

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Mathematics
REPORT**

**Saint Patrick's College
Cavan, County Cavan
Roll number: 61060M**

Date of inspection: 23 March 2010



REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN MATHEMATICS

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in St Patrick's College, Cavan, 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. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

In St Patrick's College the time allocation to Mathematics is good, indicating a strong commitment to the subject in the school. First-year, second-year and third-year classes each have five periods of Mathematics per week, Transition Year (TY) has three periods, and fifth-year and sixth-year classes each receive six periods per week. Lessons are well spread throughout the week and appropriately positioned in the school day, supporting for all classes other than TY daily progress in a subject in which new learning builds to a great extent on previously developed skills and prior learning.

Mathematics is concurrently timetabled throughout second year and fifth year, facilitating students in studying the subject at the level most suited to their abilities and interests, and allowing their movement between levels during the course of their studies. It is intended in the school that this practice will extend into third year and sixth year from the beginning of the 2010/2011 school year. This will schedule classes for Mathematics concurrently across all year groups from second year onwards. School management's willingness to put in place this arrangement, which places significant demands on the completion of the school timetable, reaffirms the importance given to the subject by the school.

First-year students are taught all subjects, including Mathematics, in mixed-ability groups. This allows them appropriate time to settle into the school and display their mathematical aptitudes prior to any decisions being made regarding the level at which they will study the subject. From second year, class groups are created according to mathematical ability, with additional support for students who find the subject challenging. Students are encouraged to study Mathematics at the highest level for as long as possible and it is school policy to discourage the uptake of foundation level. Care must be taken in this regard, however, to balance this practice with the undesirability of having students fail to attain a pass grade in the certificate examinations.

The decision regarding the level at which teachers teach Mathematics is changing from being a management decision to being one made by the mathematics teaching team. Concurrent timetabling, where a number of teachers are scheduled to teach within the same year group, is facilitating this change. There is some rotation of levels among members of the mathematics team

at junior cycle and it is expected this will become systematic. Continuity, however, is maintained from second to third years and from fifth to sixth years. The Leaving Certificate higher-level course is currently being taught by one teacher but it is intended that, from September, this responsibility will rotate between two teachers, one of them new to this level. School management recognises the importance of sharing the responsibility for teaching the subject at this level, and, in line with good practice, the need to have at least two teachers involved has been identified and acted upon.

Students in need of numeracy supports are primarily identified at the stage of transition from sixth class to first year. The process notably involves the completion of student profiles by both feeder primary schools and parents, and the school's entrance assessments that are used to pinpoint numeracy or literacy deficits. In addition, following the commencement of the school year, any teacher can report concerns to a member of the educational supports team. The needs of identified students are then addressed through withdrawal from class for support in small groups. It is recommended that the practice of withdrawing students from mainstream mathematics class, which is happening in some instances, be reviewed and, if possible, discontinued. Students experiencing difficulties could then remain with their peers for mathematics lessons and the support provided would be additional, increasing their contact and familiarity with the subject.

Consideration is currently being given to introducing other models of support for students, in line with good practice. In order to maximise the success of any innovations, it is recommended that a relevant professional development be offered to teachers involved prior to their implementation. Currently, supports in Mathematics are provided, for the most part, by teachers who themselves do not have a mathematics background. It is recommended that all such support be provided by members of the mathematics team under the guidance of the educational supports team.

Resources to enhance the teaching and learning of Mathematics are obtained on request by individual teachers or the department co-ordinator to school management. Significant funding is being invested by the school in information and communications technology (ICT) hardware and four of the mathematics team of eleven teachers have data projectors installed in their classrooms. The range of resources currently available to mathematics teachers in the school includes broadband access, interactive whiteboard, subject-specific wall charts and mobile and fixed data projectors.

Teachers are facilitated in engaging in continuing professional development (CPD) and there has been almost full involvement in Project Maths activities to date. Given the importance of this curriculum development initiative, it is recommended that all mathematics teachers participate fully in the current programme of CPD with a view to bringing into the classroom new ideas and approaches presented at in-service. Furthermore, it is recommended that the mathematics department take out membership of the Irish Maths Teachers' Association (IMTA) so as to keep up to date with issues and changes, including those due to Project Maths, occurring at the moment in mathematics education.

Some of the wide range of co-curricular mathematics activities now available to schools should be offered to students, allowing them experience Mathematics outside the classroom. Such activities can provide a challenge for mathematically-gifted students, can increase the relevance of the subject, and can introduce a fun element for all.

PLANNING AND PREPARATION

The work of the subject department is guided by a co-ordinator who assumed the role at the beginning of the current school year. His role, undertaken on a voluntary basis, includes chairing team meetings, disseminating information and liaising with school management on subject matters. The position rotates with the period of rotation decided by the serving co-ordinator. Consideration should now be given to agreeing a set period of rotation, say two years, in this way allowing each mathematics teacher the opportunity to lead the team and develop the subject department.

Formal meetings of the mathematics team are facilitated by school management around staff meetings and planning activities. Five such meetings had taken place in the current school year, prior to this inspection. Brief records are maintained and, in line with good practice, copied to school management. Such records should be stored with the department plan, helping to make it a living document that could be testament to collaboration and collegiality within the team.

The school has prioritised subject department planning in recent years and the subject department meetings referred to above have facilitated the development and review of a mathematics department plan. This document, which is in need of some updating and expansion, includes subject aims and objectives, details of the way in which Mathematics is organised in the school, suggested strategies for teaching students with special educational needs (SEN), and homework and assessment procedures. Teachers' personal planning and preparation materials were not made available for inspection.

Programmes of work for all year groups other than TY are contained in the department plan. The programmes currently comprise lists of topic headings to be covered at higher and ordinary levels along with textbooks and other course materials. It is recommended that the subject team work collaboratively on developing programmes of work for all year groups and levels that are stated in terms of learning outcomes and have agreed indicative time frames. Active teaching and learning methodologies, tried and tested by individual team members, should be included at specific points, making the document a valuable and ever-evolving resource. In reviewing the first-year programme it would be appropriate to incorporate the common introductory course for junior cycle Mathematics, developed as part of the Project Maths curriculum initiative. In addition, the order in which students are to progress through strands and topics should be agreed with a view to minimising gaps that might occur for those students changing level in the course of their studies. A programme of work for TY that reflects the principles of the Transition Year should now be included in the department plan.

It was reported that subject teachers analyse data provided by school management on results and uptake rates in certificate examinations. Such an analysis would appropriately sit in the subject department plan. The mathematics team is encouraged to compile and analyse examination data over a three or four-year period and use it to identify strengths and areas for improvement, thus contributing to team planning and review.

TEACHING AND LEARNING

In each of the nine lessons observed by the inspector, teachers had prepared for their teaching, with student handouts, worked examples and homework solutions, sometimes in digital format, contributing to the enhancement of the learning experience. A very small number of teachers began lessons by explicitly sharing the learning objective with students. It is recommended that

all mathematics teachers make it their policy and practice to clearly identify and explicitly state the learning objective at the beginning of each lesson, bringing a certainty and focus to class work.

All lessons were structured around the teacher presenting work at the board followed by the assigning of exercises for student practice. In some lessons, an effort to increase student participation was made through inviting students to the board. In recognition of students' different preferred learning styles and in line with approaches espoused by the Project Maths initiative, a wider range of methodologies should be explored and introduced into mathematics lessons.

There was natural and appropriate use of mathematical terminology and notation by teachers and some notable instances where this was also the case for students. Teachers of these classes are congratulated on developing so well this important aspect of mathematical communication. It now remains for all teachers to encourage their students to use the appropriate mathematical terms and expressions in their contributions, for example when suggesting the next steps in a problem or describing an error made in homework.

All students engaged in the work being done in class and, in almost all lessons observed, it was clear that students were making progress. The pace at which students were guided through lesson material and the expectations of progress communicated by teachers were, in most cases, appropriate to group and level and students responded accordingly. There were some good instances of lesson content being related to students' own experiences, enhancing their motivation and enjoyment of the subject.

There were a small number of very good examples of probing questions being asked, challenging students' understanding and guiding them through solutions. This commendable practice can help students to consolidate their learning, maintain engagement with the topic and foster a problem-solving approach. It is recommended, therefore, that all teachers increase their use of higher-order questions, appropriately challenging students, actively involving them in the work of the class, checking for understanding, and supporting them in developing the important skills of mathematical thinking and communication.

Mutual respect was observed at all times between teachers and students and classroom management was effective. Teachers were affirming of students' efforts and the classroom atmosphere was positive. Students were comfortable answering teachers' questions and putting forward questions, providing evidence of a supportive learning environment.

ASSESSMENT

The good practice of administering common end-of-term examination papers is in place in first year and achievement at both Christmas and summer examinations is taken into account by teachers when recommending the level at which a student should study Mathematics from second year. The extension of common examinations into second year would further support students' choice of level or assist in identifying a need to change level.

The assigning and marking of class work, homework and class tests are used by teachers to assess short to medium-term progress made in Mathematics. Regular formal testing of students' understanding and skill, preferably on completion of each syllabus topic, should be discussed and agreed by the mathematics team and documented in the department plan.

A review of a random sample of students' copy books indicated their work to be relevant to programme and syllabus and, in some cases, clearly monitored by teachers. There were instances where students' standards of presentation and correction of written work were less than satisfactory and in these cases, closer monitoring is required. All students should be reminded of the importance of presenting and marking their work in a structured and orderly fashion so as to increase the likelihood they will achieve their potential in the subject. The importance of them noting corrections indicated in class should also be reinforced.

Teachers' records of students' achievements in work assignments were not made available during the inspection. However, progress is reported to parents in formal written reports issued twice in the school year and at parent-teacher meetings that take place once in the school year for each year group.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- The time allocation to Mathematics is good. Lessons are spread appropriately through the week and well positioned in the school day. There is concurrent timetabling in second and fifth years and a commitment to extending this practice to third and sixth years from September 2010, all indicating a strong commitment to the subject in the school.
- First-year students are taught in mixed-ability groupings allowing them appropriate time to settle and display their mathematical aptitudes prior to any decisions being made regarding their level of study of the subject.
- Students in need of numeracy supports are appropriately identified using information from parents, feeder primary schools and incoming students' assessment tests.
- Significant funding is being invested in information and communications technology hardware and four of the mathematics team have data projectors installed in their classrooms.
- The work of the subject department is guided by a co-ordinator whose role includes chairing team meetings, disseminating information and liaising with school management. Formal meetings of the team are facilitated by school management around staff meeting and planning activities.
- Records of team meetings are shared with school management.
- There was natural and appropriate use of mathematical terminology and notation by teachers and some notable instances where this was also the case for students.
- There were some good instances of lesson content being related to students' own experiences, enhancing their motivation and enjoyment of the subject.
- There were a small number of very good examples of probing questions being asked, challenging students' understanding and guiding them through solutions.
- The good practice of administering common end-of-term examination papers is in place in first year and achievement in both Christmas and summer examinations is taken into account by teachers when recommending the level at which a student should study Mathematics from second year.

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

- Care must be taken to ensure that the policy of discouraging students from taking foundation level is balanced with the undesirability of having students fail to attain a pass grade in the certificate examinations.
- Teachers are encouraged to introduce co-curricular mathematics activities as a way of increasing relevance, introducing fun and raising challenge for students at all levels.
- Programmes of work for all year groups and levels, including TY, should be stated in terms of learning outcomes and have agreed indicative time frames. Active teaching and learning methodologies should be included or referenced at specific points.
- The order in which students are to progress through strands and topics should be agreed with a view to minimising gaps that might occur for those students changing level in the course of their studies.
- All mathematics teachers should make it their policy and practice to clearly identify and explicitly state the learning objective at the beginning of each lesson, bringing a certainty and focus to class work.
- A wider range of methodologies should be explored and introduced into mathematics lessons.
- All teachers should increase their use of higher-order questions, appropriately challenging students, actively involving them in the work of the class, checking for understanding, and supporting them in developing the important skills of mathematical thinking and communication.
- Regular formal testing of students' understanding and skill, preferably on completion of each syllabus topic, should be discussed and agreed by the mathematics team and documented in the department plan.

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