

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Mathematics
REPORT**

**Coolmine Community School
Clonsilla, Dublin 15
Roll number: 913150**

Date of inspection: 15 April 2010



**AN ROINN | DEPARTMENT
OIDEACHAIS | OF EDUCATION
AGUS SCILEANNA | A N D S K I L L S**

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

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Coolmine Community School, 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, examined students' work, reviewed school planning documentation and had discussions with the principal and deputy principals. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal and one of the deputy principals.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

The time allocation to Mathematics in the school is good. Junior-cycle classes have either five or six periods in the week, while fifth-year classes have five periods; Transition Year (TY) classes have four periods per week and sixth-year classes have six periods. Lessons are generally well spread throughout the week, facilitating for most classes, daily progress in a subject in which new learning builds to a great extent on previously developed skills and prior learning. Classes also have an appropriate mix of morning and afternoon periods. Three class groups are shared between two different teachers, a situation that can cause confusion for students. It is recommended that such arrangements be avoided in the future.

Currently, junior-cycle classes, from the beginning of first year to the end of third year, are organised into two separate bands with three class groups in the upper band and five in the lower. The school, through a planning task group, is actively reviewing the effectiveness and suitability of this arrangement. Upper band classes are taught Mathematics at higher level throughout the junior cycle in stand-alone groups. This can result, during third year, in the less than optimal situation of three mixed-level classes where the majority of students study higher level and a small minority study ordinary level. Lower band classes are also taught as stand-alone groups during first year. However, from second year onwards they are concurrently timetabled, facilitating the formation of higher, ordinary and foundation-level groupings for this cohort. Normally, one higher-level, three ordinary-level and one foundation-level class are formed and the timetabling strategy allows for changes in level to be made. A sixth lesson period is scheduled for upper band classes in second year and third year. While the school is congratulated on this allocation of additional time for Mathematics, efforts should be made to offer the sixth period in either second or third year to both lower and upper band classes. Senior cycle classes are concurrently timetabled across each of the three year groups, in line with good practice.

The level at which teachers teach Mathematics is decided by school management in collaboration with the subject teachers. Continuity is maintained for upper-band junior-cycle classes throughout

the three years and for lower band classes from second year to third year. In order to maximise the opportunity for continuity in lower-band classes going from first year into second year, every effort should be made to maintain the same team of teachers in the teaching block. Continuity is also maintained from fifth year to sixth year. There is rotation of levels between mathematics teachers and, appropriately, four of a total of fourteen are currently sharing the responsibility for teaching the Leaving Certificate higher-level course.

Students identified as finding Mathematics particularly difficult are supported, on a withdrawal basis, by members of the mathematics team, one of whom has recently attained a qualification in learning support. It was evident from planning documentation that, in line with good practice, there is collaboration between the educational supports department and the mathematics department.

Support is also provided for Leaving Certificate students experiencing difficulty with the ordinary-level syllabus. An additional class grouping has been formed at that level in the current sixth year, permitting greater attention to individual students' needs. This positive intervention, along with the rearrangement of all sixth-year ordinary-level groups for the final term, is being implemented in response to an issue identified by the mathematics team. This process of issue identification followed by introduction of remedial strategies is good practice. Steps taken should be monitored on an ongoing basis to ensure favourable outcomes.

Requests for material resources to enhance the teaching and learning of Mathematics are currently channelled through the co-ordinator to school management. Materials are then stored in a dedicated mathematics resource room to which all team members have access. This room is equipped with information and communications technology (ICT) hardware for teachers' use, storage presses and meeting facilities and is in itself an excellent resource for the mathematics department. The range of materials currently available in the school includes demonstration geometry equipment, class sets of calculators, numeracy games and shared worksheets.

At the time of the inspection, significant investment was being made by the school in ICT, with fixed data projectors being installed in all classrooms. Other ICT supports available include an interactive whiteboard and internet access. The school operates a shared drive system to which all teachers have access. It was reported that the mathematics department plans to upload subject-specific resources for use by the team.

Teachers are supported and facilitated in engaging in continuing professional development (CPD) and further study, and almost all members of the mathematics team have participated in Project Maths in-service offered to date. In line with good practice, a number of teachers hold membership of the Irish Mathematics Teachers' Association (IMTA), facilitating their ongoing familiarisation with issues and changes occurring in mathematics education in Ireland, including those due to Project Maths.

There has been a wide range of co-curricular mathematics activities promoted within the school to date. These have included Maths Week, the Hamilton Grand Challenge, training sessions for the Irish Mathematical Olympiad, and competitions for junior and senior students organised by the IMTA. Through participation in such activities, students get an invaluable chance to experience Mathematics outside the classroom; they provide a challenge for mathematically-gifted students, they increase the relevance of the subject and introduce a fun element for all, and the school is commended on its level of involvement.

PLANNING AND PREPARATION

The subject department structure is well established in the school and the co-ordinator of the mathematics department holds a special duties teacher post. Responsibilities of the department co-ordinator include arranging, chairing and minuting meetings, ordering resources, organising class groups, supporting teachers new to the department and driving planning activities. The current co-ordinator has held the post since 2002 and has gained extensive experience in leading a team of colleagues. The fact that the position forms part of the promoted posts structure of the school, however, lessens the opportunities for other team members to take on the role. Consideration might be given to finding a way by which the role of co-ordinator could rotate among the mathematics teachers, opening up opportunities for developing capacity within the department.

Formal meetings of the mathematics team are facilitated by school management around staff meeting times and through the release of teachers from scheduled lessons. Care must be taken to minimise teachers' absence from class due to subject department or other school meetings. Minutes of department meetings are, appropriately, kept alongside the department plan and are clear evidence of collegial discussion and collaboration. Informal discussions between two or more members of the department also take place.

A fairly comprehensive department plan has been drawn up for Mathematics. It includes the school mission statement, subject organisation details, school policy on meeting the needs of students with special educational needs, analysis of examination results, assessment procedures and other school policies and procedures. The cross-curricular links identified in the plan would benefit from greater development. Furthermore, the medium to long-term goal in this area should be to agree and implement a common approach to common elements across all relevant subject departments. For example, students learning to draw a bar chart in Geography would learn the same method as in mathematics class; working out a ratio or percentage in Business would be done in the same way as in Mathematics, and so on.

Mathematics teachers have worked collaboratively on the development of annual work programmes for each year group. The programmes currently take the form of chapters to be covered, along with indicative timescales. To maximise the potential of these programmes they should be presented in terms of learning outcomes and should include detailed reference to the use of resources or active methodologies at identified points. In reviewing the first-year programme it would be appropriate to incorporate the common introductory course for junior cycle Mathematics, developed as part of Project Maths. The current TY plan is strongly focussed on reinforcement of Junior Certificate material and on providing an introduction to the Leaving Certificate. In keeping with the aims of the TY programme, the plan should include clear details of how students are experiencing the subject differently. Teachers' personal planning and preparation materials were not made available during the inspection.

Achievement levels in certificate examinations are monitored and have been used to contribute to planning activities. The mathematics team is now encouraged to compile and analyse such data over a three or four-year period with a view to identifying main strengths and areas for improvement, thus contributing more fully to team planning and review.

TEACHING AND LEARNING

There were ten lessons observed over two days by the inspector and, in each, the lesson content was appropriate to year group and level. In the majority of lessons worksheets had been prepared

and distributed to students. Care must be taken, however, to maximise the effectiveness of class time for students, and a better balance between teaching activities and students' writing activities needs to be achieved.

There was one notable example of the lesson objective being shared explicitly with students at the beginning of class. It is recommended that all mathematics teachers make it their practice to clearly identify and explicitly communicate the lesson objective at the beginning of each lesson. This would focus students' attention and establish, from the outset, a clear sense of purpose. A review of its achievement, or otherwise, at the end of the lesson would help to reinforce learning.

Lessons were most often either structured around the teacher presenting at the board or focussed on students' written exercises. In line with the approach espoused by Project Maths, it is recommended that teachers introduce a wider range of teaching methodologies and varied student activities into class work. In one senior-cycle lesson, the process of planning an out-of-class mathematics activity in partnership with the students generated enthusiasm and enjoyment. This provided clear evidence of the positive effect of such activities on the learning experience.

There was natural and appropriate use of mathematical terminology and notation by both teachers and students. Teachers have developed this important aspect of mathematical communication very well. There were some examples of the successful relating of lesson content to students' real life experiences, adding to the relevance of the subject for students and increasing their levels of motivation. To maximise the benefits of this strategy, increased efforts should be made by all mathematics teachers to relate lesson content to real life whenever possible.

Most lessons observed were purposeful and students were making progress. However, care must be taken to ensure the pace of lessons is sufficiently challenging for all students in a class group. In some cases, additional materials may need to be prepared for small numbers of students. In other cases, the general expectations of student achievement may need to be raised.

Questions were often put to the class group as a whole and answers called out, in many cases, by the same students. More questions should be directed at named students to include all students in the work of the class and to check more carefully on levels of understanding. There were a small number of lessons in which very good use was made of probing questions, asking students to explain their answers. All teachers of Mathematics should include "why?", "how?" and "explain" as a core element of mathematics lessons, challenging students' understanding and guiding them through solutions.

In almost all lessons observed, students were attentive and engaged fully in the work at hand. Teachers had a relaxed rapport with students and mutual respect was in evidence. Classroom management was appropriate and effective and teachers were affirming of students' efforts. Students were comfortable answering teachers' questions and putting forward their own questions, providing evidence of a supportive learning environment.

ASSESSMENT

The good practice of administering common end-of-term examination papers is in place in most year groups. First-year students sit common papers within bands, and second, third and fifth year students sit common papers within levels. Teachers also share test papers meaning that class tests can also be common within levels.

Short to medium-term progress is assessed through the assigning and marking of class work, homework and class tests. A review of a random sample of students' copy books indicated such work to be relevant to programme and syllabus and, in some cases, clearly monitored and annotated by teachers. There were instances where students' standards of presentation and correction of written work were below the appropriate standard, and closer monitoring by teachers would lead to an improvement in this area. All students should be reminded, on a regular basis, of the importance of presenting and marking their work in a structured and orderly fashion as an aid to achieving their potential in the subject.

It was reported that teachers keep records of students' achievements in tests and examinations, building a profile of progress made, however, copies of these records were not made available during the inspection. This progress is reported to parents in formal written reports issued three times in the school year for first-year, second-year and fifth-year students and at parent-teacher meetings that take place once in the school year for each year group. Third-year and sixth-year reports issue twice in the school year.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- The time allocation to Mathematics in the school is good and lessons are generally well spread throughout the week. Classes also have an appropriate mix of morning and afternoon periods.
- Students identified as finding Mathematics particularly difficult are supported, on a withdrawal basis, by members of the mathematics team, one of whom has recently attained a qualification in learning support. There is collaboration between the educational supports department and the mathematics department.
- Support is provided for Leaving Certificate students experiencing difficulty with the ordinary-level syllabus through the formation of an additional class grouping at that level in the current sixth year.
- A dedicated mathematics resource room, equipped with ICT hardware, storage presses and meeting facilities is an excellent resource for the mathematics department.
- There has been a wide range of co-curricular mathematics activities promoted within the school including Maths Week, the Hamilton Grand Challenge, training sessions for the Irish Mathematical Olympiad, and competitions for junior and senior students organised by the IMTA.
- Minutes of department meetings, going back to 2002, are stored with the department plan and are clear evidence of collegial discussion and collaboration.
- Mathematics teachers have worked collaboratively on the development of annual work programmes with indicative timescales for each year group.
- In the lessons observed, there was natural and appropriate use of mathematical terminology and notation by both teachers and students.
- Teachers had a relaxed rapport with students and mutual respect was in evidence. Classroom management was appropriate and effective and teachers were affirming of students' efforts.
- The good practice of administering common end-of-term examination papers is in place in most year groups.

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

- A better balance between teaching activities and students' writing activities needs to be achieved in lessons. In line with the approach espoused by Project Maths, it is recommended that teachers introduce a wider range of teaching methodologies and varied student activities into class work.
- It is recommended that all mathematics teachers make it their practice to clearly identify and explicitly communicate the lesson objective at the beginning of each lesson. This would focus students' attention and establish, from the outset, a clear sense of purpose.
- Care must be taken to ensure the pace of lessons is sufficiently challenging for all students in a class group. In some cases, additional materials may need to be prepared and in other cases, the general expectations of student achievement may need to be raised.
- All teachers of Mathematics should include probing questions as a core element of mathematics lessons, challenging students' understanding and guiding them through solutions.
- In reviewing the first-year programme of work it would be appropriate to incorporate the common introductory course for junior cycle Mathematics, developed as part of Project Maths. The TY plan should include clear details of how students are experiencing the subject differently.
- To maximise the potential of programmes of work they should be presented in terms of learning outcomes and should include detailed reference to the use of resources or active methodologies at identified points.

A post-evaluation meeting was held with the principal and one of the deputy principals at the conclusion of the evaluation, when the draft findings and recommendations of the evaluation were presented and discussed.