In addition, teachers use everyday objects and materials to make mathematics more relevant to students' lives. There is a designated 'Maths Room' which is designed as a stimulating mathematical environment for students. School management facilitates teachers' attendance at relevant continuing professional development (CPD) courses. Whole-school CPD in areas such as assessment for learning (AfL) has been organised in addition to the in-service courses available in preparation for *Project Maths*. AfL practices and material from *Project Maths* workshops were evident in many of the lessons observed. The success with which new practice has been embraced by members of the mathematics teaching team is evidence of their strong commitment to ensuring that the subject is accessible, interesting and vibrant to students.

Appropriate measures are in place for identifying students who have learning support needs in Mathematics. The supports provided for such students are very good. These include the provision of additional teachers in each year group to facilitate the creation of small classes, team teaching, and one-to-one withdrawal and small group withdrawal from subjects other than Mathematics. Mainstream teachers provide ongoing in-class support to students experiencing difficulty through careful monitoring, individual attention and effective differentiation strategies. Above all, teachers are creative in devising learning activities that engage students and facilitate understanding; this is driven by a very genuine desire to ensure that students' individual learning needs are met.

First-year and second-year students participate in 'Maths for Fun' activities; this takes place one day per week for four consecutive weeks in each year. This involves students engaging in a range of mathematical activities designed to encourage an interest in the subject and to help students to develop confidence with Mathematics. 'Maths Week' is celebrated as a significant event in the school year with students taking part in a range of mathematical activities including this year's event on 'how maths can save lives'. Encouraging students to experience Mathematics for fun is very beneficial and there was considerable evidence during the evaluation that teachers' efforts in this regard were paying off as students were clearly enjoying Mathematics in all of the classrooms visited.

PLANNING AND PREPARATION

There is good facilitation of planning time for Mathematics. Formal departmental meetings are held once per term and these are attended by the principal which is good. Agendas are set for all formal meetings and minutes are kept. The mathematics department is jointly co-ordinated by two experienced members of the teaching team. In line with good practice these positions rotate annually. The members of the mathematics department work very well together and, in addition to formal planning meetings, they organise informal meetings as and when the need arises. This

year informal discussion resulted in two teachers exchanging class groups, for a short period of time. This was done to make the best use of the expertise that was available within the team and it provides a very good example of the members of the mathematics department working together to serve the best interests of their students. It is evident from the review of the minutes of meetings that organisational issues take up most of the meeting time. While it is important to discuss such issues at planning meetings it is recommended that some time be set aside for mathematics teachers to engage in the sharing of ideas and expertise.

A comprehensive mathematics plan has been developed. It opens with the aims and objectives that direct the work of mathematics teachers. These are well thought out and genuinely reflect the needs of the students, the ethos of the school and the nature of learning in Mathematics. There was much evidence in the subject evaluation of these aims and objective playing a central role in day-to-day lesson planning. The plan contains all of the policy documents relevant to Mathematics. The policies for differentiation of learning, for providing for students with special educational needs and for teaching students for whom English is an additional language, together with the outline of appropriate teaching methodologies are realistic, practical and well designed.

In keeping with very good practice, programmes of work for each year group have been devised directly from the syllabus documents with the inclusion of text references as a resource and guide for their implementation. As the roll-out of *Project Maths* proceeds, further work in terms of designing teaching and learning plans based on those provided by the *Project Maths* development team needs to be done. As with the existing programmes of work, the syllabus learning objectives should be used as the main guide for this task. It is suggested that the work of devising teaching and learning plans for the strands to be introduced in the next academic year be shared amongst the teaching team. Teachers should collaborate on formulating lesson ideas that could then be shared with the entire team at planning meetings.

The content of the TY plan has been chosen to encourage students to enjoy Mathematics and to make the subject accessible for all of the students in the TY mixed-ability class group. Topics including number systems, 'friendly and sociable numbers', complex numbers, probability and statistics make up the TY mathematics programme. A variety of methodologies such as investigation, discovery, group work, and ICT feature in the delivery of TY lessons. This is in keeping with the spirit of a good TY programme. To complement this programme, it is suggested that Fibonacci numbers, Chaos Theory, or a module of Applied Mathematics be considered as further options for TY.

TEACHING AND LEARNING

Six lessons were observed during the evaluation and in all cases the quality of teaching and learning was very high. In accordance with school policy, the learning objectives were shared with the students at the beginning of each lesson and their achievement was assessed as the lessons progressed. The students were motivated in working towards the learning objectives and, through frequently asking questions, took personal responsibility for ensuring that they had a solid understanding of the mathematical concepts presented and a clear idea of the work at hand. The learning objectives were also revisited at the conclusion of lessons to ensure that each student had reached an appropriate level of understanding and to provide students with a sense of accomplishment. Very good progress was being made by the students in each class group visited.

The lessons progressed at a lively pace and were designed to incorporate a variety of strategies to capture student interest. The methodologies used included investigation, discovery, activities, and games. ICT was used as an effective complementary strategy in many of the lessons observed. While teacher exposition featured in all of the lessons it did so in a very positive way: it served to form an integral part of the collaborative effort between teacher and students, in the form of leading the learning activities and in providing instructions and consolidating exercises. There was a very strong sense of team work in the classrooms visited. In each of the lessons observed student contribution was at the core of the work taking place.

In all cases, teacher instructions, explanations and work on the board were very clear. Where it was appropriate, teachers made good use of repetition to consolidate understanding by presenting the same concept in a variety of different ways throughout lessons. There was excellent use of various types of questioning. Teachers listened very carefully to student questions and answered them accurately and comprehensively; higher-order questions were used to help students to explore the concepts presented and quick questions were used to keep lessons lively and students engaged. Students were frequently asked to examine relationships between concepts; to describe what they noticed; and to predict the effects on one quantity of changes made to a related quantity. Overall, the lessons were purposeful, well thought out and, where appropriate, the strategies used served to enable students to uncover the underlying concepts for themselves. All of this is excellent practice.

There was much evidence of teachers teaching for deep understanding. In one junior-cycle lesson on surds, for instance, a graphical explanation was used to illustrate the relationship between a number and its square root. This provided students with a very clear conceptual explanation and it was evident that the students had achieved a very good understanding of the underlying idea. This type of methodology has additional value in that it allows students to build on previous understanding when tackling new concepts and it is useful in providing links between different areas of the course. This is a very versatile strategy for learning in Mathematics and it is suggested that it be considered for inclusion in teaching and learning plans at every appropriate opportunity.

A variety of valuable differentiation strategies is used to facilitate students to achieve the learning objectives of each lesson. These include the provision of individual attention to students experiencing difficulty; the facilitation of students working in pairs with one of the pair taking the role of the teacher and the other acting as the student; the provision of graduated worksheets and the inclusion of activities that stimulate the better-able student while allowing plenty of time for all students to think. It was evident from discussions with teachers that, in keeping with excellent practice, differentiation strategies are central to lesson planning.

The relationships between students and their teachers are characterised by warmth, care and genuine mutual affection. Teachers have created secure learning environments where, through affirmation and support, students are encouraged to reach their full potential. Classroom atmospheres are conducive to students and teachers working together with enthusiasm and energy. Teachers motivate students to participate fully in their own learning and are creative in devising ways to make learning a positive experience. There were many examples observed where humour was used effectively to make learning fun for students.

The quality of learning in the lessons observed was very high. It was evident that teachers have high expectations for student achievement and that high standards are set for student work. The mathematics department complete an analysis of the school's performance in the certificate

examinations and use this to set achievement targets for Mathematics. The school is justifiably very proud of its success in this regard.

ASSESSMENT

First-year, second-year and fifth-year students are formally assessed at the end of the Christmas term and in May. Transition year students sit Christmas tests but are assessed in May on the basis of their portfolio work. 'Mock' certificate examinations are held in spring for third-year and sixth-year groups. Reports are sent home on foot of these formal examinations and parent-teacher meetings are held annually. Common examination papers are set with levels for each year group which is good practice.

Homework is set regularly and usually corrected as part of the following day's lesson. In keeping with very good practice, more substantial assignments are set for examination class groups in addition to nightly homework. In a Leaving Certificate lesson observed, a set of corrected assignments was handed back to students and these were reviewed by the inspector. Each paper was corrected using assessment for learning (AfL) principles, where constructive and encouraging comments were included. The work of the lesson was to address areas of difficulty noted by the teacher in correcting the assignments. The students were encouraged to participate actively in working through the difficulties encountered by providing assistance for each other. This approach facilitated the class group in deriving benefit from the completion of the assignments in a variety of ways and resulted in a very valuable learning opportunity for students.

It is mathematics department policy to set class tests at the end of each topic studied. Teachers assess progress on an ongoing basis throughout lessons by observation and oral questioning. Laminated cards and white board markers were used in one lesson to provide the teacher with a quick assessment of learning. Games such as 'Who wants to be a Millionaire?' are used as a means of revising and reinforcing key words and ideas. Overall, a variety of creative and valuable assessment techniques is used to enable teachers to monitor progress and to meet the individual needs of students.

It was evident through the review of student copybooks, folders and projects that the standard of student work is very high. The quality of the work in the LCA folders reviewed is also very high and all of the relevant key assignments have been successfully completed.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Whole school provision for Mathematics in terms of time allocation, timetabling arrangements for level choice, ICT and resources is very good.
- The Mathematics department takes a very student-centred approach to level choice; students are encouraged to study the highest level possible for as long as possible.
- The supports provided for students with learning support needs in Mathematics are very good.
- Significant progress has been made on planning for Mathematics and a comprehensive subject plan is in place.

- In all of the lessons observed the quality of teaching and learning was very high. Teachers are committed to working in partnership with students to help them to achieve their full potential.
- The mathematics department completes an analysis of the school's performance in the certificate examinations and uses this to set achievement targets for Mathematics.
- In the classrooms visited, there was much evidence of excellent student-teacher relationships and many examples of humour used effectively to make learning fun for students.
- A wide variety of teaching and learning methodologies was used in the lessons observed.
- A variety of creative and valuable assessment techniques is used to enable teachers to monitor progress and to meet the individual needs of students.

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

- The team of teachers teaching higher-level Leaving Certificate Mathematics should be expanded.

A post-evaluation meeting was held with the teachers of Mathematics and with the principal at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.