An Roinn Oideachais agus Scileanna

Department of Education and Skills

Subject Inspection of Mathematics
REPORT

Largy College,
Clones, County Monaghan,
Roll number: 72171J

Date of inspection: 5 May 2010
REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN MATHEMATICS

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in Largy College, Clones. 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

Largy College, Clones has a current enrolment of 218 boys and 269 girls. Timetable provision for Mathematics is good. The school provides the full range of curricular programmes. Students availing of the Junior Certificate School Programme (JCSP) are integrated across the Junior Certificate class groups and receive additional mathematics lessons. This is good practice. Arrangements for level choice from third year onwards are good with mathematics lessons concurrently timetabled; this provides valuable flexibility for students to change level where necessary. The arrangements for level choice for first year and second year students, however, need to be reviewed.

Students are assigned on entry to base class groups determined by general ability. They remain in these groups until the end of second year. Mathematics lessons in first and second year are not timetabled concurrently, therefore students can only change level in Mathematics if they change base group. This can mean a change of class group and may also involve a change of teacher for some other subjects. Under this arrangement it is not always possible for students to study Mathematics in a class group appropriate to the individuals’ ability. The school has been flexible in addressing the needs of, for example, students with higher-level ability who have been placed in ordinary-level classes, by providing additional mathematics lessons or by allowing the students to change base group. While taking into consideration the demands on timetabling, it is recommended that the arrangements for level choice be reviewed. Consideration should be given to providing concurrent timetabling of mathematics lessons in each year group where students are separated into higher and ordinary level groupings. Consideration should also be given to assigning students to mixed-ability classes in first year; this would lessen the constraints on the timetable and would also allow students time to settle into school before decisions on the choice of level are made.
There are eleven teachers of Mathematics in the school. Rotation of levels in the junior cycle is good. However, just three teachers are responsible for teaching higher-level Leaving Certificate Mathematics. It is therefore recommended that in order to maintain the capacity to teach all levels within the school that this number be increased. School management encourages and facilitates teacher continuing professional development (CPD). In addition to whole-school events on topics such as school development planning, teachers have attended the workshops organised in preparation for the introduction of Project Maths and other subject-specific CPD. Teachers also attend mathematics-related courses in their own time; this is evidence of their commitment to the subject and to their own professional development.

The mathematics department has very good access to information and communications technology (ICT). Each classroom is fitted with a personal computer and data projector and has broadband internet access. In addition, PowerPoint, Excel, Geogebra and Solid Works software are installed on the mathematics department’s computers. There is also very good availability of overhead projectors for use in mathematics lessons. While there was some use of ICT observed during the evaluation there is significant scope for an increase in the amount and diversity of ICT use in teaching and learning in Mathematics. It is recommended that teachers actively engage in seeking ways that this can be achieved.

There is a wide range of resources available for mathematics lessons. These include mathematical board games, brain teasers, algebra tiles, Tangrams, set circles, 3-D models, geometry sets, and Geostrips. Teachers have created stimulating mathematical environments with student projects, commercial posters and teacher-made posters on the walls of their classrooms. This is evidence of teachers’ commitment to making the subject interesting for students.

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. Smaller class groups are created through the provision of an additional teacher in each year group. In-class support is also used to provide assistance for students in Mathematics. Overall, very good arrangements are made, from a range of valuable options, for students experiencing difficulty with Mathematics.

Students are encouraged to participate in the Team Maths Challenge and in the Irish Junior Mathematics Competitions. The school is proud of the achievements of its students in these events and this is expressed through displaying photographs of the students participating. Providing students with opportunities to engage with Mathematics outside the classroom is very valuable in encouraging them to enjoy the subject and to develop their mathematical interest.

**Planning and Preparation**

The mathematics department has engaged well with the planning process. Eight planning meetings are organised each year and minutes are kept of all formal planning meetings. Regular informal communication about Mathematics also takes place. The department is currently coordinated by an experienced member of the teaching team and, in line with good practice, this position rotates periodically. It is evident that the members of the mathematics department work well together as a group. The minutes of planning meetings suggest that much time is spent on discussing organisational issues. While this is an important function of the subject department it is recommended that some time be set aside for the sharing of ideas and for working together on teaching and learning plans.
A high quality mathematics plan has been developed. It opens with the aims and objectives of the department which centre on making Mathematics accessible and enjoyable for students. The plan contains all the relevant policy documents. There was much evidence of the subject department having a consistent and united approach to the implementation of policies. This was particularly apparent in the implementation of the homework policy as the structures around checking, correcting and giving homework were similar in each of the lessons observed. It was notable that almost every student had completed his or her homework which is evidence of the effectiveness of this consistent approach.

Programmes of work for each year group and level are contained within the planning documentation. In some cases these are set out in terms of expected learning outcomes whereas in others they comprise a list of topics to be covered within agreed timeframes. It is recommended that work continue on the programmes of work so that they are all expressed in terms of learning outcomes, methodology, resources necessary and modes of assessment. It is very good to note that work has begun on planning for the development of teaching and learning plans in preparation for the upcoming implementation of Project Maths. It is envisaged that this will be accomplished by dividing the preparation of the teaching and learning plans for each strand amongst members of the teaching team. In order to facilitate the involvement of the full teaching team, it is suggested that teachers complete this work in small groups and feed progress back to the entire team at planning meeting time.

The transition year (TY) plan is in line with the spirit of a good TY programme. The programme provides a good mix of syllabus content and material not on the Junior or Leaving Certificate courses. The programme provided is suitable to be taught in a mixed-ability setting. Alternative methodologies are used where appropriate to deliver the TY mathematics programme. ICT, games, and activities focusing on practical application are used. Students also complete a TY mathematics project which they present to their classmates which is good.

**TEACHING AND LEARNING**

High quality teaching and learning were evident in all eight lessons observed during the evaluation. Each lesson began with an outline of the expected learning outcomes. In most cases this took the form of an oral description and in some instances these were written on the board. All teachers checked the achievement of the learning objectives on an ongoing basis and adjusted lesson activities where necessary. The key concepts covered in each lesson were revisited at the end to establish the level of understanding reached by students. Teachers also used this opportunity to provide encouragement and motivation. The consistency of application of this valuable approach made for very well structured, secure learning environments where students knew, from the outset, exactly what was expected of them.

The main methodology observed was teacher example followed by student exercise. This was made effective by the lively pacing of activities and the good balance that was achieved between student input and teacher talk. ICT and overhead projectors were used in a number of lessons. In all cases teachers were very well prepared and had all of the necessary resources and materials to hand. Certificate examination classes were, in general, working thorough examination papers, which was appropriate for the time of the evaluation. The students of the TY lesson observed participated in a game of ‘Countdown’, this provided a good focus for the beginning of the lesson and proved to be very enjoyable for students. It is recommended, however, that a greater variety of methodologies and diversity in the use of ICT be included in lessons; active methodologies,
investigation, discovery, research, project work, and group and pair work are very suitable for mathematics lessons and are suggested for consideration.

In some of the lessons observed, teachers made good links between the new topic presented and prior knowledge or students’ personal experience. This was of particular note, for example, where the commutative property of multiplication was illustrated using natural numbers in an explanation involving a trigonometric expression. Another example was observed in a lesson on quadratic functions where a link was made between the points where the function crossed the x-axis and the algebraic solution to solving the equation. These are examples of very good practice. However, in a number of lessons, there was scope for the use of this type of strategy. It is recommended that where it is possible that links, similar to those described above, be made.

The practice in relation to facilitating independent learning varied across the lessons observed. There was some very good practice, such as expecting students to work on previously unseen material without preparation and allowing students time to think for themselves before providing assistance. In some cases also students were engaged in discussion and debate and received general instructions that necessitated their working on the strategic elements of problem solving themselves. Over-support of student learning was also observed. This involved teachers providing a step-by-step breakdown of solutions to questions in advance of students attempting them; providing full answers to questions when a small hint or some general advice would have encouraged students to think; and using very supportive handouts that provided questions and included the solutions. It is recommended that strategies that facilitate independent learning be included as a central element of lesson planning. This is of particular importance in light of the upcoming syllabus changes.

Very good use was made of a variety of questioning strategies. Questions requiring short answers were used to engage and involve students. Students were confident in asking questions and teachers were careful to answer questions fully and accurately. In most cases probing questions were used to encourage students to examine the underlying concepts presented. Best practice in this regard occurred where students were asked to anticipate solutions, were expected to argue ideas and misconceptions, and were asked to explain their reasoning. There were many opportunities for the use of higher-order questioning strategies, however, there is a need to ensure that the full value of these opportunities is realised. In order to achieve this, teachers should ensure that open questions that encourage students to think and to discuss mathematical ideas are used more frequently in lessons.

There was very good practice in relation to differentiation of learning. All teachers allowed time in class for students to work on individual tasks so that assistance could be provided to any student experiencing difficulty. The level of ongoing assessment throughout lessons was high and as a result teachers were able to identify students who needed help. The focus of lessons was on achieving the learning objectives and this focus guided teachers in ensuring that individual needs were met. Additional work was given to students who had finished the tasks provided; in some cases this meant that students worked ahead in the text book, whereas, in others, more challenging material was provided. A ‘buddy system’ was used in one case, where students worked in pairs, with one student acting as the teacher and the other as the student. This good practice was taken a step further in one lesson where a student who had finished her work was chosen to come to the board to work through a question for the rest of the group. This is a very simple and effective way of providing additional stimulation for better able students while providing recognition for their hard work. These are very valuable approaches and it would be worthwhile for teachers to share their good practices with each other in order to encourage further use of differentiation strategies in teaching and learning in Mathematics.
Students participated fully and with confidence in the work of lessons. The levels of student cooperation were high and there was a sense of teamwork in each of the lessons visited. Teachers were affirming and encouraging of students’ efforts. The standard of student behaviour was very high in all cases. Teachers made a conscious effort to make lessons enjoyable and fun for students and there were many instances where humour was used to good effect. Overall, students demonstrated that they were interested in Mathematics and were making steady progress.

**ASSESSMENT**

Overall, the school’s practice in relation to assessment is very good. First, second and fifth year students sit formal assessments at Christmas and in May. Students preparing for the certificate examinations are assessed in class in October and sit ‘mock’ examinations in February. In keeping with good practice common tests are set within levels for each year group. Students receive oral and written feedback on their performance in all school tests. Reports are sent home at the end of each school term and parent-teacher meetings take place annually. The student journal is also used as a valuable means of communicating with parents.

It is mathematics department policy to set class tests at the end of each topic studied. There was much evidence of Assessment for Learning (AfL) principles in the correction of student work. Teachers routinely include advisory and encouraging comments to assist students in self-assessment and to provide motivation. Ongoing assessment takes place in class through oral questioning and teacher observation. A high level of in-class monitoring of student progress was noted in all cases.

Each lesson observed began with the checking of the previous day’s homework; teachers used a stamp to mark each student’s completed work. This was followed by teachers correcting the common mistakes that had been noted in the initial checking process. By correcting only the parts that students could not do, teachers ensured that the correction of homework was completed quickly and efficiently. In some cases additional, larger pieces of work were given to students to be taken up for correction on completion. In all cases students were expected to enter the homework corrections into their copybooks and in some cases they were encouraged to use a different colour pen to highlight corrections. All of these very good practices ensure that homework is a valuable extension of the work of lessons and that its value, in providing independent learning opportunities for students, is optimised.

**SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- Timetable provision for Mathematics is good.
- There is a wide range of resources available and very good access to information and communications technology for mathematics lessons.
- Very good arrangements are made, from a range of valuable options, for students experiencing difficulty with Mathematics.
- A high quality mathematics plan has been developed and there was evidence of the consistent implementation of policies.
• High quality teaching and learning were evident in all eight lessons observed during the evaluation. Very good use was made of a variety of questioning strategies and teachers made good links between the new topic presented and prior knowledge or students’ personal experience.
• There was very good practice in relation to differentiation of learning.
• Students participated fully and with confidence in the work of lessons. The levels of student co-operation were high and there was a sense of team work in each of the classrooms visited.
• The school’s practice in relation to assessment is very good. The procedures around setting, checking and correcting homework and the use of Assessment for Learning strategies contribute to its effectiveness.

As a means of building on these strengths and to address areas for development, the following key recommendations are made:
• Concurrent timetabling of mathematics lessons should be provided in each year group where students are separated into higher and ordinary-level groupings and consideration should be given to assigning students to mixed-ability classes for first year.
• In order to maintain the capacity to teach all levels within the school the number of teachers teaching higher-level Leaving Certificate Mathematics should be increased.
• A greater variety of methodologies and diversity in the use of ICT should be included in lessons.
• Strategies that facilitate independent learning should be included as a central element of lesson planning and are encouraged for wider implementation in classroom practice.

A post-evaluation meeting was 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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