Jersey DfESC Mathematics Review 2013

Final Report

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Foreword

The review was commissioned by the Department of Education, Sport and Culture to provide an external view of mathematics and how well the subject is taught in the Island's State schools. (See appendix 2 for the schools involved.)

Reviewer Profile - Professional Experience

The reviewer is an Ofsted trained Inspector with extensive senior management experience as a mathematics teacher in primary, middle and secondary schools in England, including two inner city schools. She has worked as head of a mathematics department, senior school leader and as a Senior Inspector for mathematics in two Local Authorities (Dorset and Portsmouth). Responsibilities in these roles included raising standards of mathematical achievement from pre-school to post-16; improving subject leadership in all Key Stages and Professional Management of the primary and secondary consultants. Other responsibilities included being a link advisor to ten schools to challenge and support their leadership and management, raise standards and celebrate good practice as well as supporting schools both pre and post Ofsted. The reviewer has been Honorary Secretary of the National Association of Mathematics Advisors, commented on the English National Curriculum and mathematics examinations at both GCSE and GCE level, and contributed to research in the teaching of mathematics.

Review Methods

The review was designed in three parts. An initial scoping of the issues through an analysis of data and available documentation, including Professional Partner notes of visit, external subject reviews, and summary examination data from schools (appendix 1) including moderated Key Stage results for primary schools. From this evidence a sample of 8 primary and 6 secondary states schools (appendix 2) were visited and included: lesson observations, discussions with children, young people, headteachers, other senior leaders and teachers, teaching assistants and other support staff. In addition pupils' work, teachers' planning, school assessment and tracking data, department schemes of work and minutes of leadership meetings were scrutinised. A short, final feedback was made to the DfESC team prior to writing the report.

Summary of key findings

Strengths:

- Jersey schools have recognised the need to use data to support all pupils to make at least good progress.
- Pupil teacher relationships are strong. Pupils feel supported and offer answers or ask questions readily.
- Through DfESC support, subject leadership and management is being developed and as result is strengthening.
- Good provision of State funded nursery places.
- The introduction of the Foundation Stage Profile has established a good starting point to monitor each pupil's mathematical progress.

- The development of the moderation of end of Key Stage 1, 2 and 3 teacher assessments has resulted in greater rigour and consistency of assessment.
- Schools are developing more rigour in their school tracking systems to monitor pupils' progression of learning over time and to identify where intervention may be appropriate.
- The introduction of the intervention resource 'Numicon', led by DfESC, has been positively received by the staff and pupils in the schools which have adopted it.
- Good learning environments are evident in the schools.
- Pupils are frequently able to express their mathematical thinking well verbally.

Areas for development:

- Focus on overcoming inconsistency in the quality of teaching mathematics within schools.
- In both primary and secondary schools there are insufficient specialist trained teachers available to teach all groups timetabled for mathematics at a specific time, with the least mathematically able group often taught by non-specialist teachers. In some cases, both at primary and secondary level, subject knowledge needs to be wider and deeper.
- Over reliance by schools on published schemes of work and lack of the use of practical resources, displays of work and key words.
- Teachers' lesson planning requires development to ensure all pupils have equal access to the curriculum and work appropriate to their individual needs to ensure good progression of learning.
- Support for the teaching of Assessment Target 1: Using and Applying Mathematics; which is underdeveloped at all Key Stages.
- The use of subject specific key words and mathematical displays to support pupil learning.
- Continue the improvement of monitoring and evaluation of pupil progress.
- Appropriate use of ICT to support mathematical learning.

The Mathematical Context

Jersey State Schools have for many years performed better than England but have not improved at the same pace. From 2007 to 2010, Jersey has increased A*-C grades from 71.5 per cent to 75 per cent, an increase of 4.5 percentage points in GCSE examination results. In the same period England saw a 6.4 percentage point increase from 62.7per cent to 69.1 per cent. The difference is more marked when considering the number of students achieving at least 5 A*-C grades. Jersey has seen an increase of 0.5 percentage points from 68.2 per cent to 68.7 per cent, against England's increase of 13.9 percentage points from 53.2 per cent to 67.1 per cent. If 5 passes at A*-C including English and mathematics is compared for the 2 years data for Jersey available at the time of the review, England saw a 3.8 percentage point increase from 51.4 per cent to 55.2 per cent while at the same time Jersey saw a 2.0 percentage point increase from 53.0 per cent to 55.0 per cent. Comparison to English National statistics may not be an accurate indicator of performance because just over 40 per cent of Jersey pupils attend fee-paying schools compared to 7 per cent in England.

The increase in England has been supported by the use of pupil progress data from primary schools through to secondary education. Specific 'floor targets' are set for all schools to

achieve as a minimum. There is an expectation that all pupils who achieve a level 5 in mathematics at the end of Key Stage 2 will, as a minimum, achieve a C+ grade at GCSE. All schools in England must achieve a minimum of 40 per cent A*-C including English and mathematics and each individual pupil's progress from the end of Key Stage 2 to 4 is measured.

Data

In Jersey the central collection of data to hold schools to account has been completely redesigned with the development of an education statistics team (Insight). Prior to this, the education department mainly relied on a central statistical unit to provide information in relation to GCSEs and 'A' levels and, since the decision to discontinue SATs (Standardised Assessment Tests), the schools' own data in relation to Key Stages 1 to 3. The new team is working with Professional Partners and collects data to provide a series of overarching data sets to analyse the success of schools and the progress that pupils make from nursery to sixth form and beyond. In addition, a central data source (CMIS) is used to collect statistics data from schools. The Department is better informed about the performance of schools than at any other time. This data is becoming much more accurate due to the comprehensive moderation process introduced into the primary sector which is being rolled into Key Stage 3.

While data collection and use is improving rapidly, at the time of the review the amount and accuracy of centrally held data at DfESC was less than that held by local authorities within England. Summary data, going back many years, is available for Key Stages 4 and 5. However, with the introduction of moderated teacher assessment the department is now in a position to monitor individual pupil progress from the end of one Key Stage to another. Although it was not possible to identify the schools for the visits for this review using only central data, the Insight team is now collecting data to record the progress that pupils make through National Curriculum levels.

Jersey uses test results from standardised reading and maths tests and has used CATs tests for many years as the foundation for judgements about progress and selection. The use of CATs alone as the main measurement for value added progress and selection for State funded secondary school places could be counter-productive as it may result in low expectations and aspirations for a high proportion of pupils. It is therefore important that these predictors are considered alongside progress data related to national curriculum levels. For example, during the review two pupils in Year 11, with the same total CAT scores, in the same school were predicted a C and E grade for mathematics. The school were not able to justify the reasons for this, but did allow teachers to change the CAT predictor either up or down on school test evidence.

Review Judgements

Principles of mathematical education

For mathematics education to be successful, all pupils should develop conceptual understanding of mathematics as they learn. They should be aware of the structures and relationships within the subject in order to equip them for their future. They should be empowered to develop fluent recall of mathematical knowledge and skills. Evidence

collected during this review suggests this responsibility is not being consistently met for all pupils.

Early Years

There is good recognition of the vital importance of this area. The good provision of State funded nursery places and the high proportion of nurseries attached to schools have resulted in consistent attainment in the Early Years Foundation Stage. The introduction of moderation in the primary phase is leading to consistency and rigour of teacher assessment. At present the impact on teaching and learning is not always evident.

The Foundation Stage profile has recently been introduced and as teachers become more familiar with its demands it is hoped they will adjust their teaching to cover the breadth. This was seen when the profile was first introduced in England. Review evidence shows a discrepancy between the three components of the mathematics profile, which is made up of number (n), calculating(c), shape space and measures (ssm) in some schools. The numerical scores for a pupil in each of these areas should be similar. In some schools there was strong correlation between all three areas, an indication that the breadth of the subject had been well covered.

The profile for 2012 offers pupil based data which provides the opportunity to trace progression at pupil level. It is clear from the data that some schools are able to make better provision for pupils with differing ethnic backgrounds.

Where schools had a nursery provision it was on the whole seen as part of the school. In the best schools it was well integrated with joint planning, with the Early Years team being given their planning and preparation time together to enable good liaison. Pupils were actively encouraged at appropriate times to mingle together and joint activities were planned for the pupils to support their learning. Transition for those pupils remaining in the school at that point was smooth. Weakest practice saw no obvious link between the Early Years (i.e. Reception) school team and the nursery team, with clear differentials in the ways that the areas were set up and run, making transition for pupils remaining in the school more challenging.

Quality of teaching and learning

Review evidence shows that the quality of teaching of mathematics is not always consistent across the Island, between schools, in schools and in some cases within the same year groups in schools. The quality of teaching, assessment and the curriculum that pupils experience overall is satisfactory, although it is a cause for concern in some schools.

Attainment Target One: Using and Applying Mathematics was not consistently taught in all the schools within the review. As a result the pupils' ability to solve problems by applying their mathematics to a variety of routine and non-routine problems, with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions skills are underdeveloped. This has a direct impact in their ability to perform well in the mathematics GCSE examination. For example, the display of key mathematical language with picture clues would provide greater support for all pupils but

particularly those with English as an Additional Language. Overall teaching and learning in mathematics could be improved through better assessment, curriculum planning and subject leadership and management. Teachers' use of assessment to promote learning, identify individual pupil needs, adjust day-to-day planning and take appropriate intervention is underdeveloped in many schools. Through DfESC support subject leadership and management of mathematics in primary schools is being developed and as a result is strengthening. In States secondary schools the appointment of new subject leaders within the last three years should offer the opportunity to drive up standards, however the subject leadership role needs to be enhanced and developed. Schools are adopting a wide range of strategies to improve pupils' attainment. The impact to date has not been fully evaluated by all the schools.

Through the moderation of teacher assessments in primary schools and the modular GCSE results, schools are aware of the need to improve pupils' problem-solving and investigative skills, but such activities are rarely integral to learning except in the schools where they are at the heart of learning mathematics. Many teachers continue to struggle to develop skills of using and applying mathematics systematically.

In schools where mathematics teaching is strongest, pupils are offered a wide variety of approaches to their learning, using group, paired and individual work. The teachers use different approaches which are appropriate to the topic being covered. The pupils are encouraged to become independent learners by taking an active part in the lesson, both during the class taught session and when working independently. For example, in one school pupils were encouraged to verbalise their thinking, with other pupils supporting the development of understanding by asking questions of the pupil or offering further insight into the topic being discussed. In another classroom pupils were working in independent groups, with one being supported by the teacher and another by a teaching assistant. Two pupils, from a group working without support, were observed using the excellent working wall display to help them access their work. In another school all pupils had a wallet of practical resources such as blank number lines, hundred squares, mini-whiteboards and pens which they were encouraged to use to support their independent working.

Where teaching is at least good, teacher subject knowledge is strong. The teachers use a variety of approaches and resources to support learning. Lessons are well planned for progression of learning with high expectations of all pupils. The teachers respond to the pupils' needs with good on-going assessment during the lesson through the use of good teacher questioning. Teachers circulate as pupils work independently or with an identified group needing extra support or extension. Teacher marking is informative and supportive, ensuring that pupils know what they need to concentrate on to improve mathematically and what their next steps in learning are. Pupil teacher relationships are good with pupils responding well to teacher questioning, feeling confident enough to explore new challenges with limited information and to ask for support when needed. In one lesson the pupils were so actively engaged in their learning that they came back in their own time to finish the task.

Improving the consistency and quality of teaching within a school is crucial if all pupils are to make sustained good progress. It is important to have clear guidance, understood by all staff, on approaches to secure conceptual understanding and progression in lessons. This is especially important to support less experienced, temporary and non-specialist teachers. Some secondary schools have very high expectations of both teachers and pupils, offering

support and guidance for staff who need to improve their practice. However, in five of the secondary schools visited, teaching was inconsistent which, if indicative of normal practice, would result in poor pupil progress.

While the best teaching develops pupils' conceptual understanding alongside their fluent recall of knowledge and confidence in problem solving, much teaching is concentrating on the acquisition of disparate skills that enable pupils to pass tests and examinations but does not equip them for the next stage of education, work and life. Teachers' use of assessment in lessons is a weak aspect of teaching as it does not always result in adaptation of the current or next lesson to address the issue identified. Book scrutiny in one school showed acknowledgement by the teacher that the pupil had failed to understand the concept of the lesson taught but, in the next lesson, the teacher failed to use these findings. In another planning scrutiny, the teacher had noted the difficulty the pupils had with the concept taught but the next lesson did not change from the printed publisher's version.

In too many classrooms teachers' monitoring of each pupil's understanding is not strong enough to ensure that pupils learn and progress as well as they should. The high level over use of the scheme 'Maths Makes Sense' in Jersey results in a high proportion of teachers becoming reliant on a published scheme and its lesson plans. Although most schools have now identified the limitations of this scheme, there is still a heavy reliance in many schools on published materials, which disenfranchise teachers, making them reliant on the lesson plans supplied without making any alterations to the 'script' to suit the needs of their pupils. At its weakest this resulted in an observed teacher seen to be reading from the script while teaching her class. At its best, the observed teacher had taken the ideas for activities from the published scheme, changed them to be more interactive for the pupils and ensured that they were accessible to pupils through the way in which they were presented while also offering challenge to the most able. Best practice seen was where schools were developing their own schemes of work based on the curriculum with resources linked in from a variety of published materials and internet sites. These schools were able to develop and exploit cross curricular opportunities of the school's curriculum.

There was an overuse of the 'My Maths' system which enables teachers to set up targeted homework or class work for the students to complete. It can also be used for revision by the students. An advantage of it is that pupils can look at a tutorial if they need support when at home. Pupils raised the following issues:(i) it is unfair to those pupils who do not have internet access at home; (ii) parental banning of the use of a computer before all homework has been completed; (iii) easy to get full marks just keep trying until you get the correct answer (N.B. the system does record the number of attempts); (iv) teachers never follow up if you get it wrong, and (v) it leads to lack of engagement as they are distracted by the internet.

Teaching group allocation, often referred to as setting, is prevalent in schools in Jersey. It is being used from as early as Year 1 but is common from Year 2 in both single and multiple form entry schools. Both horizontal (within a year group) and vertical (across several year groups, as used in Read, Write Inc.) were seen on the school visits undertaken. The implications for pupils from lower year groups being taught within the 'top set' of vertical setting was seldom thought through by the school management. For example, a Year 3 pupil being taught in the 'top' set could cover the same work in the next school year(s). As a result of teaching in ability sets of pupils, teachers were not differentiating their input to the

class or, on the whole, the work they were setting for class or homework. Too often the most able pupils within the group were offered repetitive exercises, which lacked motivation or challenge. Differentiation offered was by outcome i.e. the more able you are the more questions you will complete. This leads to more-able pupils in Key Stages 1 to 4 not being consistently challenged. Work needs to be more challenging involving the application of learning in unfamiliar contexts thereby deepening a pupil's knowledge and understanding.

In secondary provision where insufficient specialist trained teachers are available to teach all groups timetabled for the subject at a specific time, the least able group mathematically are usually the group to be taught by the non-specialist teacher. In some classes, both at primary and secondary level, teacher subject knowledge was weak. Heavy reliance on printed schemes of work, without adaptation to meet the needs of the pupils in the class, mean that many pupils are not being challenged and supported in their learning of the subject appropriately. As a result pupils of different ages, needs and abilities are receiving unequal curricular opportunities.

Best practice requires books being marked regularly by the teacher, with informative feedback which helps pupils move forward in their mathematics learning. Misconceptions are picked up and guidance given on how to overcome them. For example in one class pupils had been working on subtractions for the week but the problem exercise set required them to correctly choose the appropriate operation. Weaker practice showed books where all the work was correct and lacked challenge. Written comments only referred to neatness or putting the date on every piece of work. All pupils had completed identical work and it was how far they had got that indicated their level of ability. Misconceptions had not been identified and exercises set were only for the focus of the lesson. There is a lack of the use and availability of practical resources to support pupils' development of mathematical concepts and knowledge. Where practice is good or better these resources are readily available for the pupils to access. For example in one classroom pupils were seen to get hundred squares for themselves when needed. In another, the class teacher had placed blank number lines on some desks and numbered lines to 20 for the least able group. The pupils then had these resources available for their independent work.

The Numicon initiative supported by DfESC, by delivering the professional development to the teaching assistants (TA) identified by the schools, has the potential to impact on attainment. At present, in the schools seen using the scheme, the intervention has been well established with good learning environments set up for the pupils to work in with the TA. The progress of each pupil while working with the TA is monitored and reported back to the class teacher. The full potential of the intervention has not yet been exploited as the pupils return to their normal classroom where the equipment and displays, which have supported their progress are not available. This has been identified by some of the schools who have ordered the equipment and are planning to train their TAs and teachers in its use. To sustain the long term impact of the intervention schools need to extend the use of the resource to the classrooms where the pupils return to work on a day to day basis.

Very few schools provide curricular guidance for staff, which is underpinned by professional development that focuses on enhancing subject knowledge and expertise in the teaching of mathematics. This is necessary to ensure consistent implementation of approaches and policies.

Basic numeracy skills of the pupils in both primary and secondary schools need greater attention with teachers adopting appropriate intervention in classrooms to support the pupils' development of these skills.

Most schools use published schemes of work or examination board syllabi and criteria to provide curriculum guidance. However these do not encourage staff to adopt agreed approaches to developing understanding, mathematical concepts and progression. There is limited guidance offered in Key Stage 3 in most schools. For example in one school work scrutiny, of pupils identified as of a similar ability, identical repetitive work was seen in pupil class books for algebra in years 7- 10, showing that pupils were (i) making limited or no progress in their understanding of algebraic concepts (ii) being exposed to work at levels above their achievement and (iii) curricular guidance was not helping the teachers understand what they should be teaching in each year group.

There is evidence of innovative approaches to the whole school curriculum. For example, in two of the 11-16 schools they have an integrated curriculum for year 7 supporting their assimilation into the new school. Some of the work seen was imaginative but the expectation of work was at too high level for the pupils' ability. The mathematical content needs to be guided by the mathematics department with greater direction on pedagogy and resources to support the non-specialists often delivering this content.

Schools have implemented a wide variety of strategies to improve performance in mathematics. The most common strategy has been better monitoring of pupils' attainment and progress coupled with greater use of intervention programmes. It remains centred on examination performance in the majority of secondary schools, linked to widespread use of early GCSE entry and repeated sitting of units. This can encourage short-termism in teaching and learning and lead to underachievement at GCSE, particularly for able pupils, as well as a lack of attention to the attainment of the least able. Where mathematics teaching is strong, high-attaining pupils' needs are met through depth of GCSE study and additional qualifications.

In all schools the adult pupil relationships were at least good. Pupils in most schools readily offered answers to teachers' questions and were prepared to ask for help when needed. Subject specific language was well used in the best classrooms where pupils were also encouraged to use correct terminology. In the best classrooms teacher questioning was a well-developed skill which supported pupils learning by for example exposing common misconceptions and supporting pupils to identify and overcome them. This is an area for development for some teachers in the schools visited.

Pupil interviews indicated that they found their teachers approachable in all schools. They recognised which teachers to approach if work was difficult. For example, the establishment of independent work areas in one school had helped to attract pupils to the subject and they regularly sought support for their work. Pupils would like to have the opportunity to work together in paired or group work; to have a more open approach to learning rather than the didactic model which is common in most schools visited. As already stated pupils did not like the high usage of 'My Maths' for class taught sessions or for homework and there was mixed opinion as to whether the programme supported their revision. Most pupils need to be taught how to learn mathematics and to revise effectively for in-school tests or external examinations. Teachers who have a real enthusiasm for their subject were seen to be the

'best' teachers and those more likely to engage in the mathematics rather than what had to be taught for the next test. Generally pupils in all schools felt that their teachers cared but felt that the way in which they taught was not as engaging as in other subjects.

Monitoring of progress

The use of assessment data to track pupils' progress in order to intervene to support pupils at risk of underachievement is emergent. Schools are developing tracking systems and in some cases have intervention programmes in place, but too often these are not monitored and evaluated. In some schools the data entered onto the system is not moderated and therefore may not be robust.

In some schools the importance of monitoring the quality of mathematics teaching needs to be given a higher profile so that teachers are more systematically held to account for their pupils' progress and for providing interventions in their own classrooms to support this progress. Secondary schools are developing their monitoring and evaluation of pupil progress to address the need to intervene intensely at GCSE and a variety of strategies are being used to improve A*-C grades for mathematics such as early entry, re-sit opportunities on modular courses and double entry. In one school, pupils were being entered for Functional Skills as an alternative to GCSE and in another school pupils whose module results were not likely to gain them a C+ were also entered for the linear examination in the June examination of Year 11. Schools also reported entering pupils for their final modular examination in November, again in March and June if necessary to gain a C+ grade.

School leaders are monitoring the quality of teaching and recognise where there is unsatisfactory teacher performance. In order for this monitoring to be more effective, schools need to pay attention to the mathematical detail and teacher subject knowledge which is crucial in improving teachers' expertise. The review evidence suggests that monitoring of teachers' classroom performance could be used more effectively to secure better quality provision for mathematics. Usually analysis is linked to intervention and revision and monitoring focused on the generic characteristics of teaching rather than pinpointing the subject-specific weaknesses or inconsistencies that impede better teaching and greater coherence of learning.

ICT

The use of ICT to support mathematics education is not well developed. There are examples of good use within both primary and secondary schools. In England (as in Jersey in previous years) the provision of a lap top to each teacher has supported the use of ICT as a teaching and learning tool in the classroom. In addition the ICT systems enable the teacher to access the internet in order to use, for example, an item on BBC news to support the teaching of percentages. Teachers talked of the limitations placed on them by the current States ICT protocol which means it can be difficult to prepare work on a computer at home and bring it into school on a data stick.

ICT could be used more effectively to support learning in most schools. For example, the potential of interactive whiteboards to enhance learning could be exploited with appropriate software beyond their basic function. Limited software appeared to be available for the support of either teaching or learning in many schools.

The limits placed on teachers who do not have laptops which can be linked into the school system and the robustness of the filtering system that restricts access to web pages that have not been approved reduces the teachers' ability to use this invaluable resource. I believe the department's new IT strategy will address this issue and provide greater flexibility for schools to take control over filtering and access arrangements.

The use of graphical calculators to support the development of concepts such as algebraic thinking and for A level studies is not well developed.

Inclusion and differentiation

The high proportion of pupils with English as an additional language was evident in many schools from their data; however there was little evidence of support or intervention for these pupils within the classrooms. For example Key Words were not usually shared with pupils and no picture clues, when appropriate, were linked to them. On occasions the presence of these pupils was used to explain the overall disappointing level of attainment within the school. The use of focused, appropriate and timely intervention would help to overcome the challenge offered.

The Jersey education system is possibly unique with its mix of state, state-funded private and private secondary schools. As a result it offers distinctive challenges to those working within the state secondary schools; however care must be taken to avoid lowering expectations of pupils' attainment.

Intervention

Schools and departments are developing tracking systems to enable them to identify pupil underperformance. In some schools the rigour of teacher assessment is not yet in place. Best practice has seen the development of agreed and moderated teacher assessments which inform the levels/grades entered onto the tracking system. In the first instance Individual teachers are held responsible to offer support and intervention to pupils in their group not making expected progress. Where this intervention does not help the pupil, other interventions are put into place. For example, in one school a pupil had been identified as not making sufficient progress to achieve a grade C at GCSE, a Teaching Assistant has been assigned to work with the pupil both during mathematics lessons and after them to help overcome gaps in understanding. The pupil's timetable has been adjusted to allow this to happen. In another school where pupils were not making sufficient progress to reach the predicted grade, that could, after discussion, be lowered in line with the teacher assessment. This should be challenged. Structured intervention is not common practice other than for students sitting GCSE modules. Best practice and research shows that intervention offered earlier in pupils' schooling limits the need for intensive support at this stage.

Pupils' basic numeracy skills are underdeveloped. This was acknowledged in most secondary schools. In the majority of schools no intervention had been put in place to support the pupils' development of these skills. There were regular speed tests of the skills in three schools which served to reinforce the pupils' lack of skills but did little to help them improve. In order for all pupils to be able to access the GCSE, these skills need to be developed and regularly practised to support immediate recall when needed.

The use of Cognitive Ability Tests (CATs) to predict GCSE performance may be leading to low expectations and lack of drive to attain the best results for individual pupils. Some schools use the lowest figure on the scale recommended by the States. The average score on all tests for each pupil is used. Too few schools look at the non-verbal reasoning, which is a better predictor of attainment for mathematics, to identify anomalies. This places children with English as an additional language at a disadvantage.

The availability and use of teaching assistants (TAs) in schools is mixed. In secondary, where they are well used and integrated into the subject area; they have measurable impact and allow targeted intervention to take place, particularly focused in most schools on examination classes. In one school, on the day of the visit, classes had a high proportion of TA support which was not well focused on learning.

Leadership and Management in Mathematics

Where leadership and management in mathematics is at least good, schools are making progress with the development of the teaching of mathematics. They have robust tracking, monitoring and evaluation in place and are continually looking at ways to enhance their provision. The school has an emphasis on the quality of teaching. There are established procedures in place for intervention. In the most effective the class teacher is responsible for identifying the appropriate intervention for each pupil in their care. Interventions are monitored and evaluated. In the best schools a learning environment has been established where staff development and sharing good practice is valued. Teachers and teaching assistants are aware of their strengths and individual areas for development. Where practice is good, the areas for development within the subject have been identified, actions to be taken prioritised and resources are available to enable successful outcomes. Subject leadership is being developed within these schools through dispersed leadership and the development of accountability. Whole school moderation of levels is built into the school programme of meetings and is valued by the teachers and considered to be important. The impact of this regular review of pupil levels can be seen in teacher planning and intervention within class to support individual pupils. Issues, such as pupils with English as a second language, high mobility, and loss of pupils to the private sector at different times are seen as challenges to be managed and overcome.

Where improvement is lacking, teaching tends to be of an inconsistent standard across the school, which may be recognised, but no intervention or support structures have been put in place to support the class teacher or teaching assistant's development. Pupil interventions lack focus and are not monitored and evaluated. In the weakest schools the high level of intervention is not impacting on pupil progress or attainment and teaching assistant support is not well directed. For example, pupils in some schools have become dependent on teaching assistant support and intervention.

Where senior management of the school hold subject leaders to account, offer support and guidance, the annual review of examination results is rigorous. Both senior management and subject leaders are aware of the strengths and areas for development for each staff member teaching within the department. For example, good practice was seen where performance weaknesses for a staff member had been identified, a programme of support was agreed and implemented. Progress was monitored and evaluated. The teacher saw it as a positive process and was now making a positive contribution to the department and pupils' progress.

Where senior management was less effective in challenging and supporting subject leaders the annual review of examination results was perfunctory and underperformance not challenged. Intervention was poorly organised and no evaluation had taken place. Pupil progress was not well monitored with lack of standardisation and accountability.

Subject leadership skills are embryonic in several schools, with limited ability to lead change and they are not always able to lead by example as their own practice within mathematics teaching needs to be enhanced.

There have been new subject leaders appointed in all secondary schools in the last four years, fifty per cent (50%) of which were internal appointments. Subject leadership skills in most schools are emergent. Most subject leaders are aware of their specific development needs and would like the opportunity to enhance their skills. They often have a clear idea of the department issues but have not yet gained the knowledge to overcome them and do not know where to seek advice. The small number of secondary schools on the Island may be seen as a limitation but it should offer the opportunity for them to share practice, pool resources and support each other. Monitoring and evaluation by subject leaders of teaching and learning, marking, pupil progress, work scrutiny, pupil interviews etc. is not yet well developed in most schools but is being supported by senior management. In the best schools time is allocated for this within the timetable and subject leaders are held to account.

There is some evidence of the use of classroom displays to support mathematics teaching but it is inconsistent as it has not been seen as a priority by the subject leaders or the senior management.

Mathematics staffing in some of the secondary schools has been very challenging for up to five years with lack of consistent specialist mathematics teachers, long term illness and gaps in subject leadership. Cover is becoming increasingly challenging for long term absence. Adequate planning to enable the pupils to overcome the resultant issues is not evident in all schools. For example some pupils had not had a specialist teacher for the whole of their secondary education. Schools will need to become more proactive in their approach to recruitment and for example look to work together to identify ways in which to maximise the use of specialists. Recruitment of qualified mathematics teachers and subject leaders is becoming increasingly challenging. Heads feel this is because salary/monetary advantages have been eroded and the cost of housing continues to be high.

Examinations

GCSE mathematics C grade should be the aspiration for all pupils in secondary education. At present in Jersey, less than twenty-five per cent (25%) enter Highlands College having achieved this goal. It is a necessary prerequisite for many level 2 qualifications offered by the college and as a result they have to work to support the pupils to gain a GCSE C grade in addition to their college courses. When pupils move onto a new school while the modular system remains, module results should be transferred as the pupil moves not only after request for the information.

In at least one 11-16 school pupils in Year 11 are now entered for a Functional Skills examination at entry level or level 1 as an alternative to GCSE. This may limit their options post 16 where courses above entry level require a mathematics GCSE C grade or equivalent

as a minimum entry requirement. In order not to disadvantage pupils in later life it should be exceptional for pupils not to be entered for GCSE.

The decision of some schools to enter pupils into alternative examinations brings into question the accuracy of comparing reported data from schools unless it is clear that the A*-C grade percentage is school cohort number and not subject entry number based. Jersey has not seen the same improvement in both GCSE and GCE grades that has been seen in schools in England over the last ten years and as a result it has fallen behind its statistical neighbours. However it is fair to say that Jersey started from a higher base.

The high degree of selection in Jersey (circa 45%) inevitably impacts on the performance of the 11-16 schools. However this should not lead to low expectations. Although it could be tempting to say that the position of the 11-16 schools is not equivalent to schools in England, there are areas of severe deprivation, much higher levels of English as an additional language, staffing issues resulting in no specialist teachers and selective schools which affect several areas within England. If measured against schools in these areas Jersey schools are not in the top percentile.

There is a need to look at how to encourage more pupils to study A level mathematics and then to take it up to degree level in order to offer the potential to develop 'home grown' teachers. The current take up of A level across the Island is not optimised. The schools recognise the need to improve the results and one way to achieve this would be to explore ways in which pupils are supported to become independent learners before they complete GCSE, by making lessons more interactive with links to real life situations and by developing pupil learning and revision skills.

Recommendations

1. The DfESC should research the uptake, retention and success rates in AS and A-level mathematics and further mathematics by pupils attending all Jersey schools, with a view to improving the uptake of the subject post-18.

2. The Mathematics Advisor would benefit from networking with colleagues across England working in this field. The National Association of Mathematics Advisers (NAMA) offers a regular e-newsletter, termly inset sessions and an annual conference, all of which helps to ensure that their members are kept up to date with developments in mathematics education both from a Government and research basis, and are able to network with colleagues working in the field.

3. All schools need to tackle mathematical disadvantage with determination. Policies and approaches to maximise learning need to be established, understood and implemented consistently by all mathematics staff for the benefit of all pupils.

4. In order to raise attainment schools should use a variety of strategies to improve all pupils' learning of mathematics, such as revising schemes of work, helping staff to enhance their subject expertise, and extending intervention programmes to all pupils who are in need of support, not just those at key borderlines or about to take national assessments. Schools should focus on high quality teaching and hold teachers to

account for pupil progress including monitoring and evaluating their lessons and adjusting them to meet the needs of their pupils.

5. Teachers should focus on building pupils' fluency with, and understanding of, mathematics.
6. Pupils of all ages and abilities should be encouraged to tackle varied questions and problems, developing a preparedness to grapple with challenges, and explaining their reasoning with confidence
7. Schools should raise ambition for more able pupils and in particular work to raise the number of level 3 pupils at the end of Key Stage 1. They need to raise ambition for these pupils to go onto realise level 5 by the end of Key Stage 2, with the expectation they will gain A* or A grades at GCSE.
8. Schools need to tackle in-school inconsistency of teaching with the aim of making more lessons good or outstanding, so that every pupil receives a good mathematics education.
9. Schools should increase the emphasis on problem solving across the mathematics curriculum and develop the expertise of staff in choosing teaching approaches and activities that fosters pupils' deeper understanding, including through the use of practical resources, visual images and information and communication technology.
10. Teachers need to develop skills including better questioning to check and probe pupils' understanding during the lesson, enabling them to assess this and adapt their teaching accordingly.
11. Teachers need to build on the lessons learned through moderations to develop deeper understanding of the progression in strands of mathematics over time. They need to know and use the key knowledge and skills that underpin each stage of learning to inform their teaching and the pupils learning.
12. Schools and subject leaders need to ensure policies and guidance are backed up by professional development for staff to aid consistency and effective implementation.
13. School management and subject leaders need to sharpen the mathematical focus of monitoring and data analysis and use the information gathered to improve teaching, effective intervention and the curriculum.
14. Schools could use the Ofsted Mathematics Survey as the basis for monitoring and evaluating teaching in mathematics lessons, as it identifies subject specific strengths and areas for development for the senior manager to feed back to the teacher.
15. Key words for each module of work should be prominently displayed, referred to throughout the lesson with pupils expected to use the key words in their verbal and written answers.
16. Mathematics displays should be interactive, relevant and used to support pupils' learning. In Primary schools they should be 'working walls' which are added to throughout the module of work. In secondary schools if space is limited then working walls could be developed on the interactive whiteboard.

In addition, primary schools should:

1. Refocus attention on improving pupils' progress from the Early Years Foundation Stage through to Year 2 to increase the attainment of the most able. Act early to secure the essential knowledge and skills of the least able by effective intervention which is monitored, evaluated and supported once the pupil returns to class.
2. Create a school based curriculum document which offers guidance to staff on whole school approaches, use of resources etc.

In addition, secondary schools should:

1. Ensure examination and curricular policies meet all pupils' best interests and secure good depth and breadth of study at the higher tier GCSE. This would reduce the reliance on the use of resit examinations, early entry, and dual entry.
2. Create a 5 year teaching programme for GCSE mathematics which develops pupils' depth and breadth of learning of the subject as well as ensures progression of learning. This should also include guidance on approaches to teaching, pedagogy and resources.

Notes

This report is based predominantly on evidence from visits to schools to observe and explore mathematics teaching during February and March 2013 in a range of state maintained and funded schools in Jersey. The sample of 14 schools and the college of further education were selected from a cross-section of schools geographically and by institutional type. No school with temporary senior management was included in the sample.

The visits were conducted in most schools with a member of the senior management team accompanying the consultant during all classroom observations.

During the visits, evidence was gathered through activities including:

- observations of part lessons and intervention sessions
- scrutiny of pupils' work and discussions with groups of pupils
- discussions with senior and subject leaders, with teachers whose lessons were observed, with teaching assistants and other support staff, and occasionally with others such as DFESC staff, consultants and governors
- analysis of documentation such as assessment information, schemes of work, policies and other management documentation, information about intervention strategies and the professional development of staff in mathematics.

In addition a further two (2) days were spent scoping the project which involved looking at DfESC held data and discussions with DfESC staff.

Appendix 1 Mathematics Review Data Checklist November 2012

	Item
1	List of all Schools forming part of the Review (appendix2)
2	Education Green Paper http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/C%20Future%20of%20Education%20in%20Jersey%2020110712%20KP.pdf
3	Foundation Stage Profile Data (2012)
4	KS1 End of Year Data (NC TA Levels) (2011, 2012)
5	KS2 End of Year Data (NC TA Levels) (2011, 2012)
6	Year 5,7,9 Whole island CATs Data (2011, 2012)
7	Year 4, 7 PIM Data (2009, 2010, 2011)
8	KS3 End of Year Data (NC TA Levels)
9	KS4 End of Year Results (2008, 2009, 2010, 2011, 2012)
10	Highlands College (GCSE Mathematics retake) figures
11	Higher Degrees destinations
12	Moderation Reports for Primary Schools
13	External (SERCO) reports of some schools Mathematics Departments
14	Other external reports (eg VFM reports)
15	Professional Partner Annual Reports

Appendix 2 List of schools Visited

Primary

Grouville

La Moye

Rouge Bouillon

St John

St Luke

St Martin

St Saviour

Victoria College Prep

Secondary

Grainville

Haute Vallee

Hautlieu (½ day)

Highlands (½ day)

Jersey College for Girls (½ day)

Le Rocquier

Les Quennevais

Appendix 3 ESC Mathematics Review 2012-2013

Consultant: Angela Easton (Angle Education Solutions)

School Visits – content checklist

Each school selected should expect a visit lasting a day (8.30 – 5pm) during which time the school should organise a timetable to include the following:

- Interview with the Headteacher
- Interview with the subject leader. To include discussion of data and tracking information
- Drop-in class observations to see the subject taught across the age/ability range. Including opportunities to talk with pupils in the classroom
- Book-look and work scrutiny
- Teacher planning and schemes of work
- Verbal debrief to Headteacher

Each school selected will be contacted by 17 January 2013

Each school will devise a timetable for the visit to cover the items above. Each timetable should include the contact details (telephone number and email) for the Headteacher and for the subject leader. Timetables should be submitted to Sarah Johnson, s.johnson@gov.je by Monday 28 January 2013. These will then be sent to the Consultant, Angela Easton. The Consultant will contact the school directly to request data and documentation required before the visit.

Appendix 4

Example Primary Timetable For The Day

8-30 to 8-55 Interview Head Teacher

8-55 to 9-30 Interview with Maths Subject Leader and Foundation Phase Leader

9-30 to 10-15 Drop-In Class Observation – Year 2.

10-15 to 10-45 Drop-In Class Observation – Reception.

10-45 to 11-00 Break.

11-00 to 12-00 Drop-In Class Observation – Year 6.

12-00 to 1-00 Lunch with staff opportunity to talk about maths.

1-00 to 2-00 Drop-In Class Observation – Year 4.

2-00 to 3-00 Book Look and Work Scrutiny.

3-00 to 4-00 Teacher Planning and Schemes of Work

4-00 to 5-00 Verbal Debrief to Head Teacher and subject leader.

Example Secondary School

8.30 Arrive at school. Met by headteacher

8.30 to 9.15 Meeting with Headteacher

8.45 am to 10.35 Drop in class observations including talk to students: teachers and classes were identified with allocated times

10.35 to 11.40 Meet with Head of Maths

11.40 Maths office to carry out book looks, work scrutiny, teacher planning and schemes of work

12.40 to 13.10 Meet Head of Maths

13.10 to 13.40 Lunch with maths staff

13:40 to 15:00 Drop in class observations including talk to students: teachers and classes were identified with allocated times

15.00 – 16:30 Further meeting time with department members feedback to head of department 16.30 debrief meeting with headteacher

References

Finnish Pupils success in Mathematics

Good Practice in Primary Mathematics

It Makes You Think

Key Understandings in Mathematical Learning http://www.nuffieldfoundation.org/key-understandings-mathematics-learning

Mathematics Made to Measure

Mathematics Understanding the Score

Primary Arithmetic http://www.acme-uk.org/news/news-items-repository/2011/6/paper-on-primary-arithmetic

Primary Questions and Prompts for Mathematical Thinking

Quality First Teaching http://www.optimus-education.com/what-do-we-really-mean-quality-first-teaching

Raising the bar: developing able young mathematicians http://www.acme-uk.org/news/news-items-repository/2012/12/acme-launches-raising-the-bar-developing-able-young-mathematicians

Thinkers (to develop teacher questioning)

We Can Work it Out (group work)

Teaching resources Association of Teachers of Mathematics http://www.atm.org.uk/ ; the Mathematical Association http://www.m-a.org.uk/jsp/index.jsp ; National Centre for Excellence in Teaching Mathematics www.ncetm.org.uk and NRICH http://nrich.maths.org/frontpage