Subject Inspection of Mathematics
REPORT

St Clare’s College
Ballyjamesduff, County Cavan
Roll number: 61051L

Date of inspection: 23 February 2010
SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in St Clare’s College. 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. 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 Clare’s College has a current enrolment of 182 boys and 209 girls. Timetable provision for Mathematics and timetabling arrangements for access to level choice are very good. Students are placed in mixed-ability class groups in first year and are assigned to higher and ordinary levels from second year onwards. Transition year (TY) is optional and there is currently one TY mixed-ability mathematics class group. In keeping with good practice, students are encouraged to study the subject to the highest level possible for as long as possible. A change of level takes place following consultation with students, parents, teachers, the guidance counsellor, and the principal.

The mathematics department comprises six teachers. In general, there is good practice in relation to the assignment of teachers to class groups; levels for junior cycle mathematics are rotated amongst the entire teaching team. Levels for the senior cycle are rotated amongst those teachers who are currently involved in teaching Mathematics to Leaving Certificate. The responsibility for teaching TY mathematics currently falls to one member of the teaching team. It is recommended that TY mathematics should be rotated amongst all teachers of the subject; this will help to maintain capacity in the department and will provide more variety of opportunity for the teachers.

The mathematics department has good access to information and communications technology (ICT). The computer room can be booked for mathematics lessons and a mobile data projector and laptop are also available. One room that is used by the mathematics department has been fitted with an interactive whiteboard. There is scope to increase the use of ICT in teaching and learning in Mathematics. It is therefore recommended that mathematics teachers seek ways in which this can be achieved.

A wide range of resources is available for teaching and learning in Mathematics; these are stored in a central location and are well shared among the teaching team. Classrooms are student-based therefore materials, resources and ICT equipment have to be carried from the storage areas to the
classroom. This arrangement is placing limitations on the use of concrete materials and active methodologies in lessons. However, in order to facilitate the effective implementation of the upcoming changes to the mathematics syllabuses and in particular to the changes in emphasis in terms of methodology and delivery, it is important that these limitations be overcome. Consideration should be given to equipping some of the rooms currently used by mathematics teachers, for example science rooms and the music room, with a range of resources and using these rooms on a rotational basis. In addition, students should be encouraged to make mathematics resources and to collect everyday objects that can be used in mathematics lessons. A mathematics storage area could also be created in students’ base classrooms.

Students in need of learning support are appropriately identified. Support is provided through team teaching, small group and one-to-one withdrawal, and the creation of smaller class groups. A ‘buddy’ system has been established whereby TY students provide assistance to students who find Mathematics difficult. This initiative provides benefits to both groups of students and is in line with very good practice. Students who have exceptional ability in Mathematics are encouraged to work on mathematically challenging material. It is evident that a high level of learning support in Mathematics is provided to students.

There are a number of students in the school who do not have English as their first language. It is good that many valuable interventions are available to support these students. To complement the good measures that are already in place for such students it is recommended that they be encouraged to bring an English-second language dictionary to mathematics lessons. In addition, it is recommended that teachers create key word charts for each topic covered. These should have each key word translated into all of the languages represented in the class group. A graphic description should also be included where appropriate.

Students are provided with opportunities to participate in extracurricular mathematics-related activities. World Maths Day and Maths Week are celebrated as significant events in the life of the school. Participation in mathematical activities outside the classroom provides a very valuable opportunity for students to experience Mathematics for pleasure.

**Planning and Preparation**

Formal planning time is allocated once per term as part of the school planning process. Minutes are kept of all planning meetings. Mathematics teachers also meet informally on a day-to-day basis to discuss issues that arise. Currently one experienced teacher co-ordinates the mathematics department. It was evident from the review of the minutes of planning meetings that discussion centres on organisational issues, such as assigning students to class groups. While these types of discussions are necessary, it is recommended that the members of the mathematics department engage in the sharing of best practice, the exploration of ideas gained from attendance at in-service courses and the development of greater variety in teaching and learning strategies.

Good progress has been made in planning for Mathematics. The mathematics plan includes minutes of all formal planning meetings, a list of the resources available, examination material and details of in-service courses attended. The plan also includes programmes of work for each year group and level. These comprise a list of chapters of the text book to be covered within agreed timeframes. It is recommended that these programmes of work be developed, over time, to include learning objectives, methodologies, resources necessary and assessment modes. The
teaching and learning plans provided in preparation for Project Maths and the information received at the workshops attended should be used to guide this work.

The TY plan mainly consists of a list of Leaving Certificate topics. A project on the lives of famous Mathematicians and mathematical puzzles and games are also included. The plan does not accurately reflect the very good work taking place in TY. In keeping with a good TY programme the Leaving Certificate topics are taught using a variety of methodologies and approaches. The study of statistics, where the data used is derived from a survey designed and complete by TY students, provides a good example of this. In addition, TY students are involved in the ‘Buddy System’ with students experiencing difficulty with Mathematics. The plan should be developed so that it reflects and informs classroom practice in TY.

TEACHING AND LEARNING

High quality teaching was evident in all six lessons observed. In all cases the lessons were well planned, purposeful and appropriate to the syllabus. Each of the lessons was well structured and had a clear focus. It was evident that teachers had set teaching objectives in their lesson planning in terms of the quantity of material to be covered in the lesson. The quality of learning tended to be highest in lessons where the teaching objectives were linked to student learning outcomes. In some cases teachers provided students with an explicit statement of the expected learning outcomes and monitored progress throughout the lesson to ensure that each student was achieving these; this is in line with good practice. However, it was evident in two of the six lessons observed that the students had not achieved understanding of the core concept of the lesson, even though the planned material was covered. It is therefore recommended that teachers share the planned learning outcomes with the students at the beginning of each lesson and that their achievement be checked at the end.

The main methodology employed in lessons was a combination of teacher example and student exercise. A good balance was achieved between teacher input and student activity; this good practice encouraged student participation and engagement. Examination preparation, in the form of working through past certificate examination papers was the main activity in two of the lessons. It is recommended that teachers collaborate on increasing the variety of methodologies used in teaching and learning in Mathematics. This is of particular importance in maintaining high levels of student interest in revising for the certificate examinations.

Teachers’ work on the board and their explanations were clear in all cases. Teachers were careful to relate the work of lessons to prior learning and to real life. In one instance, where calculus was introduced, a recapitulation of previously learned material was completed; this very good practice made a positive contribution to the evident progress made by students. In this lesson, however, the rules of differentiation were introduced without the underlying principles being covered. This resulted in the students learning how to use the rules of differentiation without exploring the significance of finding the derivative of a function. An understanding of the deeper concept would have been facilitated by starting at the most basic level of the concept, slope of a tangent to a curve, moving on to differentiation from first principles and gradually building towards differentiation by rule. This lesson provides a good example of the need to follow the natural hierarchy of each topic so that students can achieve a deep understanding. It is recommended that teachers take this into consideration in lesson planning.
Very good use was made of questioning to involve students and to assess progress. It is good that in most cases higher-order questioning strategies were used to encourage students to understand the underlying concepts in explanations. The focus of some of the lessons observed, however, was on the mastering of a particular technique, through practice, rather than on the exploration of the underpinning ideas and concepts. For example, in a lesson on ratio, it was evident through student questioning that the students had mastered the technique necessary to complete the questions in the textbook without fully understanding the concept of ratio. It is therefore strongly recommended that teachers ensure that lessons focus on encouraging students to gain as deep an understanding of the mathematical concepts involved as possible. In the lesson above this could have been achieved by presenting suitable scenarios, inviting students to examine and question the ideas and by engaging in discussion to expose and argue conceptual misconceptions.

An active methodology was used in the TY lesson on probability. The teaching and learning plan for this lesson was provided at the recent Project Maths workshop attended by teachers, in preparation for the upcoming changes to the mathematics syllabuses. It is very good that the Project Maths materials are becoming part of teaching and learning practice at this stage. The learning activities were well managed and through very good discussion the students were facilitated in examining the ideas presented. The students participated enthusiastically in the lesson activities and engaged well in discussions and in asking and answering questions. By the end of this very good lesson the students were able to demonstrate that the learning objectives had been achieved.

The relationship between students and their teachers was characterised by warmth and good humour. Students responded well to the encouragement, affirmation and support that they received from their teachers.

**ASSESSMENT**

Class tests are held for first, second, fifth and transition year students at Christmas. Students preparing for the certificate examinations sit ‘pre-certificate’ examinations in February. Formal examinations are held for first, second, fifth and transition year students in May. Reports are sent home on foot of these formal examinations and parent-teacher meetings take place annually. Common examination papers are set within levels for each year group which is good practice. It was evident from the review of the first year formal examination papers that there is a need for the questions set to be differentiated, so that their component parts provide an appropriate challenge for the full range of learners. This measure would contribute to the quality of the information gained from examination results.

Ongoing assessment takes place in class through teacher observation and oral questioning. A high level of in-class student monitoring was evident in most of the lessons observed, where teachers made good use of the time available while students were working to check progress and provide assistance. In one lesson there was scope for the provision of more assistance and monitoring, it is therefore recommended that the good practice used in most lessons be extended to all lessons.

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 student work is generally very high.
It is mathematics department policy to set class tests at the end of each topic covered. In one case weekly tests are set to motivate and encourage students preparing for the certificate examinations. In order to build on the good assessment practices already in place it is recommended that mathematics teachers consider Assessment for Learning (AfL) as a learning tool in the wider sense. Further information on AfL is available on the National Council for Curriculum and Assessment website (www.ncca.ie).

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- Timetable provision for Mathematics and timetabling arrangements for access to level choice are very good.
- A high level of learning support in Mathematics is provided to students.
- Good progress has been made in planning for Mathematics. The quality of planning for the lessons observed was good and was purposeful and appropriate to the syllabus.
- High quality teaching was evident in all six lessons observed. All were well structured and clearly focused with a good balance achieved between teacher input and student activity. Teachers’ work on the board and their explanations were clear in all cases.
- Very good use was made of questioning to involve students and to assess progress.
- The school’s practice in relation to assessment is good.
- The relationship between students and their teachers was characterised by warmth and good humour.

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

- The members of the mathematics department should engage in the sharing of their own best practice, the exploration of ideas gained from attendance at in-service courses and the development of greater variety in teaching and learning strategies.
- The programmes of work for Mathematics should be developed, over time, to include learning objectives, methodologies, resources necessary and assessment modes. The Project Maths teaching and learning plans as well as guidance received at workshops should be used to guide this work.
- Teachers should share the planned learning outcomes with the students at the beginning of each lesson and their achievement should be checked at the end.
- Teachers should ensure that the focus of lessons is on encouraging students to gain as deep an understanding of the mathematical concepts involved as possible.

Post-evaluation meetings were 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.

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