An Roinn Oideachais agus Scileanna
Department of Education and Skills

Subject Inspection of Mathematics
REPORT

Virginia College
Virginia, County Cavan
Roll number: 70390L

Date of inspection: 30 April 2010
REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN MATHEMATICS

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Virginia 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, deputy principal and subject teachers. The board of management of the school was given an opportunity to comment on the findings and recommendations of the report; the board chose to accept the report without response.

SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT

Virginia College has a current enrolment of 340 boys and 303 girls. Timetable provision for junior cycle Mathematics is poor. Four class periods are allocated to each of first, second and third year groups. It is recommended that the time allocated to Mathematics in the junior cycle be reviewed with regard to increasing the provision. The provision of time allocated to Mathematics at senior cycle is good with two class periods in Transition Year (TY) and six periods to both fifth and sixth year class groups. The provision for Leaving Certificate Applied (LCA) Mathematical Applications is in line with syllabus requirements.

Students are assigned to mixed-ability class groups on entry into first year and are divided into higher and ordinary-level groups after Christmas. In line with good practice, mathematics lessons are timetabled concurrently in all year groups, with the exception of TY, to allow students to change level where necessary. There is one mathematics group in TY and it is of mixed ability. It is mathematics department practice to limit access to higher-level Mathematics to the number of students who will fill the higher-level class groups. Although the higher-level classes are very large, there are a small number of junior cycle students in the school who have not had the opportunity to study higher-level Mathematics as they could not be accommodated in the higher-level classes. It is therefore strongly recommended that the current restricted access for students to higher-level Mathematics be reviewed. It is essential that all students who are capable of attempting higher-level Mathematics in the junior cycle get the opportunity to do so.

There are ten teachers in the mathematics department. There is good rotation of levels in the junior cycle; however, only two of the ten teachers have responsibility for teaching higher-level Leaving Certificate Mathematics. It is recommended that the number of teachers teaching higher-level Leaving Certificate Mathematics be increased.
Resource provision for Mathematics is very good. Most classrooms are fitted with a personal computer and data projector; the computer room can be accessed on a booking system; in addition some tablet personal computers have also been provided for use in teaching and learning in Mathematics. Other resources used in mathematics lessons include geometry equipment, 3-D solids, and overhead projectors. Teachers have created stimulating mathematical environments with a range of student-generated work, commercial posters and teacher-made displays such as number lines and key word charts. Teacher continuing professional development is encouraged by management and most teachers are members of the Irish Mathematics Teachers’ Association.

Appropriate procedures are in place for identifying students who have learning support needs in Mathematics. Support is provided through one-to-one and small group withdrawal, and the creation of smaller class groups. Team teaching is also used to provide support for students in Mathematics. Overall, good arrangements are made from a range of valuable options for students experiencing difficulty with Mathematics.

Students are encouraged to participate in a variety of extracurricular and co-curricular mathematics activities. These include participation in the **BT Young Scientist and Technology Exhibition**, and the **PRISM Maths Challenge**. In addition **Maths Week** is celebrated in the school each year. Providing opportunities, such as these, for students to experience Mathematics for fun is a very valuable way of encouraging an interest in the subject.

**PLANNING AND PREPARATION**

There is good provision of planning time for Mathematics. Formal meetings are organised five times per year as part of the whole-school planning process. Agenda are set for these meetings and minutes are kept. There is a co-ordinator for the work of the department and in keeping with good practice this position rotates amongst members of the teaching team. The members of the mathematics department provide support and advice for each other through the regular conversations about Mathematics that take place informally. It was 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 it is recommended that time be set aside also for teachers to engage in the sharing of ideas and expertise.

Significant progress has been made on planning for Mathematics and a comprehensive plan has been developed. Policies on assessment, homework, and providing for students with special educational needs are examples of the policies that are contained within the planning documentation. In addition, it is good that a list of effective methodologies is included in the plan. A section of the plan is allocated to planning for changing departmental needs, such as the need for further use of information and communications technology (ICT) in teaching and learning. This is evidence of teachers’ commitment to developing their own professional skills.

Common programmes of work have been developed for each year group and level. These are developed in terms of topics to be covered within agreed timeframes; resources necessary and modes of assessment are also outlined. It is recommended that the good work that has already been done on these programmes continue with a focus on the expected learning outcomes for students. In addition, as a means of preparing for the upcoming syllabus changes, it is also recommended that mathematics teachers use these programmes of work to engage in the development of teaching and learning plans. 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.

A very high quality TY plan has been developed. The plan opens with a rationale for TY Mathematics that focuses on including additional non-syllabus content and a variety of methodologies to engage students in developing an interest in the subject. Topics such as ‘magic squares’, cryptography, puzzles, budgeting, career investigation, Applied Mathematics, and project work form part of the TY programme. Some syllabus content is taught in TY using alternative methodologies, such as investigation, surveys, active methodologies including outdoor activities, and ICT. The plans for teaching each topic are very clearly outlined in terms of learning objectives, methodology, resources and modes of assessment. It is clear that much thought and effort went into devising this programme and it is in keeping with the spirit of a very good TY programme. Furthermore, the ease with which it could be adopted by any other teacher is a very valuable aspect of the design of this TY plan.

**TEACHING AND LEARNING**

In general the quality of teaching and learning observed was high. In most cases teachers shared the learning objectives with the students. In general this took the form of an oral introduction to the work of the lesson. Best practice in this regard occurred in one instance where the learning objectives were written on the board at the beginning of the lesson and their achievement was checked at the end. This very good strategy allows teachers to structure lessons around student understanding and to focus activities on learning outcomes, therefore its further use is recommended. Teacher instructions and explanations were clear and in most cases the pacing of learning activities was appropriate. By allowing students additional time to explore the valuable material presented, a slower pace would have enhanced learning in a small number of lessons.

The main methodology used was teacher exposition; however, this was complemented by the use of ICT, and by setting students in group and pair work. One lesson took place in the computer room. Although there was much use of ICT, there is considerable scope for an increase in the diversity of its use. It is recommended that a wider variety of methodologies be considered for use in mathematics lessons; investigation, discovery, active learning, and research are suggested.

There were some good examples of teachers providing opportunities for students to work independently and to think for themselves. In general this was achieved by encouraging students to focus on the strategic aspect of the work at hand and by only providing assistance to students where necessary. These strategies will support the mathematics department in preparing for the introduction of *Project Maths* where students will be expected to apply learning in unfamiliar situations. In one case, however, a step-by-step breakdown was provided in preparation for each question attempted by students, where all of the strategic elements of the tasks were outlined. In order to avoid students becoming overly dependent on their teacher it is recommended that strategies that encourage them to think for themselves be included in all lessons.

Good use was made of various types of questioning in all of the lessons observed, and in some instances teachers made excellent use of questioning. The variety included quick questions that were used to involve students; open questions that were used to encourage students to examine the underlying principles and concepts; and questioning that formed part of teachers’ assessment of understanding throughout lessons. Students also engaged very well in asking questions; in one
case the teacher’s attention to answering student questions accurately and to ensuring that students were satisfied with explanations was exemplary.

A variety of approaches was used to encourage students to develop a deep understanding of the concepts presented. There were good examples of links being made between connected areas of the syllabuses, such as linking linear simultaneous equations with the intersection of two lines. Students were encouraged to recall concrete activities that had been previously undertaken, to assist them in answering questions. Explanations that started from a position of solid student understanding and developed to incorporate new ideas were used in some cases. Best practice in this regard was observed in two lessons. In one such lesson, on finding the area under a curve, the students were facilitated in questioning, testing and accepting the concept through taking a line and finding the area under it by integrating the function and also by applying the familiar formula. In another lesson, on co-ordinate geometry, when finding the equation of a line parallel to an axis, the students plotted points along the line and were then asked to describe what they noticed. These approaches are very valuable in teaching and learning in Mathematics and should be included in lesson planning wherever possible.

Teachers differentiated learning by providing individual attention for students experiencing difficulty and by facilitating group and pair work. It is recommended that this good practice be expanded upon by using graduated worksheets that provide for the less able student also while containing challenging material for the more able. In addition, strategies that encourage students to provide assistance to their classmates or to work ahead on their own initiative when appropriate should be used. Learning should also be differentiated by using active methodologies that engage and stimulate all students and allow teachers time to provide individual attention to anyone experiencing difficulties.

Classroom management was very good in most of the classrooms visited. In general, the standard of student behaviour was very high. Designated seating for students would have improved the classroom dynamics in one case. In another instance a number of students were instructed to remain outside the classroom for the duration of the lesson. The classroom door was left open and the teacher periodically left the room to discipline these students. The repeated interruptions that occurred had a very disruptive effect on learning for the students in the classroom. Leaving students unattended also poses a health and safety risk. It is therefore recommended that situations of this nature do not recur.

The relationships between students and their teachers are very positive in most cases. Teachers are encouraging and affirming of student effort and students respond well to this. Classroom atmosphere is conducive to encouraging confidence with the subject. Students participate well in lessons and their contributions are warmly welcomed. Teachers are very generous in providing assistance to students outside of their timetabled hours. Overall, it was evident that teachers, out of a strong sense of care for their students, are committed to helping them achieve their potential in Mathematics.

**ASSESSMENT**

All year groups are assessed in October and at Christmas. First, second and third year students sit summer tests in May. ‘Mock’ examinations are held in the spring for students preparing for the certificate examinations. Reports are sent home on foot of these assessments and parent-teacher meetings are held annually. Common examination papers are set within levels for each year group.
which is good practice. It is good that students who are entitled to reasonable accommodations in the certificate examinations also receive the required assistance in the in-house examinations.

Class tests are set at the end of each topic studied. In general teachers assess progress very well through observation and oral questioning. In one case there was a need for more care to be taken in the correction and monitoring of student work. The standard of student work in the copybooks reviewed was appropriate to student ability and students are making steady progress in Mathematics. This is borne out by the analysis of the school’s performance in the certificate examinations compared to national norms; which indicates that the school is performing well.

There was some evidence of Assessment for Learning (AfL) practices with positive and constructive comments included in correction of student work. In addition, the work of students of the LCA class group visited was exchanged between students for correction. This was observed to be very effective and provided a very good learning opportunity for students through the facilitation of high quality engagement and discussion.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- Resource provision for Mathematics is very good.
- Good arrangements are made, from a range of valuable options, for students experiencing difficulty with Mathematics.
- Significant progress has been made on planning for Mathematics and a comprehensive plan has been developed.
- In general the quality of teaching and learning observed was high. A variety of approaches was used to encourage students to develop a deep understanding of the concepts presented.
- Students and learning activities were very well managed in most of the classrooms visited.
- The relationships between students and their teachers are very positive in most cases. Teachers are encouraging and affirming of student effort and students respond well to this.
- The standard of student work in the copybooks reviewed was appropriate to student ability and students are making steady progress in Mathematics.

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

- The time allocated to Mathematics in the junior cycle should be reviewed with regard to increasing this provision.
- The arrangements made for level choice in the junior cycle should be reviewed so as to ensure that every student capable of attempting higher-level Mathematics has the opportunity to do so.
- The teachers of Mathematics should engage in the development of teaching and learning plans. 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.
- A wider variety of methodologies should be considered for use in mathematics lessons; investigation, discovery, active learning, and research are suggested.
• The seating arrangements in classrooms should be chosen to support good student behaviour.
• Situations that result in students being left unattended should be avoided.

Post-evaluation meetings were held with the teachers of Mathematics and with the principal and deputy principal, at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.