Subject Inspection of Mathematics
REPORT

St Patrick’s Classical School
Navan, County Meath
Roll number: 64350N

Date of inspection: 11 November 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 Classical School, Navan. 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, deputy principal and subject teachers. 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

St Patrick’s Classical School has a current enrolment of 851 boys. Whole school support for Mathematics is very good in relation to timetable provision and timetabling arrangements for level choice. Concurrent timetabling is provided for mathematics lessons in all year groups except transition year (TY); this is valuable in facilitating a change of level where necessary. TY is optional and there is one mixed-ability class group for Mathematics.

At the beginning of first year students are assigned to higher and ordinary level class groups in order of ability on the basis of the results of incoming assessment tests. This means that the top scoring thirty or so students are put into one group; the next thirty students are put into the next group and so on. The groups are rearranged in a similar way following common Christmas examinations. Throughout second and third year it is good that there is genuine flexibility for any student to be reassigned to a class group best suited to his ability. It is recommended, however, that the mathematics department review its practice in assigning students to level groups.

Consideration should be given to the creation of mixed-ability classes for the duration of first year and to the mixing of abilities within levels where there is more than one class group of a particular level. This measure would allow students to settle into first year before decisions regarding levels are made; it would allow teachers to have a greater role in these decisions and would avoid providing students with an explicit statement of expectation that might go on to define them. The research available in this area should be consulted as part of the review. ‘Moving Up’ and the longitudinal study, following students through second level education, carried out by the Economic and Social Research Institute (ESRI) should prove informative to such a review.

Twelve teachers make up the mathematics department. There is good rotation of levels in the junior cycle. The number of teachers teaching higher level Leaving Certificate Mathematics has recently been increased to four teachers which is a good development. Additional teachers are
provided for each year group to enable smaller classes to be formed for students who experience difficulty with Mathematics. This is a good support for students. The teachers of Mathematics have been very active in engaging with continuing professional development (CPD) and school management is supportive in this regard. In addition to attendance at the Project Maths workshops teachers have attended a variety of mathematics-related CPD courses in their own time. This is evidence of the teachers’ commitment to their own professional development and to the subject.

Information and communications technology (ICT) provision for Mathematics is very good. All classrooms are fitted with a ceiling-mounted data projector and a personal computer and there is broadband internet access throughout the school. The school’s two computer rooms can be accessed for mathematics lessons through a booking system also. Teachers integrate geometry software such as Geogebra, Autograph and Geometer’s Sketchpad in lessons where appropriate. Other resources, including, geometry equipment, trundle wheels, clinometers, measuring equipment, dice and playing cards are used to make mathematics lessons more active for students. The range and variety of resources available for teaching and learning in Mathematics are evidence of teachers’ interest in the subject and commitment to making lessons stimulating for students.

Appropriate procedures are in place for identifying students who have learning support needs in Mathematics. Support is provided through small group withdrawal and the creation of very small classes which is very appropriate. Members of the mathematics department have also developed their capacity to contribute in this area. Team teaching, involving two mathematics teachers, has in past years been used as a method of delivering numeracy support which is very positive and the reintroduction of this model is encouraged. A resource teacher who is qualified to teach Mathematics provides learning support in the subject which is in keeping with very good practice. The resource teachers are however timetabled at the same time as Irish to coincide with students who are exempt from studying the language and this reduces the flexibility in learning support provision for students with mathematical difficulties. For example, it reduces the feasibility of providing in-class support in Mathematics. It is recommended that ways in which more flexible arrangements can be made in this regard should be considered in the creation of next year’s timetable. Teachers provide individual attention to any student experiencing difficulties on an ongoing basis throughout lessons. Overall, good provision is made for students experiencing difficulty with Mathematics.

The school encourages students to participate in training for the Irish Mathematical Olympiad; this is valuable in providing a very high level of challenge for students with a strong interest in Mathematics. It is suggested that the mathematics department consider other ways to engage students in activities of mathematical interest. The Irish Junior Mathematics Competition and the PRISM Mathematics Challenge are offered as ideas to engage students outside the classroom. Chess and bridge are suggested as games that might appeal to a wider group of students and would be very good for developing students’ problem-solving and critical-thinking skills.

PLANNING AND PREPARATION

There is good provision of planning time for Mathematics and evidence of very good practice in terms of collaboration amongst department members. Informal meetings are also held regularly. The department is currently co-ordinated by an experienced member of the teaching team and in line with good practice this position rotates amongst members of the team. In addition to organisational issues planning meetings are used for discussion around strategies in teaching and learning which is very positive. It is very good to note that teachers are proactive in integrating
the teaching and learning plans provided for the introduction of Project Maths into lesson planning. To formalise and extend this good work it is suggested that each teacher teach a number of lessons, following the teaching and learning plans and then report back to the team as a whole.

Very good work has been completed on subject department planning and there was evidence of excellent practice in relation to curriculum planning. The mathematics plan contains all of the policy documents relevant to the subject and very well developed programmes of work for each year group and level. Each year group’s programme is set out in terms of student learning objectives, the resources necessary, methodologies used and assessment. The new syllabus documents are provided in terms of student learning outcomes and will complement the existing programmes of work very well. It is suggested that curriculum planning should now focus on interpreting the syllabus to identify learning outcomes that link mathematical ideas together. Some time should also be spent on matching teaching and learning plans with the corresponding learning outcomes on the syllabus and organising these to make them more readily accessible for teachers.

The content of the TY plan comprises mainly Leaving Certificate material and is not in keeping with the spirit of a good TY programme. It is recommended that the TY plan be reviewed to include more variety of Mathematical experience for students. A module of Applied Mathematics, a project on budgeting, statistical surveys, a project on the practical applications of trigonometry and the history of Mathematics are offered for consideration. It is important that in TY students are provided with opportunities to develop their interest and enthusiasm for the subject.

**TEACHING AND LEARNING**

Eight lessons were observed in the evaluation and the quality of teaching and learning in all cases was high. Appropriately, most lessons opened with the provision of an outline of lesson content. Best practice in this regard was observed where the expected learning outcomes were shared with students at the start of the lesson and their achievement checked at the end of the lesson. Where it was appropriate prior learning was revisited before new material was presented which is good practice. In all cases teacher instructions and explanations were clear and there was good variety in the learning activities provided for students. In many cases teachers put mathematical ideas in a context that would appeal to students which is very good. The pace of lessons was appropriate to students’ abilities.

Teacher example followed by student exercise was a feature of all lessons. This was complemented by the good use of ICT in one instance and by the use of pair work and investigative strategies in others. It was evident from the discussions that took place in one lesson, on finding the perimeter of various shapes, that active learning sometimes takes place. It is also clear from the range of resources available that there is openness within the mathematics department to the inclusion of active methodologies. There was scope in some of the lessons observed for the more extensive use of discovery and investigation to enable students to engage in a more concrete way with lesson content. It is recommended that teachers collaborate on increasing the range of methodologies, including ICT used to deliver mathematics lessons.

Very consistent practice in relation to teaching for deep understanding was observed in all lessons with all teachers taking a conceptual approach. This was facilitated by very good use of open questioning strategies that encouraged students to explain their reasoning and to fully explore the ideas presented. Teachers were dedicated to ensuring that students had reached full understanding
and would not proceed to the next concept until they were satisfied that this was the case. Students were very active in asking probing questions of teachers and it was evident that students were accustomed to being encouraged to take responsibility for their own learning in this way.

There was good evidence to suggest that most teachers are taking a Project Maths approach and that they are familiar with the teaching and learning plans provided by the Project Maths development team. A lesson observed on co-ordinate geometry provided a good example of this. In this lesson students worked in pairs on deriving the formula for the area of a triangle. The teacher provided a series of activities for the students to work on; these were well designed to ensure that learning could progress from completing a specific, numerical example to developing a general formula. At various points in the lesson the teacher provided assistance in the form of general advice that facilitated students in achieving the conceptual elements of the task for themselves. There was a sense of excitement when the formula was derived. This excellent lesson closed with the students verifying the new formula by using it to work out the area in the original numerical example. The investigative approach taken in this lesson is very much in keeping with the spirit of Project Maths.

In some lessons observed learning was well differentiated to suit all of the students in the class group. The differentiation strategies used included the provision of graduated worksheets and the provision of individual attention to any student experiencing difficulty. In some cases, however, students who had successfully completed homework or class work needed to be provided with additional material while corrections were worked through on the board. It is recommended that additional work be provided for such students in order to ensure that they are sufficiently challenged and engaged.

In all cases the quality of learning was high as students engaged very well with the work at hand. Students were observed to take responsibility for their own learning through asking and answering questions. In some of the classrooms visited students provided assistance for each other in solving problems; this happened spontaneously in some cases and was part of the lesson plan in others. Students paid very good attention to teacher explanations and demonstrated an interest in the subject.

All lessons progressed within secure, well structured learning environments where teachers had developed good routines for classroom management. The standard of student behaviour was high. The teacher’s approach was particularly positive with one group observed where the students experienced difficulty maintaining attention and focus. This involved the lively delivery of a very good variety of learning activities. In order to complement this current very good approach it is suggested that the provision of short term rewards should be considered as an additional strategy in the management of such students.

Classroom atmosphere was conducive to developing student confidence with the subject and in all cases the quality of relationships between the students and the teachers was very good. There was a strong sense of warmth and care in all of the classrooms visited. Students responded well to the encouragement, support and affirmation frequently supplied by their teachers. Overall it was evident that through very good collaboration between students and their teachers a strong sense of teamwork had been developed.
ASSESSMENT

There is good practice in relation to assessment. Formal examinations, with reports sent home, are held at Christmas and in May. Students preparing for the certificate examinations sit ‘Mock’ examinations in the spring. Common examination papers are set for each year group and level which is good practice. In addition it is mathematics department policy to set class tests at the end of each topic studied. Parent-teacher meetings are held annually.

Ongoing assessment takes place in class through oral questioning and teacher observation. There are two class sets of laminate boards available for use in assessing students’ progress throughout lessons. Students write their answers on the laminate boards and hold them up for the teacher to see; this provides teachers with a very quick and comprehensive assessment of student understanding. There was scope for including this kind of assessment in some of the lessons observed and therefore an extension of the use of laminate boards in this way is recommended.

Homework is set regularly and usually corrected as part of the following lesson. It was evident from the review of student copybooks that the standard of presentation of students’ work is generally very high.

The school completes an analysis of the school’s performance in the certificate examinations compared to national norms each year. This information is used to inform some aspects of planning for Mathematics, such as timetable provision or timetabling arrangements. It also allows the mathematics department to monitor progress and to plan for ongoing development of the subject in the school. It was evident from this analysis that the school is performing well in Mathematics.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Whole school support for Mathematics is very good in relation to timetable provision and timetabling arrangements for level choice.
- Mathematics is very well provided for in terms of information and communications technology and resources.
- Good provision is made for students experiencing difficulty with Mathematics.
- There is good provision of planning time for Mathematics and evidence of very good practice in terms of collaboration amongst department members.
- Very good work has been completed on subject department planning and there was evidence of excellent practice in relation to curriculum planning.
- The quality of teaching and learning was high in respect of the eight lessons observed in the evaluation.
- Very consistent practice in relation to teaching for deep understanding was observed in all lessons with all teachers taking a conceptual approach.
- Classroom atmosphere was conducive to developing student confidence with the subject and in all cases the quality of relationships between the students and the teachers was very good.
- There is good practice in relation to assessment.
As a means of building on these strengths and to address areas for development, the following key recommendations are made:

- The mathematics department should review its practice in assigning students to level groups. Consideration should be given to the creation of mixed-ability classes for the duration of first year and, in all year groups, to the mixing of abilities within levels where there is more than one class group of a particular level.
- In the creation of next year’s timetable, more flexible arrangements should be considered with regard to how learning support provision in Mathematics is organised.
- The TY plan should be reviewed to include more variety of Mathematical experience for students.
- Additional work should be provided for students who have completed assigned tasks throughout lessons in order to ensure that they are sufficiently challenged and engaged.

A post-evaluation meeting was held with the teachers of Mathematics, the principal and 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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