The Education and Training Inspectorate

SURVEY OF BEST PRACTICE IN
ENGLISH AND MATHEMATICS
IN POST-PRIMARY SCHOOLS

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The Education and Training Inspectorate - Promoting Improvement

Providing Inspection Services for

Department of Education
Department for Employment and Learning
Department of Culture, Arts and Leisure

CUSTOMER SERVICE EXCELLENCE

Glossary of abbreviations and terminology used in case study extracts and report.

AfL	assessment for learning
C2k	The managed service which provides both hardware and software for schools
CASS	Curriculum Advisory Support Service
CATs	Cognitive Abilities Tests [standardised tests produced by GL Assessment and previously by NFER]
CCEA	Council for Curriculum, Examinations and Assessment
CEIAG	Careers, Education, Information, Advice and Guidance
EAL	English as an Additional Language
ETI	Education and Training Inspectorate
FSME	free school meals entitlement
GCSE	General Certificate of Secondary Education
ICT	information and communications technology
IEP	individual education plan
INSET	in-service training
NFER	National Foundation for Education Research [often still used by schools when they refer to standardised tests produced by GL Assessment]
PIE	Progress in English [standardised tests produced by GL Assessment and previously by NFER]
PIM	Progress in Mathematics [standardised tests produced by GL Assessment and previously by NFER]
PRSD	Performance Review and Staff Development

RM Staff	shared folders in the C2k system through which staff can share resources
RTU	Regional Training Unit
SELB	Southern Education and Library Board
SEN	special education needs
SENCO	special education needs co-ordinator
SIMS	Schools Information Management System [a management information system provided for schools through C2k]
SLT	Senior Leadership Team
SoW	scheme of work
VLE	virtual learning environment

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Introduction

The Department of Education commissioned the Education and Training Inspectorate (ETI) to undertake an evaluation of the quality of provision for English and mathematics in a number of post-primary schools where there is evidence to show that the pupils are achieving high standards in these important areas of the curriculum. It is widely accepted that success in post-primary education is predicated on high quality learning experiences and outcomes in English and mathematics.

Methodology

The survey focused specifically on those schools which achieve good outcomes in external examinations, particularly in relation to the proportion of pupils achieving five or more A* to C grades including English and mathematics at GCSE, with an emphasis on those that have a relatively high level of Free School Meals Entitlement (FSME). The sample of schools was chosen to include schools from the controlled, integrated and maintained non-selective sectors. A few schools with lower FSME were included in order to confirm that the features of best practice are equally prevalent in all successful schools. Seven schools were visited by two inspectors for a one-day visit.

The Case Studies

The schools were given the opportunity to demonstrate their success in English and mathematics and subsequently to write case studies outlining examples of action taken to promote improvement. These case studies take different forms but all highlight why the schools have achieved success in particular aspects of their on-going work. Other case studies were provided by four schools which had recently gone through an inspection in which the provision in English and/or mathematics was evaluated as very good or outstanding. (See appendices 1 and 2)

To ensure this report provides the highest level of engagement and produces benefit for all, the selected case studies are presented by the schools themselves. The report focuses separately on the findings from the English and mathematics departments and, when appropriate, extracts from the case studies are repeated in the English and mathematics sections. It also sets these findings against other support documents

produced by ETI, particularly *Better Mathematics* [1] and *Better English* [2]. It is clear from this report that there are a number of generic and subject-specific aspects of good practice which have been identified in *Better Mathematics* and *Better English*; what this report adds, however, are clear indications of how the good practice identified in these support documents can be realised in practice in schools which face significant challenges, including motivating and engaging pupils from relatively low socio-economic backgrounds.

The report focuses specifically on three areas of the provision within the English and mathematics departments:

- Planning;
- Learning and Teaching; and
- Leadership and Management.

Each school may have contributed more than one aspect. A brief description of the school is given in appendix 1 which helps to set the school in the context in which it works.

While it is possible that all the characteristics of high quality, outlined in the following report, will be fully present in both the English and mathematics departments, it is more likely that, depending on the stage of development of the subject, they will be only partly present in one or other of the subjects. What became clear during the survey visits was that elements of good practice were present in at least one of these core departments and that this good practice was being disseminated to other departments in the school as part of the school's continuous improvement agenda.

1 www.etini.gov.uk/index/surveys-evaluations/surveys-evaluations-post-primary/surveys-evaluations-post-primary-2007/better-mathematics-evaluation-and-prompts-for-self-evaluation-and-improvement-in-post-primary-schools.pdf

2 www.etini.gov.uk/index/surveys-evaluations/surveys-evaluations-post-primary/surveys-evaluations-post-primary-2011/better-english-2.pdf

ENGLISH

The Quality of English Provision 2010-12

The Northern Ireland Curriculum seeks to ensure that all pupils can achieve their potential and are able to make informed and responsible choices throughout their lives. This is underpinned by a need for pupils to prepare for life and work by developing as individuals, contributors to society and contributors to the economy and environment.

English has a very significant role to play in achieving these curriculum objectives. The study of English provides pupils with opportunities to become confident and discerning users of language and to appreciate literature more fully. It allows pupils to acquire, develop and use the necessary skills of reading, writing and talking and listening in a wide range of contexts, purposes and forms; many of which will re-occur throughout their lives.

Key Findings

While there is a commitment to, and a clear understanding of, the need for all pupils to acquire and develop good literacy skills, in 2010-2011 there were around 9,000 pupils in full-time education who had not achieved the required standard in literacy, and therefore lacked opportunities to contribute to and play an active role in society.

Many initiatives have been introduced over the years to allow teachers to become more skilled in helping pupils become more literate. Some have been more successful than others. We accept that there is no one way to get this right. It is a combination of many components and characteristics. It is about being clear about *'what the pupil can already do'* and *'what they need to do to develop and/or improve'* and ensuring that the planning for learning and teaching promotes and develops literacy skills in an exciting, innovative manner, using literary and non-literary texts which will engage, enthuse and inspire the pupils.

In the period 2010-2012 there were 25 inspections in post-primary schools focusing on English. Inspection evidence over this period indicates that there has been an improvement in provision, with an increase in the percentage of English departments evaluated as very good or outstanding rising from just under 20% to just over 30%.

The quality of leadership and management evaluated as good or better increased from 61% to 71%. Inspection evidence indicates that, through more effective and rigorous use of self-evaluation, departments are becoming more adept at using data to identify and target underachievement at the earliest stage helping to bring about overall improvement in standards. Furthermore, departmental meetings that help promote effective practice have also contributed positively to the improving picture.

There has been a continued improvement in the quality of planning, with the most effective focusing not only on what is to be taught but also indicating the learning to take place.

There is evidence of an improving trend in the quality of teaching observed, with 70% of lessons evaluated as good or very good and a small number outstanding. In the most effective practice, teachers build on prior learning which helps motivate, enable and challenge the pupils to become more involved in their own learning.

While there are fewer than 10% departments evaluated as inadequate, there has been an increase in the percentage evaluated as satisfactory. The characteristics of these departments include over-direction of work from teachers, an over-reliance on text books and too few opportunities for the pupils to become more active and engaged in the learning process.

Planning

Better English indicates that good planning for learning and teaching is essential when trying to bring about improvement. There is nothing random about teaching English. High quality learning happens where:

- planning has been thorough and meticulous;
- the teacher has clearly established exactly what and how the pupil will learn, understand or do; and
- lessons are well-structured, provide appropriate challenge and are matched to the needs, interests and abilities of all pupils.

Good planning is essential to be able to demonstrate coherence and progression in the learning experiences of the pupils.

From the schools visited, and lessons observed, it was clear that staff working together to create long-term planning for the department helped to promote a more collegial and shared responsibility for the learning. Connections in learning were planned explicitly and this helped the pupils begin to connect their learning in a meaningful and interesting manner.

St Cecilia's College – Promoting Literacy Across the Curriculum

As an English department we worked together to ensure that a shift in focus occurred in terms of teaching topics and teaching styles to address the need for improvement in key stage (KS)3 and KS4. Schemes of work were discussed at English departmental level and topics identified for KS3 which would inform the teaching required for KS4 and KS5. Using in-service days and departmental meetings, the new demands at KS4 and KS5 were discussed. The skills identified from the KS3 guidance and KS4 examination specifications informed the modification and creation of KS3 schemes of work to ensure that layered learning / connected learning occurred and that the foundation for skills required at KS4 and KS5 are laid in KS3. Members of English department were tasked with the creation of schemes of work, creating units reflecting fiction and non-fiction, working in pairs or individually, in order to ensure all members have ownership of the schemes and that new course demands of KS4, such as the study of spoken language and media analysis are firmly embedded at KS3 as individual learning units.

Newtownhamilton High School - Revision of Schemes of Work

We updated our KS3 and KS4 schemes of work and purchased resources to reflect the requirements of the revised curriculum and revised specifications for GCSE English language and literature. Group and paired work was promoted; pupils were encouraged to be independent and active pupils. Topic models relating to fiction and non-fiction texts were provided at the start of each unit of work for all of KS3 to support the implementation of assessment for learning. The teaching of media, analysis of non-fiction texts, development of personal writing skills and mini controlled assessment tasks were built into KS3 units of work.

Modelled answers from staff and pupils were provided in conjunction with the use of self and peer assessment. The introduction of modules and resits were accompanied by effective teaching and preparation, revision classes and examination skills coaching. Suitable controlled assessment titles were created to meet the needs of pupils and fulfil the criteria provided by CCEA. Relevant commercial packages for KS3 and KS4 classes were also purchased to develop the use of ICT and enrich learning.

St Joseph's Boys' High School – Assessment for Learning

Within our English department there are common units of work across the key stages, with the flexibility for teachers to adapt them to suit the needs of the class.

We have introduced pupil friendly learning intentions and the discussion of success criteria with pupils to ensure that they have a sense of ownership of their work. Through teacher and pupil self-assessment and marking for improvement, pupils are more aware of how to achieve the best results in their work.

Formative assessment is an integral part of our planning and practice. Constant appraisals are encouraged in peer assessment in units to promote critical thinking and self assessment to encourage personal development.

Teachers also offer a target or formative comment and KS3 level when assessing the work of a pupil in exercise books. All means of assessment are differentiated to offer open-ended responses for higher ability classes and guided responses for other classes.

Heads of department visited acknowledged that time spent planning for learning was integral to improving learning and teaching and raising standards achieved.

Learning and Teaching

The characteristics of good practice in learning and teaching observed during this survey reflected much of what was written in *Better English*. This included:

- teaching which was creative and innovative and which matched well the needs of the pupils whilst also providing challenge and support;
- teachers ensuring that the pupils' experiences were enjoyable, and the balance between teacher direction and intervention and pupil autonomy, encouraged the development of the pupils' independence and helped them take more responsibility for their learning; and
- high expectations of what the pupils can achieve being held by teachers and pupils and new skills, knowledge and understanding being built seamlessly upon that which had gone before.

Holy Trinity College - High Expectations for All

The English teachers set realistic, high expectations which challenge and motivate pupils. They monitor and track the progress of individual pupils, measuring attainment at the end of the key stages and in public examinations. Pupils have increased confidence in communication, thinking skills, and personal capabilities. Teachers use a wide range of assessment for learning techniques and provide feedback which highlights both strengths and areas for improvement. Pupils are better informed about, and prepared for, third-level education. The acquisition and development of literacy continues to be a focus for the school. The head of English / literacy co-coordinator has devised and shared a literacy policy as well as providing ongoing training and support to all staff, in order to promote the development of literacy skills at all key stages.

St Joseph's Boys' High School – Back to Basics

We have introduced VOCP – vocabulary/openings/connectives and punctuation in ALL English rooms and within the reading room. As a department there is a focus on basics – spelling, punctuation, vocabulary and reading. There was a drive for department members to deliver an engaging and interesting English curriculum.

Oral language and the development of knowledge is highly encouraged in each class.

We have a whole school strategy to spelling and presentation of pupils' work including training for staff on the best way to teach spelling. We have created a 'keywords' booklet which is implemented into the English department's spelling scheme. This is coupled with a universal wall display of spelling strategies tailored to subject needs which is now being generated for all departments. There is an 'open-door' policy within the English department for literacy advice to staff across the whole school.

Holy Trinity College – Broadening Teaching Approaches

Developing pupils' thinking skills and personal capabilities is central to teaching. Teachers regard themselves as facilitators and employ a range of active learning and teaching strategies as well as the regular use of ICT. There is an increased emphasis on careers education information advice and guidance and the linking of English schemes of work to real life.

Pupils are increasingly involved in the setting of personal targets and are in discussions with their class teachers about their progress. Increased use of self and peer evaluations allow pupils to become more independent and to assume greater responsibility for their learning.

Learning and teaching appear regularly on the agenda for department meetings and minutes are available for all other staff to see. Feedback on these minutes is provided by the Principal and SLT. The head of English works closely with the SENCO and raising standards leader to consider all the available data and plan, monitor and review initiatives designed to improve standards of literacy.

Better English highlights the value of skilful use of up-to-date ICT, which gives pupils the opportunity to explore and research in a meaningful context and to consolidate their learning. Internet research enables the teacher to promote accuracy, discernment and judgement for the pupils so that they can become more effective in managing information. This must play a part in the classroom of the 21st Century. When used effectively, ICT can enable teachers and pupils to access, select, manipulate, enhance and use texts in ways that would not otherwise be possible.

Markethill High School – Use of ICT

The introduction of ICT resources within established curriculum content (in particular state of the art iPad tablet technology) has served to help inspire pupils to engage within their learning environment. By building on a pupil's existing familiarisation with touch screen technology, the child can be provided with a sense of immediacy and empowerment within their learning environment; in particular, those pupils who may find some elements of academic life and work challenging. This feeling of empowerment can, in turn, lead towards establishing standardised routines within the classroom for those pupils with additional needs. One specific example of this is:
"Who would be confident to click into iCamera and show their work up on the board?"

New-Bridge Integrated College - Use of ICT

Extension work through use of technology to stretch more able pupils has been a success. The use of voice thread and discussion forums with classes encourages peer assessment, as well as developing pupils' analytical and evaluation skills of various texts. The development of the school's VLE has been a key factor in raising attainment in English, as pupils have been able to access additional work from home.

The best learning occurs when the English programme has coherence, plans for progression and demonstrates a balance between the acquisition of language skills and their use by the pupils for purposes which they see as interesting and current.

St Mary's College, Irvinestown - Assessment for Learning

The whole school was working on AfL. In the midst of focusing on the new curriculum, we could quickly see how AfL could transform the English department. We had to teach pupils how to self assess and this would take a lot of time and repetition BUT collaboration grew out of this organically as did a focus on teaching strategies, resources and tools. It took time for all teachers to understand AfL, see its value, get together to plan AfL, write in assessment opportunities, change teaching strategies and devise better ways of questioning.

It also took a long time for pupils to learn how to use AfL effectively and it had to become habitual and routine in classrooms. Pupils could know their target BUT still be unsure about what to do in order to reach it. This was something that we had to focus on for improvement. We knew it needed 'unwavering concentration' to succeed and we have found this to be the case. However, at the point where 72% of our pupils achieved A to C, we knew that we were on the right road – we are still not there, but we are well on our way!*

A good ethos is essential to effective English teaching because high quality learning takes place in classrooms where relationships are positive and supportive and where pupils feel safe and secure. In such circumstances, pupils:

- feel confident in expressing their views and opinions;
- can enjoy fully their English work; and
- develop their learning in a climate where they can be challenged and encouraged to give of their best.

Well-settled and well-motivated pupils, who are consulted about their learning needs, respond best to challenge and stimulation.

Leadership and Management

Better English identifies clearly the importance of leadership and management in promoting improvement and ensuring that the pupils achieve their full potential.

The head of English plays an important role not only within the department but also in promoting the use and development of English across the school. Improving standards of literacy must be a priority for all our schools. *Count, Read: Succeed* [3] reminds us that to promote literacy for all pupils, schools need to take

> *"...an integrated approach to the acquisition of talking, listening, reading and writing skills across the curriculum... it is the central purpose of our schools, supported by parents to ensure that pupils develop the necessary literacy skills to succeed at school and later on, in life and work."*

The responsibility for promoting literacy is not exclusive to the English department, but the forward-thinking head of department can guide and direct this work with the benefit of expertise.

Holy Trinity College - Promoting Literacy Across the Curriculum

Improving standards of literacy is a challenge for all schools but one which Holy Trinity College embraces every day. The SLT, teachers and support staff work closely to tackle underachievement in these areas. The SLT recognise the centrality of developing literacy and numeracy and they are at the heart of the school development plan and feature as a whole school objective in PRSD. Additional teaching time, smaller groups and a setting arrangement are practical and effective means of enabling progression in these all important areas.

Like most schools, Holy Trinity College is rich in data. Staff here, however, agree that it is how the data is interrogated and used to effect improvements in pupil outcomes that is most important. In order to ensure ever more effective use of the available data, the college has recently appointed a Raising Standards Leader tasked with refining and improving the effective use of whole school data. Our aim is for 'a systematic use of data' as recommended in 'Every School a Good School'. Data is benchmarked and cross-referenced to free school meals.

3 www.deni.gov.uk/count_read_succeed_a_strategy_to_improve_outcomes_in_literacy_and_numeracy.pdf

Holy Trinity College has approximately 15 feeder primary schools with which it enjoys very good relations. In 2010, with the help of C2K, the college introduced a pilot which involved the direct transfer of the new year 8 pupils' end of KS2 PIE and PIM data into the assessment module on SIMs. This enabled the College to place pupils in classes initially, had the added benefits of avoiding a stressful and unnecessary testing of pupils as well as strengthening links with our feeder primary schools and providing continuity between KS2 and KS3.

The English department's focus over the past three years reflects the concerns of '*Count, Read: Succeed'* and the drive to ensure that all school leavers have secured at least a grade C in GCSE English and are literate. Key aims of the Department *have been to increase the number of pupils achieving Level 5 + at KS3 and to raise the percentage of pupils achieving grades A*-C at GCSE. The department has also focused on the implementation of the new statutory requirements for communication at ks3 and embedding thinking skills and personal capabilities and assessment for learning strategies. Familiarising all department members with the new levels of progression for assessing communication and creating and gaining accreditation from CCEA for communication tasks have also been regarded as priorities for the department.*

Promoting and developing literacy is much more than learning key words. It is not about asking what another subject department can 'do' for literacy. It is about providing opportunities through all learning and teaching to help the pupils:

- become thinkers and developers of thought;
- explore language and their understanding; and
- engage with that which they like and understand and that which they don't like or understand.

St Mary's College, Portglenone - Promoting Literacy for All

Literacy is actively promoted in a wide variety of ways. The pupils' week begins with a whole school assembly that regularly focuses on literacy. Younger pupils visit our school library on a fortnightly rota as part of our Reading Olympics scheme. Professional development days and departmental meetings are used to share relevant policies, revisit key issues and develop our cross curricular communication tasks.

Our sixth form pupils play a key role in promoting literacy. They not only exemplify our aspirations for academic progress but they also offer very effective pupil leadership. They act as literacy mentors for younger pupils and co-run our EAL club improving language skills and inclusion alongside a qualified EAL primary school teacher and an EAL tutor.

Sperrin Integrated College - Literacy Week

A commitment by all staff as teachers of literacy is firmly embedded in the college and is evidenced by pupil and staff involvement in the college's annual 'Literacy Week'. This includes: teachers sharing their reading habits in assembly; visiting authors; participation in the 'Read On' challenge; Spellathon and a literacy focus in all subject areas; form teacher involvement in 'Word of the Week' and form class reading time and a number of teachers leading reading clubs for boys and girls. This has proven to be particularly successful where male teachers have led reading clubs for boys and acted as good role models. Sixth form pupils participate in group reading activities in the library and take responsibility for some of the lunch-time reading clubs.

A good head of department should:

- be able to lead and conduct honest and comprehensive internal evaluation as the basis for departmental action plans and target setting;
- have a strategic approach to improvement supported by the analysis of relevant data and regular monitoring of provision, outcomes and standards; and
- ensure all work is led by a clear action plan which sets targets which are smart, measured and time-bound.

St Mary's College, Irvinestown - Action Planning

The action planning process was a hurdle: we knew what was wrong and what we didn't like, but we were less clear about what we would like and where to start implementing change. We started with a breakdown of the previous year's results and we "number crunched" to prioritise: there was going to be more time spent on teaching Paper 2 skills (non-fiction); different teaching of the use of quotation; new resources written to help pupils with forming answers; and explicit instruction relating to the timing of completing answers. We re-wrote coursework booklets, advice sheets for examination questions and examination booklets.

At the same time there was to be a focus on teaching to different learning styles with exact strategies written beside individual pupils' names. We re-wrote schemes to allow for much more focus on talking and listening, aiming for a final score of at least 17/20 for all pupils. We decided to finish teaching by December of year 12 to allow the final term for re-writing coursework and re-sitting talking and listening activities for under-achieving pupils and for focused exam preparation for all pupils, using mark schemes as teaching tools.

There would be after-school clubs for pupils who were still underachieving, with individual meetings between pupils, parents and the English teachers/Principal to take place for any pupils not on track. The Principal took responsibility for pupils not completing classwork or homework tasks; while this was a huge undertaking, it reinforced the message that not achieving was not acceptable.

Excellent teamwork, holding high expectations, demonstrating a clear process for collaboration and sharing of best practice generated a consistency of approach, especially in the crucial area of the quality of teaching. In addition, close working relationships with the SENCO are a very important element in ensuring all of the pupils' needs are met effectively. *Better English* identifies the central role this plays in raising standards.

There has been much talk about the benefits of sharing good practice, especially to help those teachers who do not teach English. There are many ways to do this without disrupting the life and work of the school, and it is incumbent on all teachers to find local ways to do this.

Sperrin Integrated College – Sharing Good Practice

A shared resources area was set up allowing teachers access to literacy resources. The English department's marking code and self correction technique was given to all departments; the literacy co-ordinator led a staff training day which introduced staff to resources and suggested possible uses of these; the SENCO shared a number of ideas and resources on issues such as creating a 'Dyslexia Friendly Classroom' and the English department piloted the use of narrow, subject specific targets for IEPs and shared these with other departments.

Holy Trinity College – The Importance of Literacy

The focus on raising standards in both English and literacy and the other priorities identified by the Head of English came about as a result of the school development planning process which identified literacy as a key area for whole school development.

Having decided to focus on raising standards, a number of actions were taken. Firstly, changes in curriculum planning enabled all top and middle band Year 11 pupils to be timetabled together allowing for promotions and demotions within bands. The time allocated to the teaching of English was increased from seven, 50 minute periods over two weeks to eight, allowing additional time for examination preparation. This has been of particular benefit to the top two classes who complete both English and English literature GCSE. An additional 'split' was created in last year's Year 12 cohort to support and target a small number of top band pupils who were not on track to secure at least a 'C' grade at GCSE. After-school revision classes and 'catch-up' controlled assessment classes were made available for those who had been absent.

The college has invested in additional staff to support literacy. The head of English works closely with the college SENCO to identify pupils who require withdrawal and/or in-class support. A specialist literacy teacher is employed two days each week to withdraw pupils in need of additional support and two full-time members of the English department also have periods allocated to withdrawal and support.

St Joseph's Boys' High School – Best Use of Data

Robust baseline testing evidenced a range of difficulties in the Year 8 cohort identifying between 58% and 89% of new intake pupils scoring below the average mean score of 100. This year, the English department introduced the online version of PIE to provide more information to help identify pupils' particular areas of difficulty. Diagnostic profiles on each pupil have been prepared and provided across whole school to heads of departments.

This information, in addition to assisting the English teachers, also assisted the SENCO in the identification of any new special needs concerns and whole school strategies for literacy support. Central to these strategies was the sharing of all data with all teaching staff and the up-skilling of classroom assistants, so that they were able to address the literacy needs of the pupils they support.

It is evident that all the English departments visited place a strong emphasis on the sense of subject identity. The English departments are also aware of the importance of English and how the success in English can help the learner succeed in other areas of the curriculum.

The Way Forward

In order to continue to meet the needs of all pupils and to provide them with enriching and exciting experiences all teachers of English should:

- have a more secure understanding of the curriculum of the primary school, and where the pupils are, upon entry into year 8, in the acquisition and development of their skills, knowledge and understanding with regard to all aspects of English and literacy;
- move the teaching of GCSE and A level beyond the examination specification to ensure that all pupils receive a broad and balanced experience in English;
- customise the planning for GCSE and A level to meet the needs of all the pupils; and
- seek out staff development in relation to the promotion and development of literacy skills within and across all departments in post-primary, which needs to go beyond providing resources, activities and tasks, and, must provide opportunities for teachers to develop their pedagogical skills with regard to promoting literacy within their subject area.

MATHEMATICS

The Quality of Mathematics Provision 2010-12

Mathematics is also at the heart of the Northern Ireland curriculum. For young people to become well-informed and active members of society, and to be able to contribute to the economy, they need to acquire appropriate mathematical knowledge, understanding and skills. Research shows that poor basic mathematical skills have a continuing adverse effect on a person's life and lead to the greatest disadvantage for the individual in the labour market and in terms of general social exclusion[4].

In addition, more jobs require workers to be able to solve problems within mathematically-rich situations. Schools need to meet this challenge and improve their mathematics provision so that pupils gain not only the necessary core knowledge, understanding and skills, but also the confidence and competence to apply these in familiar and unfamiliar settings.

Key Findings

While the performance in public examinations in mathematics continues to rise, the year-on-year increase is small. Improvement in mathematical standards remains a priority. During inspections, inspectors make evaluations based not only on examination results, but also on the quality and standard of work the pupils complete. In the period since the publication of *Follow-up to Better Mathematics*[5] the achievements and standards achieved by pupils in post-primary inspections was evaluated as not good enough in one-half of the post-primary inspections.

Inspection evidence indicates that teachers' high expectations are one of the main determining factors for success. The quality of planning, which was evaluated as not good enough in three-fifths of inspections, and the quality of questioning, evaluated as not good enough in over half of the inspections, are central to the pupils being suitably challenged to reach their full potential.

4 Making Mathematics Count, Smith, 2004

5 www.etini.gov.uk/index/surveys-evaluations/surveys-evaluations-post-primary/surveys-evaluations-post-primary-2010/follow-up-to-better-mathematics.pdf

However, high expectations alone will not bring about improvement: clear exposition, high quality learning experiences and supportive feedback are also necessary. While clear explanations, based often on the teachers' secure subject knowledge, continues to be a strength, and the range and quality of learning experiences continues to improve[6], the quality of feedback following the marking of pupils' work was a strength in only around one-third of inspections.

Central to mathematics departments improving the experiences of the pupils and bringing about the raising of standards, is their developmental work under the leadership of the head of department. The main area for improvement in *Follow-up to Better Mathematics* was the role of the head of department in leading his or her teachers, and specifically in planning, implementing and reviewing actions that promote improvement. Inspection evidence indicates that this continues to be poor – it is not good enough in more than three-fifths of departments.

The PISA[7] 2009 scores for mathematical literacy provided evidence that the ability of 15 year-olds to apply their mathematics needs to improve. *Count, Read: Succeed* emphasises the importance of pupils being able to apply their mathematical knowledge, understanding and skills. This is a significant change, and some schools are at an early stage of developing a coherent cross-curricular approach to raising the standards of the pupils' ability to apply their mathematical skills in familiar and unfamiliar contexts. Teachers of other subjects need to understand the mathematics required in the discourse of their own subject and ensure that the pupils experience a consistent approach to the learning of mathematics and receive appropriate help with any difficulties in their mathematics at the point of need.

Planning

Better Mathematics identified the quality of departmental planning as one of the main areas for improvement for post-primary mathematics provision. It highlighted that in the best practice the schemes of work:

- provided a broad, balanced and coherent curriculum;

6 For example, as a result of using the type of activities promoted in Improving Learning in Mathematics (The Standards Unit, Department of Education and Skills, 2005) resource (www.ncetm.org.uk/fi les/224/improving_ learning_in_mathematicsi.pdf).

7 Programme for International Student Assessment

- were sufficiently detailed to help the teachers match the work to the abilities of the pupils;
- identified when and how information and communication technology would be used;
- emphasised appropriately the role of mental mathematics; and
- outlined both formal and informal instances when the pupils would undertake work related to processes.

Follow-up to Better Mathematics also emphasised that the scheme of work needs to be a working document which is reviewed regularly and acts as a depository of best practice.

The evidence from this survey indicates that thorough planning is the foundation on which effective learning is built. It was most effective when it took full cognisance of what the pupils had learnt in their previous schools and provided guidance to ensure appropriate progression in the learning from year to year.

Newtownhamilton High School – Building on Previous Learning

Over the past 3 years the mathematics department has focused on developing the Revised Curriculum by the introduction of new text books into KS3 and amending existing schemes of work. Using information gained from liaison with primary schools, we were careful to address any regression experienced between KS2 and KS3.

The two mathematics teachers from Newtownhamilton High, with the assistance of CASS met a number of times with teachers from our main feeder primary schools where we discussed the learning and teaching of mathematics in KS2 and KS3. We exchanged visits to watch lessons being taught in both the primary and high schools. Questionnaires were completed and exchanged and schemes of work shared. We identified overlap and amended our schemes as a result.

The level of detail in the planning extends to the use of appropriate learning and teaching approaches and, in the best practice, plans for high-quality interactions between teacher and pupils which are all important.

St Joseph's Boys' High School – Improving Teaching Approaches

As a result of St Joseph's focus on improving numeracy levels across the school the mathematics department now carefully incorporates assessment for learning strategies within the planning. We plan effective use of questions for our lessons, placing more emphasis on open-ended questions, improving the pupil thinking skills and we plan our lessons to incorporate more active learning for the pupil.

As a result of our modified planning and teaching styles our pupils take more responsibility for their own learning.

Ballycastle High School - Improving Learning Experiences

During the interim period since the inspection visit, the teachers reviewed the schemes of work each year to improve collaborative and investigative work. Where appropriate they also identified opportunities through which the importance of mathematics in careers could be promoted. Throughout this period, both the use of formative and summative assessment played a key role. The schemes of work outlined starter and plenary activities for each topic and during these activities the use of effective questioning was highlighted.

Since *Count, Read: Succeed*, successful schools are also planning across departments to ensure that pupils receive a coherent range of learning experiences.

New-Bridge Integrated College – Involving a Whole School Approach

Year 9 intervention to address underachievement in mathematics is supported by a whole school numeracy strategy with specific subjects working closely with the mathematics department to actively develop numeracy skills and raise attainment. INSET was provided by the mathematics department for all staff to support the use of mental maths strategies across the curriculum and ensure these skills are transferable. Through the Numeracy Strategy Team the mathematics department has produced 'help sheets' to ensure a common approach to basic numeracy skills.

The 'open door' policy of all members of the mathematics and English departments promote an ongoing dialogue of good practice and support. A 'cross-fertilisation' of ideas between mathematics and English, through regular planning meetings, has resulted in new strategies being developed and implemented to raise attainment at KS4.

In conclusion, there was clear evidence that successful schools have collaborative planning as a priority and the characteristics for effective planning outlined in *Better Mathematics* and *Follow-up to Better Mathematics* are guiding their practice.

The centrality of the schemes of work to ensuring that schools have high expectations for the mathematical learning for all pupils was clearly evident. The survey confirmed that shemes are most effective when they provide clear guidance to help both the subject specialist and the non-subject specialist plan their individual lessons, within a coherent structure, to ensure progression in the skills and understanding of all the pupils.

Learning and Teaching

Learning occurs most effectively when it is built on a strong positive ethos or climate for learning in mathematics lessons. *Better Mathematics* highlighted the elements that constitute such an ethos:

- the working relationships between the pupils and teachers are strong;
- pupils are settled and motivated;
- teachers give sensitive individual support when difficulties arise with the pupils' understanding; and
- pupils believe that, with the help of the teacher and their hard work, they can improve their standards of achievement.

The evidence from the case studies confirms that a strong climate for learning, in which the pupils are expected to think and participate fully in their learning, is engendered and strengthened by good working relationships among the teacher, learning support staff and pupils. The evidence also confirms that teachers having

high expectations for what their pupils know, understand and can do, is the starting point for high standards.

St Cecilia's College – Building on High Expectations

To raise standards in mathematics and numeracy the mathematics department provides a climate for learning. The mathematics teachers have high expectations for all pupils and share these with pupils and parents via daybooks and parental meetings.

The high expectations relate to the presentation of work, homework that is well attempted, the use of correct mathematical language and competency in mental maths skills and the four basic operators. Also the mathematics department has high expectations in relation to behaviour so that there is no disruption of learning and teaching.

St Mary's College, Portglenone – Building on Positive Working Relationships

Positive reinforcement has helped us to develop a strong climate for learning to the extent that our pupils enter classrooms ready and willing to learn. Pupils are encouraged to become independent thinkers and to annotate their work with helpful prompts or hints.

The small size of our school helps us get to know our pupils as individuals. We have a good knowledge of their personalities as well as their academic strengths and weaknesses. The strong working relationships between staff and pupils encourages mutual respect as pupils, for example, know that their teachers are doing the best that they can for them.

The involvement of the pupils in their learning starts with the teachers focusing on the intended learning. This includes them involving pupils as much as possible, for example in peer-mentoring, and results in the pupils taking greater responsibility for their own learning.

St Cecilia's College – Involving Aspects of Assessment for Learning

The mathematics department provides high quality teaching for all pupils. Teachers clearly display learning intentions and these are revisited throughout the lesson. This enables pupils to be focused, clear about what they are doing and feel that they are making progress.

Effective questioning is used throughout the lesson so that pupils have to think through and explain their solutions to problems. This allows both teachers and pupils to be clear about what has been understood.

St Mary's College, Irvinestown – Involving Peer Learning

In the classroom, differentiation and target setting ease pupil fears and also facilitate cooperative learning and the setting of achievable goals. Peer learning and peer teaching are harnessed as effective learning strategies. Pupils can find it easier to understand a peer explaining a difficult concept, or breaking that concept down using a different style and type of language than the teacher has employed.

We know that high level learning has taken place when a pupil is able to teach another. Peer learning and teaching provides continuous assessment opportunities for the teacher and can assist in self-assessment and peer assessment, constantly building learning opportunities for all pupils involved.

Holy Trinity College - Building Independence

Pupils set personal targets and are involved in discussions about their progress. Increased use of self and peer evaluations allow pupils to become more independent and to assume greater responsibility for their learning.

The characteristics of effective learning and teaching of mathematics are now well agreed and accepted by the mathematics education community[8]. *Better Mathematics* identified these as being in place when teachers:

- share the intended learning with the pupils at the start of the lesson;
- recap and link the work to previous learning, or set the work in an appropriate real-world context;
- provide clear exposition involving, where appropriate, multiple explanations, with board-work modelling what the pupils should do;
- use a variety of activities, including ICT and practical equipment, which entails the pupils working individually, in pairs or in groups;
- provide opportunities for the pupils to problem-solve;
- integrate, when appropriate, the use of effective mental mathematics strategies;
- use skilful questioning, challenging the pupils' understanding and requiring them to draw conclusions and justify their thinking;
- highlight common misconceptions and exploit these in a sensitive way;
- relate the ongoing work to other parts of the course to encourage the pupils to make interconnections and think of mathematics holistically;
- engage the pupils fully by ensuring that the lesson had appropriate pace, challenge and progression;
- teach step-by-step algorithms only when necessary; and
- encourage the pupils to think and talk about how they learn and what they have learnt, often through appropriate plenary sessions at the end of lessons.

In particular, in the lessons observed during this survey, teachers explained the mathematics behind the methods of solution carefully, were precise in their use of mathematical language, made connections with previous learning and understanding, and used meaningful contexts to engage their pupils. The lessons had pace and challenge and involved opportunities for pupils to work in pairs and small groups to problem-solve and complete collaborative learning activities.

8 See Mathematics Matters, National Centre for Excellence in the Teaching of Mathematics, 2008 (www.ncetm.org.uk/files/274681/NCETM+Mathematics+Summary.pdf)

Holy Trinity College – Making it Relevant

Developing pupils' thinking skills and personal capabilities is central to teaching. Teachers regard themselves as facilitators and employ a range of active learning and teaching strategies and make regular use of ICT. There is an increased emphasis on careers education information advice and guidance and the linking of mathematics content to real life.

St Cecilia's College – Involving a Range of Opportunities

Mathematics teachers consistently highlight the use of mathematics in other subjects. For example, when teaching formulae we emphasise how this skill is used in science. When teaching ratio we illustrate how this skill is used in home economics, technology and geography.

Pupils realise that mathematics is not just for the mathematics lessons but has many practical uses in the real world. Mathematics is a life skill.

Opportunities for improving the pupils' mental mathematics were used fully and these provided the basis, on many occasions, for the teachers to reinforce their high expectations. Interactive white boards were used effectively and a number of schools have invested in commercial software to support their use.

Newtownhamilton High School – Involving Mental Mathematics and ICT

Mental mathematics is a focus each week, with one mental mathematics homework set per week for KS3 pupils. Other fun mental mathematic activities take place each week. Practical activities take place in the mathematics classes and "The Improving Learning in Mathematics Box" ideas proved to be useful.

Much use is made of the interactive white boards. 'Boardworks' was purchased for both KS3 and KS4 and is used almost every day. 'Whiteboard Maths' has been used for a number years now in the mathematics department. Pupils have responded well and have shown improved motivation, which can be seen in their end of topic evaluation sheets.

The effective use of ICT to support learning in mathematics was identified in *Better Mathematics* as an area that, in many schools, is generally underdeveloped. This survey identified a number of good examples of the effective use of ICT.

St Cecilia's College – Using ICT

ICT is used constantly to enhance learning and teaching. Two of the mathematics rooms have laptops and every mathematics room has an interactive white board. All mathematics rooms have a 'Visualiser' which allows teachers to demonstrate the proper use of practical equipment, such as the protractor, in mathematics. Pupils are encouraged to use 'Mangahigh.com' website which has the full mathematics curriculum and mathematics games. Also a numeracy area on the VLE is being developed and currently includes the 'Numeracy Workout' software which is excellent.

Better Mathematics identified three important aspects of assessment as particular weaknesses:

- too much self-marking by pupils which was not regularly monitored and followed-up by individual, group or whole class feedback;
- an over emphasis on marking without an appropriate proportion of errors being corrected; and
- the use of comments which, although encouraging, provided little guidance to enable the pupils to improve.

A feature in a majority of the schools visited was the regular and thorough monitoring of the pupils' work in homework and classwork books. In the best practice, the teachers also monitored and praised the corrections completed by the pupils following individual or whole class feedback. In a few of the schools, interactive white boards and Visualisers (small video cameras) were also used to provide feedback to the whole class through the teacher's marking of pupils' work.

Newtownhamilton High School - Assessing Pupil's Work

Homework is regularly set and marked and feedback given. Tests are set at the end of each topic and feedback is given to each pupil. A record of all tests is kept and target setting takes place particularly for KS4 pupils. Examinations are given twice a year and reports sent home.

Mathematics websites were also used to involve parents in their child's homework and provide additional support.

St Joseph' Boys' High School – Using ICT at Home

As a department we invested in 'MyMaths.co.uk', an online programme to improve pupils' mathematical skills. 'MyMaths.co.uk' consolidates and reinforces what pupils have learnt that day in the classroom. The website caters for all levels of ability from basic addition and subtraction to high level GCSE material. We involved parents in this strategy so they too could support and monitor the work their son completed on 'MyMaths.co.uk' at home. Parents were given access to login details so they could monitor and support their son's progress.

We also knew that some pupils did not have internet access at home so the school computers were accessible after school to facilitate these pupils. Teachers set online homework which pupils could try a number of times in order to improve their score. Pupils could also rate the task according to how difficult they found it, which gave valuable feedback to the teacher. 'MyMaths.co.uk' proved a useful tool in improving our pupil's numeracy levels and we also use 'Mangahigh.com' as another online web site for KS3 pupils to provide fun activities to also help improve pupil numeracy.

A number of the schools had also developed VLEs which were used to involve and support the pupils.

Markethill High School – Using the VLE

As a mathematics department, we have grasped the opportunities which the VLE affords us in order to support, develop and extend pupils' numerical abilities. Examples of this are: presentation material to reinforce explanations of specific topics (the year 8 VLE topic area on algebra contains links to relevant Powerpoints which explain concepts); topic-related resources at KS3 which contain a wide variety of motivational activities; specialised software, accessible through the VLE, that assesses the pupils' learning and records the mark for individual pupils; and, at GCSE level, the sharing of past papers and mark schemes with pupils.

In this survey, formative assessment, for example through effective questioning, was evident in the lessons observed. In the best practice, mini white boards (sometimes called, 'show-me boards') were used effectively by the teacher to quickly ascertain how well a new skill had been learnt.

St Joseph's Boys' High School – Using Formative Assessment

Formative assessment plays an integral part of every mathematics lesson. It takes place though the use of effective questioning in lessons and close observation of pupils and their class work/homework. A worthwhile task for us has been to ask our pupils to explain their thinking and approach to solving a mathematical problem. Self-evaluation is part of the learning process and allows pupils to evaluate their learning.

Better Mathematics highlighted the provision for pupils who have difficulties with their mathematical learning as an area which in many schools required improvement. In particular, it identified the need to:

- use the information collated at primary school and/or arising from effective screening procedures to identify the pupils who require additional support in mathematics;
- use diagnostic tests, where appropriate, to identify the specific weaknesses in the pupils' knowledge, understanding and skills;

- design lessons to address the specific areas identified; and
- have evidence of mathematical progression and improvement in the performance of each identified pupil.

The schools in the survey had well-established procedures for summative assessment, which at KS4, in all of the schools, triggered various interventions.

St Cecilia's College – Using Assessment to Identify Need

The KS3 pupils do four summative tests during the year. These are used to inform teachers, pupils and parents of pupil progress. Following these tests pupils set targets for their next test in their daybooks. Progress booklets are used by KS3 pupils themselves to identify areas of weakness.

Year 13 maths pupils are used as mathematics mentors to support these pupils at lunchtime. The after school homework club, which is staffed by classroom assistants, is also available.

St Mary's College Portglenone - Using Assessment to Maintain High Expectations

Teachers use end of topic tests, homework exercises and internal examinations to constantly inform their professional judgement of pupil progress. Our early intervention for pupils with numeracy difficulties includes targeted use of classroom assistants and withdrawal and help from our sixth form mentors.

Our experience is that systematically routine internal assessment, including examination practice, has been a major factor in our pupils' success at GCSE level. Individual teachers are encouraged to regularly reflect on pupil outcomes in mock and actual examinations. The department is also held accountable for results but, in fact, we all take great pride in achieving good results.

All educators know that high teacher expectations result in better pupil outcomes. We have found that regular assessment, and an element of competition between pupils, helps to maintain our high expectations.

Sperrin Integrated College – Targeting Support

A rigorous tracking, review and mentoring system at KS4 has been introduced which supports the identification of pupils who are under-achieving or under-performing. Following the Christmas mock examinations in year 12, pupils are identified who are on GCSE grade C/D and E/F border lines. Intervention strategies are put in place at KS4. Additional classes are provided by teachers at lunch time and after school. A 'collapsed' timetable is put in place before modules and examinations to facilitate final preparation. Year 12 pupils attend a three day Easter school with specific focus on mathematics and English. We have also employed one of our part-time mathematics specialist teachers for one day a week for special educational needs numeracy support.

In the best practice, the pupil's progress is monitored and the effectiveness of the intervention is evaluated and revised.

St Mary's College, Irvinestown – Reviewing Support Strategies

There is very specific individual assessment for every pupil underpinned by the sharing of success with pupils and parents and with explanations of how many marks he/she is off their target grade. Each pupil is then shown how – in practical terms – they can gain the marks to raise their grade to the 'C' and above. There is a specific focus at pupils whose predicted grade is below a 'C'.

Each class teacher must outline three strategies that they will implement to aim to get these pupils to a 'C' grade. This process is supported by formal interviews between the Principal and the head of department, the mathematics teachers and pupils and mentors and parents to evaluate the intervention strategies, to add additional support and to constantly track dips and improvements in performance.

In addition to the extra support provided during the run-in to GCSE examinations, all the schools in the survey demonstrated how important close links with the SEN team are.

Holy Trinity College – Benefiting from Professional Liaison

The mathematics department liaises with the SENCO and the Learning Support Team regarding numeracy concerns and the SENCO provides advice and guidance to teachers who are required to write IEPs. The Learning Support Team work closely with the mathematics department to ensure that not only the academic needs but also the emotional needs of pupils are met to enable pupils with SEN develop positive attitudes, self-confidence and self-belief both inside and outside the classroom.

In conclusion, there was clear evidence that the successful schools sampled in the survey are providing effective learning and teaching, as outlined in *Better Mathematics*, *Commentary on Post-primary Mathematics Teaching*[9] and *Follow-up to Better Mathematics*.

Leadership and Management

Better Mathematics identified the need for improvement in the quality of departmental leadership and management, particularly, the role of the head of department to monitor and evaluate[10] more rigorously in order to bring about improvement in the experiences of the pupils and the standards they achieve. Four years later, leadership and management were still an area for improvement identified in *Follow-up to Better Mathematics*.

In particular, the role of the head of department was outlined in detail, namely, the need for him or her to lead the departmental team with commitment, ensuring that the teachers collaborate effectively to:

- reach a shared understanding of what is the most effective mathematics pedagogy;

9 www.etini.gov.uk/index/surveys-evaluations/surveys-evaluations-post-primary/surveys-evaluations-post-primary-2007/commentary-on-post-primary-mathematics-teaching.pdf

10 See also www.etini.gov.uk/index/surveys-evaluations/surveys-evaluations-post-primary/surveys-evaluations-post-primary-2008/better-mathematics-report-of-a-survey-monitoring-and-evaluation-of-mathematics-in-post-primary-schools.pdf

- produce a scheme of work that is a working document and acts as a depository of best practice, provides guidance for each teacher to plan his or her individual or series of lessons and ensures coherence and progression in the pupils' learning;
- promote and disseminate best practice within the team through open, inclusive discussions at regular, well-planned meetings;
- propose and implement actions, identified through individual and team self-evaluation and taking cognisance of whole-school issues, to improve the pedagogy and the standards the pupils achieve; and
- in light of discernable improvement, review the above actions identified through rigorous monitoring and evaluation, including the use of performance data.

All schools involved in the survey placed a high value on providing high quality learning in mathematics and, as such, ensured that effective leadership and management within mathematics was a priority, being at the core of development planning and staff development.

Holy Trinity College – Placing Numeracy at the Centre of Development

The SLT recognise the centrality of developing literacy and numeracy and they are at the heart of the school development plan and feature as a whole school objective in PRSD. Additional teaching time, smaller groups and a setting arrangement, particularly for mathematics classes, are practical and effective means of enabling progression in these all important areas.

Sperrin Integrated College – Prioritising Mathematics

We had our first set of GCSE results in 2007 and since then we have successfully targeted and achieved year on year success in raising standards in mathematics. So, what brings about this improvement? On reflection we realised that success could not be attributed to one strategy or approach – a fact borne out by the firm belief that raising standards in mathematics and numeracy is everyone's responsibility – from the Board of Governors and all management levels to every teacher.

Development of a consistent, high standard of teaching strategies within the mathematics department has been a particular focus over the past few years as identified in our school development plan. The SLT supported this initiative by dedicating a training day, staff development programme time and directed time to enable the whole department to sit down and discuss and develop mathematics pedagogy.

This included topics such as pupil and teacher learning personality, and levels of learning mathematics. Each teacher made this initiative a focus in their PRSD targets and revised units of work to incorporate a standard approach. This included the use of practical materials, such as 'Cuisenaire Rods', addressing the needs of our kinaesthetic pupils.

The cross-curricular nature of numeracy was also an area which the schools were developing. In the best practice, the schools were appropriately focusing on providing coherence across different subjects in addition to preparing for the statutory assessment at KS3 and GCSE.

Ballycastle High School – Promoting a Whole-School Approach

Through collaboration and discussion with teachers from other departments as to what numeracy support would benefit pupils and teachers, the following actions were identified: the development of numeracy booklets, provided for all teachers and pupils outlining methods and techniques used within the mathematics department to ensure consistency within each subject e.g. drawing graphs correctly; the displaying of posters in all classrooms encouraging 'Estimate, Calculate, Check' and suggesting appropriate mental mathematics approaches; and the support from the mathematics department in the creation of Using Maths tasks. The aim was that pupils and teachers should have greater confidence in their numeracy ability.

Curricular provision varied amongst the schools visited, and in nearly all assessment data was used effectively to support the banding of classes.

Sperrin Integrated College – Banding Classes

A child centred approach is taken to curriculum planning ensuring pupils are engaged with appropriate teaching strategies, resources and assessment for learning activities which reflect specific learning styles and special needs. In KS3, pupils are banded in numeracy teaching groups for mathematics, science, and ICT. They are also banded in literacy teaching groups for English, French, history and religious studies.

This has proved to be very successful with both parents and pupils. Parents like the fact that their child has the opportunity to be in different ability bands depending on their ability in mathematics or English. Teachers can more accurately plan work for pupils working at particular ability levels.

The banding of classes according to ability was not universal; in one school, mixed-ability classes were being used and, as a result, peer-learning and peer-teaching were the basis of very effective co-operative learning experiences for the pupils (see Learning and Teaching section).

St Mary's College, Irvinestown – Using a Mixed-Ability Approach

The objective behind teaching mathematics in mixed ability classes was to prioritise mathematics for every single pupil, to ensure that the school community could see and believe that mathematics was both necessary and achievable for every pupil, not just a small, identified minority.

We had to change the culture: encourage everyone to actively pursue subject excellence and remove the fear surrounding mathematics. We had to challenge the acceptance of underachievement in mathematics and put teaching, learning and assessment in mathematics under the microscope.

This commitment to the discrete mathematics provision manifested itself, in most of the schools, through employing specialist mathematics teachers. Beyond the benefits of having teachers with secure subject-knowledge, the evidence indicated that the advantage of having meetings at which all could attend was important. In the best practice, the departmental meetings were regular and had learning and teaching at their core.

Holy Trinity College – Prioritising Learning and Teaching at Meetings

Learning and teaching appear regularly on the agenda for departmental meetings and minutes are placed on 'RM Staff' where feedback on them is provided by the Principal and SLT.

Sperrin Integrated College – Prioritising Reflection at Meetings

Our vice-principal devised a format for departmental minutes which included the requirement for each teacher to share with colleagues an aspect of their teaching which they were particularly pleased with, since the previous meeting. This kept us focused and ensured that we made time for reflection and sharing of good practice.

St Mary's College Portglenone – Using Data to Inform Practice

Department meetings are used to interrogate pupil performance data as we prioritise curricular targets. We then try to vary and tailor our teaching accordingly. For example, we have found that developing real life contexts for our lessons has been very helpful in engaging and maintaining the interest of our pupils. Good practice sheets are then used to cascade ideas that have proved to be successful.

The evidence from the schools visited supported the view that the sharing of good practice was vital to bringing about and sustaining improvement.

Markethill High School – Sharing Good Practice

At a whole-school level, the VLE contains a 'numeracy' zone where staff from all departments have access to information, ideas and strategies to support numeracy. Part of this area has been devised following useful in-service training with support from the Southern Education and Library Board's CASS service.

The school's PRSD objective 1 is firmly focused on how CATS data can be used to differentiate accordingly within the classroom for numeracy development across the school, and the numeracy zone on the VLE has become a place where the sharing of good practice takes place amongst and between staff, with forums indicating elements of good practice which staff share with their colleagues.

In all the schools, the development planning process was well-embedded and, as a part of this, the mathematics departments had action plans. In the best practice, target setting was integral to the action planning.

Holy Trinity College – Target Setting Informing Action Planning

Each mathematics teacher sets individual targets at KS3 and GCSE and produces a personal action plan to meet the targets set. These individual plans feed into the overall departmental action plan. In order to further refine the department's use of self-evaluation, the head of department has attended Regional Training Unit summer school courses on 'Improving self-evaluation.'

Furthermore, the key priorities within the action plans were focused on improving the quality of the learning experiences of the pupils and, as a consequence, the standards achieved by them.

New-Bridge Integrated College – Prioritising the Improvement of Learning Experiences

The mathematics department engages in peer classroom observation on a regular basis, to facilitate the sharing of good practice. There has been a strong focus on effective questioning to raise literacy standards through talking and listening as well as raising attainment in mathematics. Good quality professional development from literacy advisors has enabled the mathematics team to further develop questioning techniques to elicit the best responses from pupils and further develop mental mathematics skills. This has resulted in better pupil engagement and improved quality written responses to GCSE mathematics questions, where methods have to be explained and the quality of written communication is assessed.

St Mary's College, Portglenone – Trialling New Ideas

The mathematics department has a strong shared vision, we wish to meet the needs of every pupil and let them achieve to the best of their ability. We self-evaluate, share information and disseminate best practice. We constantly seek to consolidate and improve our results. As a result, we regularly trial new ideas, strategies and resources. For example, last year we trialled the use of Visualisers to aid AfL whilst this year our Area Learning Community received funding allowing us to employ a temporary numeracy tutor who targeted year 10 pupils. We strive to keep our teaching fresh, enriching our pupils' learning experiences whenever good opportunities become available.

The process of action planning for improvement is best exemplified by the following extended extract:

De La Salle High School – Identifying, Implementing, Evaluating and Reviewing

The mathematics department has a strong sense of collegiality in which collaborative work is promoted. Members are keen to try something out. If it is less than successful, no blame is attached, evaluation is carried out and the focus moves on. There is a definite open door policy with all contributing to departmental development.

For the last three years the department has focused on assessment for learning with the aim of improving learning and teaching to raise standards. Following an audit of the department's strengths and weaknesses, the focus developed from formative feedback in year 1, to peer and self-assessment in year 2, and then to effective questioning in year 3. At the onset of the third year, a baseline position was determined from peer observation of lessons (where members of the department observed each other) and open discussion in departmental meetings.

The department established that: a small number of pupils were putting their hands up to answer questions; teachers waited for only a second or two for pupils to work out the answer; they mostly asked closed questions; and they asked most of the

questions. On reflection, staff realised that this practice only established what the pupils knew or didn't know. Generally, the focus was on the 'good' pupils who put their hands up or the weaker pupils who didn't know the answer. This left a large swathe of pupils who were only passively participating in the class. It didn't develop the pupils' understanding.

Staff drew up an action plan to implement effective questioning. The schemes of work were amended to highlight opportunities for questioning; for example, teachers used more open questions, encouraged pupils to ask their own questions, left time for the pupils to think before expecting an answer, followed up initial questions with more probing ones, and introduced a 'no hands-up' practice during lessons.

Peer observation and open discussion in a departmental meeting provided the basis for our evaluation of this focus on effective questioning. Staff noted that the pupils preferred effective questioning to the previous practice and more time was spent carefully planning questioning sessions. It was agreed that effective questioning led to: greater participation by all pupils; more thought out answers; not always a 'right' answer so pupils were more adventurous than before; increased confidence among pupils; pupils displaying their level of understanding; higher order thinking - pupils analysing, evaluating, projecting etc.

Inspection evidence demonstrates that the role of the head of mathematics in leading and managing the improvement agenda is very important. It is perhaps not surprising that the case studies, which were written by the head of department, underplayed this aspect of leadership and management. However, the outworking of strong collaborative team work, led by an enthusiastic and capable head of department, was clearly evident during the survey visits.

The Way Forward

Many of the characteristics of good practice illustrated in the case studies are not new and can be best summed up by teachers having high expectations for what the pupils can achieve. This involves having well-planned progression in the schemes of work, challenging questioning which involves all, and rigorous follow-through of support given to pupils.

The following are key points for the way forward.

- Heads of department need to work with their team – both specialists and non-specialists - to reach a shared understanding of what constitutes effective learning and teaching in mathematics and, subsequently, to promote and demonstrate the agreed characteristics of effective practice.
- Teachers need to maintain a focus on the development of the pupils' core knowledge and understanding as this is the necessary precursor for pupils being able to apply and use their mathematical skills in familiar and unfamiliar settings.
- They need to monitor regularly the pupils' work, provide timely and appropriately detailed feedback and support, and follow up on any corrections giving praise and further help when needed.
- Departments need to strengthen the curricular links[11] with the primary schools that their pupils previously attended in order to build effectively upon their experiences and so overcome the regression in learning that occurs too often at the transition stages.
- In addition, they need to take full cognisance of DE circular 2011/23 *Essential Skills Qualifications in Post-primary Schools* when planning for appropriate curricular pathways for their pupils; in particular, schools need to ensure that the teachers who are preparing their pupils for Essential Skills are appropriately trained (see section 10 of circular).

11 See Transition in Mathematics: Primary to Post-primary (www.etini.gov.uk/index/surveys-evaluations/surveys-evaluations-post-primary/surveys-evaluations-post-primary-2010/transition-in-mathematics-primary-to-post-primary.pdf)

CONCLUSION

It is hoped that this report will act as a source of good practice to inspire other schools that may be undertaking a thorough evaluation of their provision. There is no instant fix to bringing about improvement, nor will a new resource instantly raise standards. It is incumbent upon the leadership at all levels, including governors and class teachers, to ensure that as part of the self-evaluative process the needs of the pupils are kept at the forefront of any development work. Learning from the success of others who have worked successfully towards addressing the many real challenges faced in raising standards as identified in this report, will help shape the future direction of the work undertaken in the English and/or the mathematics departments.

The need for improvement and ensuring that the pupils reach their full potential is constant. In order to achieve this, the departments must have a clear picture of where they are in their planning for success. Other documents which have proved successful for departments in providing guidance in the self-evaluative process include *Better English*, *Better Mathematics* and *Together Towards Improvement* [12]. These documents help departments work toward realising the expectations in *Count, Read: Succeed* and *Every School a Good School* [13].

12 www.etini.gov.uk/index/together-towards-improvement/together-towards-improvement-post-primary.pdf

13 www.deni.gov.uk/esags_policy_for_school_improvement_-_final_version_05-05-2009.pdf

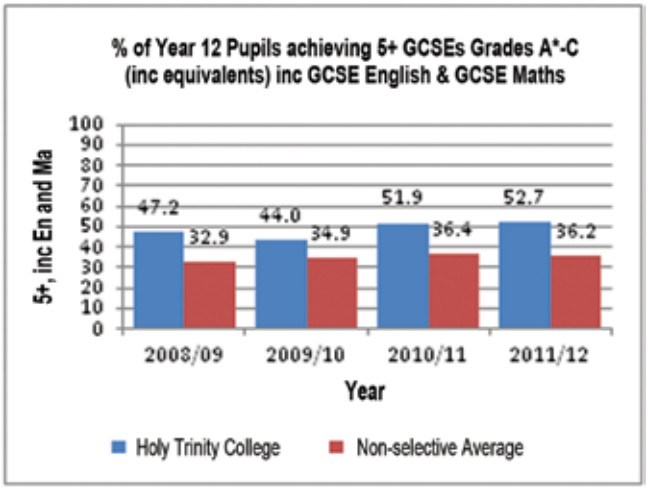
APPENDIX 1

Schools included in sample

The following schools were visited and submitted case studies:

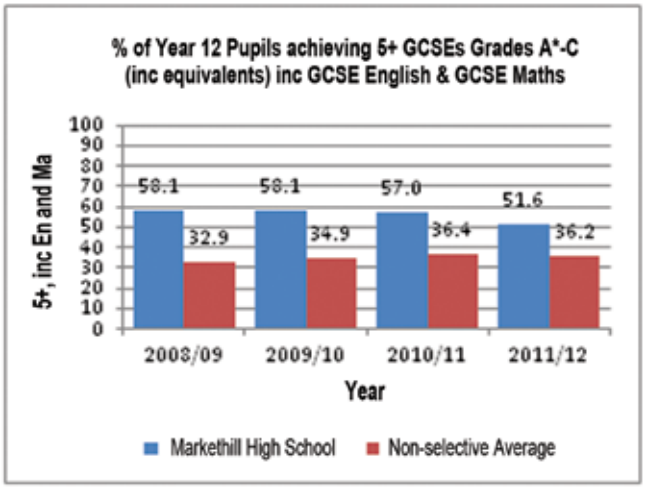
Holy Trinity College, Cookstown 523 0278

Holy Trinity College is a maintained, 11-18, co-educational, non-selective school. In 2011-12, there were 852 pupils, of whom 212 were in the sixth form. The percentage of pupils entitled to FSM was 31.9% and 17.0% were on the SEN register. There were 82 pupils for whom English was an additional language.



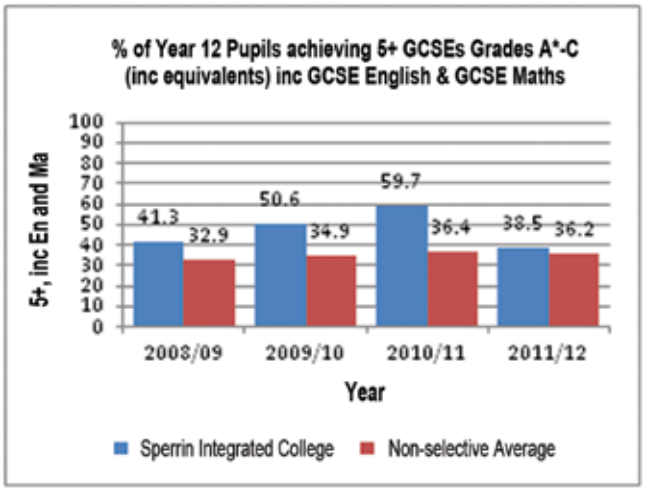
Markethill High School 521 0083

Markethill High School is a controlled, 11-16, co-educational, non-selective school. In 2011-12, there were 490 pupils enrolled. The percentage of pupils entitled to FSM was 9.2% and 19.4% were on the SEN register. There were fewer than five pupils for whom English was an additional language.



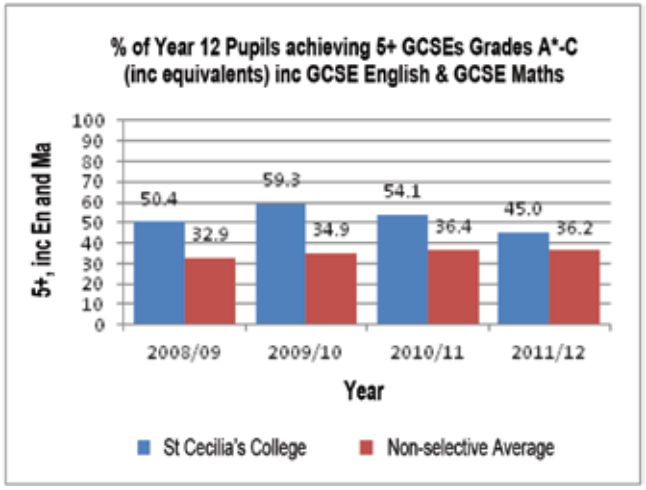
Sperrin Integrated College, Magherafelt **326 0303**

Sperrin Integrated College is an integrated, 11-18, co-educational, non-selective school. In 2011-12, there were 495 pupils, of whom 82 were in the sixth form. The percentage of pupils entitled to FSM was 21.4% and 46.1% were on the SEN register. There were 25 pupils for whom English was an additional language.



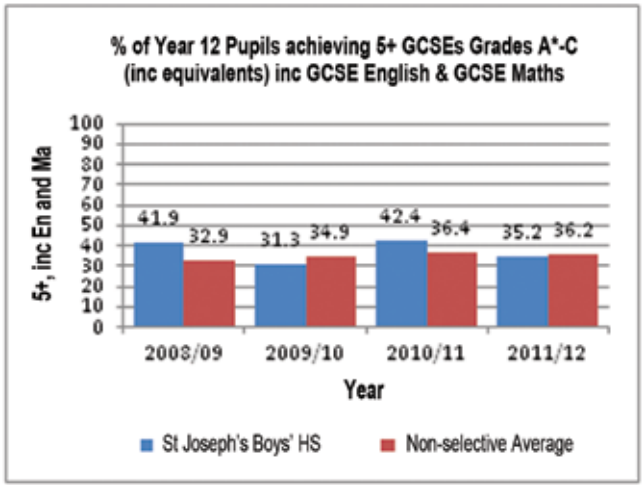
St Cecilia's College, Londonderry **223 0188**

St Cecilia's College is a maintained, 11-18, all-girls, non-selective school. In 2011-12, there were 867 pupils, of whom 206 were in the sixth form. The percentage of pupils entitled to FSM was 44.2% and 14.3% were on the SEN register. There were no pupils for whom English was an additional language.



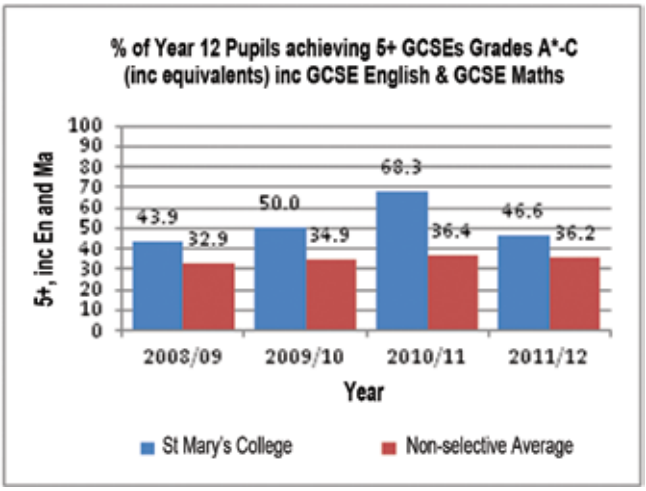
St Joseph's Boys' High School, Newry **523 0056**

St Joseph's Boys' High School is a maintained, 11-16, all-boys, non-selective school. In 2011-12, there were 416 pupils enrolled. The percentage of pupils entitled to FSM was 41.6% and 40.9% were on the SEN register. There were 40 pupils for whom English was an additional language.



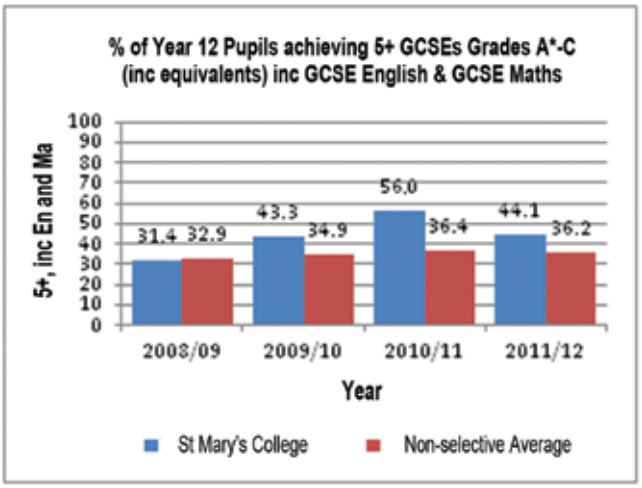
St Mary's College, Clady, Portglenone **323 0142**

St Mary's College is a maintained, 11-18, co-educational, non-selective school. In 2011-12, there were 329 pupils, of whom 51 were in the sixth form. The percentage of pupils entitled to FSM was 24.3% and 10.6% were on the SEN register. There were 18 pupils for whom English was an additional language.



St Mary's College, Irvinestown **223 0109**

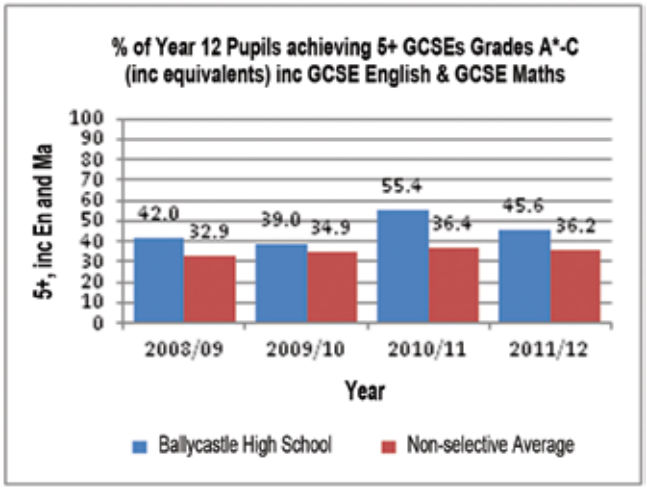
St Mary's College is a maintained, 11-16, co-educational, non-selective school. In 2011-12, there were 161 pupils enrolled. The percentage of pupils entitled to FSM was 34.8% and 44.7% were on the SEN register. There were fewer than five pupils for whom English was an additional language.



The following schools submitted case studies and had been recently inspected:

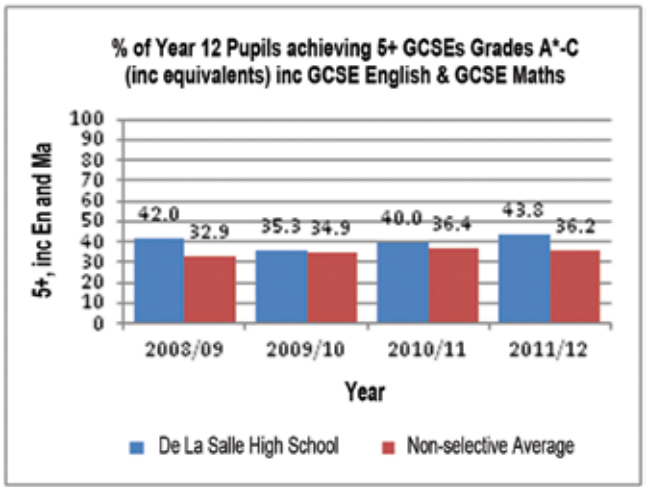
Ballycastle High School 321 0124

Ballycastle High School is a controlled, 11-18, co-educational, non-selective school. In 2011-12, there were 359 pupils, of whom 64 were in the sixth form. The percentage of pupils entitled to FSM was 18.9% and 12.8% were on the SEN register. There were no pupils for whom English was an additional language.



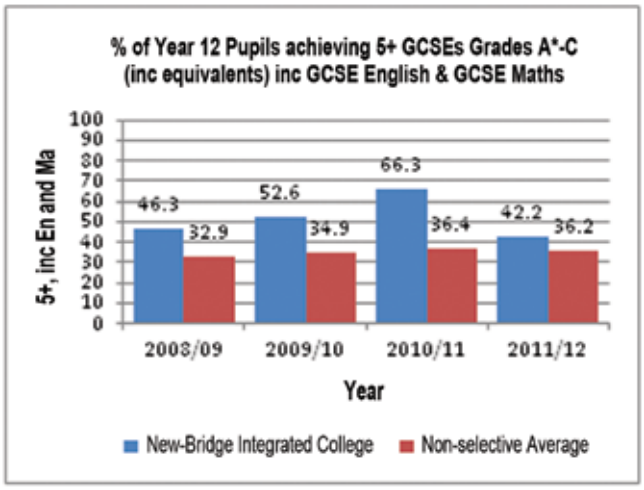
De La Salle High School, Downpatrick 423 0224

De La Salle High School is a maintained, 11-18, all-boys, non-selective school. In 2011-12, there were 358 pupils, of whom 37 were in the sixth form. The percentage of pupils entitled to FSM was 33.5% and 20.7% were on the SEN register. There were five pupils for whom English was an additional language.



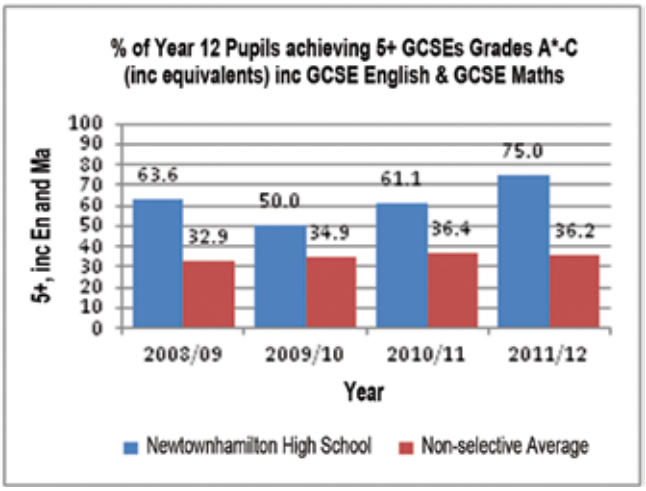
New-Bridge Integrated College, Loughbrickland **526 0285**

New-Bridge Integrated College is an integrated, 11-18, co-educational, non-selective school. In 2011-12, there were 536 pupils, of whom 98 were in the sixth form. The percentage of pupils entitled to FSM was 12.9% and 26.1% were on the SEN register. There were seven pupils for whom English was an additional language.



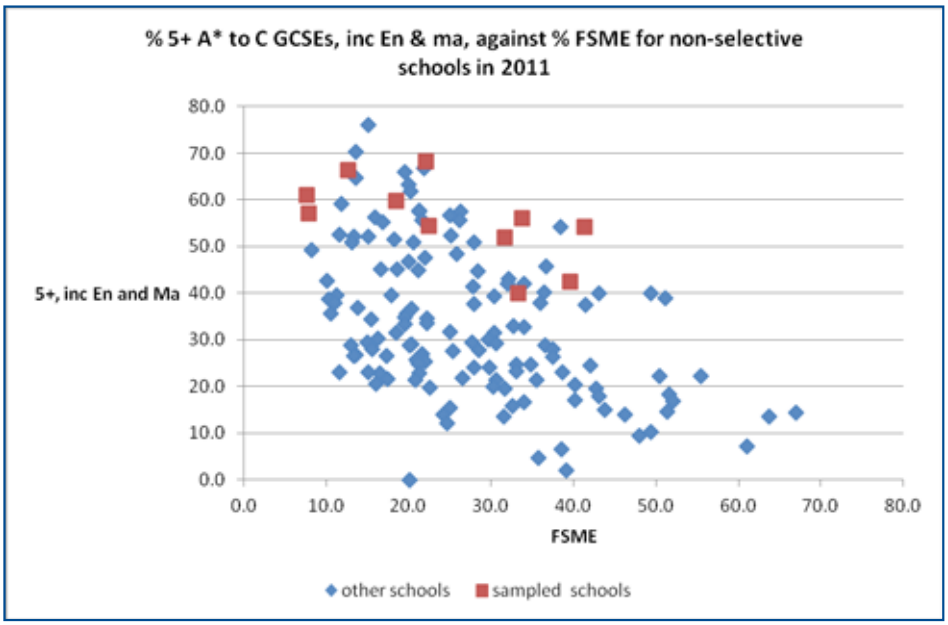
Newtownhamilton High School **521 0025**

Newtownhamilton High School is a controlled, 11-16, co-educational, non-selective school. In 2011-12, there were 167 pupils enrolled. The percentage of pupils entitled to FSM was 4.8% and 23.4% were on the SEN register. There were fewer than five pupils for whom English was an additional language.



APPENDIX 2

Performance data (2010/11) which informed the selection of schools



School	*% of pupils entitled to Free School Meals*	*% of year 12 pupils achieving 5+ GCSEs at grades A* to C (including equivalents) including GCSE English and mathematics*
Ballycastle High School	22.5	55.4
De La Salle High School, Downpatrick	33.3	40.0
Holy Trinity College, Cookstown	31.7	51.9
Markethill High School	7.9	57.0
New-Bridge Integrated College, Loughbrickland	12.6	66.3
Newtownhamilton High School	7.7	61.1
Sperrin Integrated College, Magherafelt	18.5	59.7
St Cecilia's College, Londonderry	41.3	54.1
St Joseph's Boys' High School, Newry	39.6	42.4
St Mary's College, Clady, Portglenone	22.1	68.3
St Mary's College, Irvinestown	33.7	56.0

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