

An Roinn Oideachais agus Scileanna

Department of Education and Skills

**Subject Inspection of Mathematics
REPORT**

**St Joseph's Secondary School
Stanhope Street, Dublin 7
Roll number: 60843Q**

Date of inspection: 20 January 2011



**AN ROINN DEPARTMENT
OIDEACHAIS OF EDUCATION
AGUS SCILEANNA AND SKILLS**

**REPORT
ON
THE QUALITY OF LEARNING AND TEACHING IN MATHEMATICS**

SUBJECT INSPECTION REPORT

This report has been written following a subject inspection in St Joseph's Secondary School, Stanhope Street. 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 Joseph's Secondary School has a current enrolment of 280 girls. There is a high level of whole-school support for Mathematics. Timetable provision for the subject and timetabling arrangements for level choice are good. Students are placed in mixed-ability class groups in first year and are assigned to higher and ordinary levels from Christmas of first year onwards. Transition year (TY) is optional and there is currently one TY mixed-ability mathematics class group. Mathematics lessons are concurrently timetabled in each year group; this is a very valuable arrangement for facilitating movement between levels where necessary. In keeping with good practice, students are strongly encouraged to study the highest level possible for as long as possible.

The mathematics department comprises six teachers. Teachers are deployed in line with their experience and expertise and school management supports teachers' continuing professional development (CPD). In addition to attendance at the workshops in preparation for the implementation of *Project Maths* teachers have taken part in CPD events on Leaving Certificate Applied Mathematical Applications. The mathematics teachers have engaged with the Inner City Mathematics Teachers' Initiative in organising and hosting events to facilitate local Mathematics teachers in supporting each other's professional development. This is all very good practice.

The mathematics department access to information and communications technology (ICT) is good. The computer room can be booked for mathematics lessons and there are also mobile data projectors and laptops available. It is good that there are plans to install ceiling-mounted data projectors in classrooms in the very near future as a result of the funding provided by the National Centre for Technology in Education (NCTE). There is scope for an increase in the use of ICT in teaching and learning in Mathematics and teachers should explore ways in which this can be achieved.

A wide range of resources is available for Mathematics. These include graduated cylinders, playing cards, dice, Tangrams, algebra tiles, geometrical 3-D solids, and a variety of games of mathematical interest. Good use of these resources was observed in the evaluation with one lesson taking place in the computer room, two lessons involving activities and through the integration of ICT in another lesson. This is evidence of teachers' commitment to making mathematics accessible and interesting for students.

Classrooms are currently student-based which means that, in order to include variety in the methodologies used resources have to be carried from a storage area to classrooms. This arrangement requires a high level of organisation and preparation. In order to facilitate the successful implementation of *Project Maths* the school should review the possibility of allocating base classrooms to teachers. This measure would allow teachers to keep the resources and materials necessary for the experiential learning activities that are central to the spirit of *Project Maths*, to hand for regular and frequent use in mathematics lessons.

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. Mainstream teachers provide ongoing in-class support to students experiencing difficulty through careful monitoring and individual attention. As part of the department's numeracy policy, all first year students are encouraged to tackle arithmetic without the aid of a calculator; this is to encourage the development of their mental arithmetic skills. There is a strong emphasis on inclusion in the mathematics department's policies and practice for the delivery of support to students. 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 and there are students who, in addition to finding Mathematics difficult, experience literacy difficulties. Many valuable interventions are available to support these students. To complement the good measures that are already in place 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 expressed using mathematical symbols, where appropriate and translated into all of the languages represented in the class group. Where possible, a graphic description should also be included.

PLANNING AND PREPARATION

The mathematics teachers meet formally twice or three times per year but frequently meet informally to discuss day to day issues as they arise. Although the members work well together as a team there is no co-ordinator for the department. It is recommended that a co-ordinator be appointed and that this position be rotated periodically. Over the next number of years considerable work will need to be done on planning for ensuring the successful implementation of *Project Maths*; this would benefit from a more formalised approach to curricular planning.

A good mathematics plan has been developed and it includes all of the relevant policy documents for Mathematics. There is a strong emphasis on inclusion and on ensuring that students are equipped with the mathematical skills needed for life; this reflects the school's ethos.

Programmes of work have been developed for each year group and level and these are expressed in terms of topics to be covered within agreed timeframes. It is recommended that the syllabus documents now become the focus for planning the programmes of work and that this work centre

on interpreting the syllabuses. This should be done in a way that ensures a solid understanding of the learning outcomes for students is achieved. In addition, teachers should familiarise themselves with the teaching and learning plans provided by the *Project Maths* development team; a suggested format might be that each teacher would teach one lesson described in the teaching and learning plans and report their experience back to the group as a whole. This is recommended with a view to teachers, over time, creating their own plans similar to those provided. Two of the lessons observed in the evaluation would be very suitable for sharing through this format.

The transition year (TY) plan is well designed and appropriate to be taught in a mixed-ability setting. It includes topics such as budgeting, probability, Simpson's rule and statistics. There is an emphasis on the use of project work, group work and active learning in the delivery of this programme. Puzzles, quizzes and games are used to encourage the development of students' problem-solving skills. The TY plan outlines strategies to ensure that the lessons are differentiated to suit a variety of ability levels with a particular focus on providing adequate levels of challenge for all TY students. This is in keeping with the spirit of a good TY programme.

TEACHING AND LEARNING

High quality teaching and learning was evident in all six lessons observed. In all cases teachers' explanations and instructions were clear and lessons progressed at a pace appropriate to students' ability. Teachers shared the learning objectives with students at the beginning of lessons and checked progress regularly. This good practice ensured that learning activities were adjusted to match student needs on an ongoing basis throughout lessons. High levels of student involvement and a sense of teamwork were strong positive features of each lesson observed and this contributed to the quality of learning demonstrated by students.

Various questioning strategies were used in lessons. These included quick questions to assess understanding and to involve students and open questions to engage students in exploring the underlying ideas in the lessons. In many cases students were expected to explain their reasoning; this was of particular note in a lesson on indices observed. Teachers were very careful in providing meaningful and accurate answers to student questions and to making sure that students fully understood what was being taught. For example, in ensuring students were convinced that a formula in sequences and series was true the teacher used a concrete numerical example to expose the underlying concept. This is all very good practice.

A range of methodologies was used in the classrooms visited; these included teacher exposition, pair work, games, project work and use of ICT. While there was a good range of methodologies observed there was scope, in some of the lessons inspected, for learning to take an investigative or a discovery approach. In a lesson on co-ordinate geometry the learning activities comprised teacher examples, where students were provided with the formula, followed by student practice exercises. A discovery approach, where students are provided with the main concept and facilitated, through questioning, to come up with the formula themselves would have been very suitable for this material. In another lesson students could have investigated the formula for circumference of a circle through a measuring activity. It is recommended that approaches like these be included in lesson planning.

Students were invited to work at the board in most instances and they demonstrated a keen interest in doing so; this proved to be a very good way of getting students actively involved in the work of the lesson. Two of the lessons observed opened with students correcting homework at the board. In one case the board was divided into four sections and four students worked

simultaneously on completing the questions for the remainder of the class group. This strategy was very good and ensured that homework correction took up an appropriately short period of class time. In the other case, however, five students were brought to the board in turn to complete homework questions. This approach meant that this task took up most of the class time with the majority of the students remaining passive for a large portion of the lesson. It is therefore recommended that strategies that ensure the optimal use of class time be adopted for all classroom activities.

There was evidence of teachers' creativity in planning learning activities for students. In one lesson on arithmetic students participated in a game that involved engaging in a variety of physical activities. For example they had to count how many times they could tap their feet in ten seconds and divide by ten to see how many taps they could do in one second; this proved very enjoyable. Students were then provided with a pack containing questions and their answers on separate cards and were required to work in pairs to match the cards. This pair work was very effective in allowing each student to correct the other's work and to discuss mathematical ideas. A second teacher was present and worked with the main teacher in providing individual assistance for students where necessary throughout this excellent lesson.

In many of the classrooms visited teachers facilitated learning by providing stimulating activities for students and expecting them to do most of the work. In one case this was achieved by students completing a project to create posters relating to the circumference of a circle. Another very good example of this occurred in a lesson that took place in the computer room. In this case Leaving Certificate Applied (LCA) students were provided with a key assignment and following very clear instructions from their teacher proceeded to work independently on the task. Through adopting these approaches teachers ensured that students were actively engaged in their own learning and were provided with well designed opportunities to derive optimum benefit from the work at hand.

In one lesson visited rules were written in longhand text on the board for students to take down. A significant number of students of this class group had difficulties with either language or literacy and it is therefore recommended that mathematical symbols be used where possible in preference to text. Key word charts and number lines would also be useful in assisting students with literacy difficulties to access Mathematics and are also recommended.

In all cases the standard of student behaviour was exemplary. 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 excellent. There was a very strong sense of warmth and care in all of the classrooms visited. Students responded well to the affirmation and praise frequently supplied by their teachers. It was clear that students and teachers work very well together as a team.

ASSESSMENT

Overall, 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 early in the second term. Examination papers are differentiated to meet the needs of students. In addition, any student who qualifies for reasonable accommodation in the certificate examinations is provided with appropriate assistance in all formal in-house examinations. This very good practice is evidence of the school's commitment to inclusion.

It is mathematics department policy to set tests at the end of every topic studied. 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. Homework is set regularly and usually corrected as part of the following lesson. In some cases teachers are using Assessment for Learning (AfL) principles in the correction of written work by including constructive and encouraging comments. Similarly, teachers are very supportive and are careful to point out all elements of student work which are correct, in the provision of individual attention throughout lessons.

Laminated sheets were used to assess understanding in one class group, which involved students holding up the answers to the questions in a quiz on indices. This provided the teacher with a very quick and comprehensive assessment of the various levels of student understanding of the concepts covered in the lesson. Further use of this very effective assessment strategy is recommended.

The school measures the success of the many interventions provided for students as part of its Delivering Equality in Schools (DEIS) planning process. This is done by testing and re-testing students which is very good practice. In addition comparisons are made, for some students, between their incoming assessment data and their performance in the certificate examinations. It is recommended that this very good approach be extended to the results of all students. This would provide the school with a good profile of each student's progress.

SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS

The following are the main strengths identified in the evaluation:

- There is a high level of whole-school support for Mathematics in the school.
- Students are strongly encouraged to study Mathematics at the highest level possible for as long as possible.
- It is evident that a high level of learning support in Mathematics is provided to students.
- The TY plan is well designed and appropriate to be taught in a mixed-ability setting.
- High quality teaching and learning was evident in all six lessons observed.
- Various questioning strategies and a range of methodologies were used in the classrooms visited.
- In all cases the standard of student behaviour was exemplary and classroom atmosphere was conducive to developing student confidence with the subject. It was clear that students and teachers work very well together as a team.
- 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:

- There is scope for an increase in the use of ICT in teaching and learning in Mathematics and teachers should explore ways in which this can be achieved.
- In order to facilitate the successful implementation of *Project Maths* the school should review the possibility of allocating base classrooms to teachers.
- A co-ordinator for the mathematics department should be appointed and this position should be rotated periodically.

- The syllabus documents should become the focus for planning the programmes of work for Mathematics and the teaching and learning plans provided by the *Project Maths* team should inform the delivery of the syllabus.
- Strategies that ensure the optimal use of class time should be adopted for all classroom activities.
- To assist students with language or literacy difficulties mathematical symbols should be used where possible in preference to text and key word charts and number lines should be used to help students access Mathematics.

Post-evaluation meetings were held with the deputy principal and 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.