



St Richard Reynolds Catholic High School

Policy: College Numeracy

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1. Statement of Principle

At St Richard Reynolds Catholic College we are committed to raising the standards of Numeracy for all students, so that they develop and extend their ability to transfer and use numeracy skills effectively in every area of the curriculum and into the world of work. The Numeracy development of students is a responsibility that we all share and it is not the exclusive preserve of any one department. Therefore, we recognise that all staff are teachers of Numeracy.

Numeracy is a proficiency which involves confidence and competence with numbers and measures. It requires: an understanding of the number system; a repertoire of computational skills; and an inclination and ability to solve number problems in a variety of contexts. Numeracy also demands practical understanding of the ways in which information is gathered by counting and measuring and presented in graphs, diagrams, charts and tables.

2. The aims of our Numeracy policy:

- to support all staff in identifying, developing, maintaining and improving standards of students' Numeracy and Mathematics;
- to support the transfer of students' knowledge, skills and understanding between subjects by ensuring consistency of practice including methods, vocabulary and notation;
- to identify opportunities and encourage collaboration and projects between different departments;
- to raise an awareness and appreciation in staff and students that Mathematics contributes and draws from many subjects and aspects of the curriculum and is an important key skill in lifelong learning.

3. Objectives

3.1 Students:

- Will need support to develop confidence and competence with numbers and measures;
- Require understanding of the number system, a repertoire of mathematical techniques, and an inclination and ability to solve quantitative or spatial problems in a range of contexts;

- Students need to know how data is gathered, and how data is presented in graphs, diagrams, charts and tables and how to explain their findings.

3.2 Parents and Carers:

- To actively support the College Numeracy intervention, understanding the importance of Numeracy in life-long learning;
- To support provision of after-hours intervention sessions;
- To attend additional support in Numeracy.

3.3 Teachers:

- To be fully committed to raising Numeracy skills at all levels of student attainment;
- To develop their own skills in Numeracy in order to be highly effective role models for students by consistently demonstrating high standards of numeracy;
- To be able to identify key Numeracy skills within their subject area and individual lessons;
- To understand and support the whole academy Numeracy strategy ensuring there is consistency in methods and vocabulary;
- Where possible and relevant, explicitly teach key Numeracy skills as appropriate to subject area.

3.4 For the Mathematics Subject Team:

- The Mathematics team, led through the work of the Coordinator for Mathematics, has the responsibility for the development of Numeracy in the College;
- The Mathematics team will advise other subject areas on the teaching of Numeracy and will devise guidelines to aid the development of consistency across the curriculum;
- To identify methods, vocabulary and notation for all subject areas that will assist in the transfer of Numeracy skills across the curriculum;
- Raise the profile of Numeracy by delivering a focus each half term with relevant training and providing and delivering material a Numeracy spot in briefing each week;
- As the College develops, the Maths department will provide a Maths-link specialist for each department who will liaise with the department and support to:
 - Identify the opportunity to use Maths skill focussing on subject area SOW;
 - Organise training for the departments in relevant Maths skills, including use of preferred methods;
 - Support the department in producing resources so that a correct and consistent approach is used in all subjects;
 - Provide information on common misconceptions and errors which may occur during teaching of specific topics;
 - Seek opportunities to use topics and examination questions from other subjects in Mathematics lessons.

3.5 For Subject Leaders:

- To ensure that schemes of work are audited and reviewed to develop opportunities for Numeracy based activities. This includes recognising barriers to Numeracy learning and strategies being put in place to remove them;
- To include Numeracy development in subject improvement action planning;
- To monitor, evaluate and review the quality of teaching and learning across the subject area to ensure that there is excellent coverage and opportunity to develop Numeracy;

- The department will provide a maths-link non-specialist who will work with the Maths-link specialist to:
 - Identify the opportunity to use Maths skill focussing on subject area SOW. Feedback information to Mathematics teachers on when specific Maths skills will be required for particular classes;
 - Support their department in planning their lessons to promote relevant Maths skills with confidence, based on training from maths department;
 - Use correct Mathematical language, notation, conventions and techniques, relating to their own subject. Encourage students and department staff to use these correctly.
 - Monitor Maths skills difficulties and misconceptions that are typically experienced by students in their subject lessons. Liaise with Maths specialist to overcome these difficulties.
 - Provide resources and ideas from other subjects, for Mathematics teachers to use applications of Maths, relating to other subjects within Mathematics lessons.

3.6 For the Learning Support Team:

- Identification of students' Numeracy needs through administration of Numeracy / Mathematics tests and ensuing diagnostic testing where appropriate;
- In collaboration with the Mathematics subject area, to identify, suggest and offer intervention strategies, assessment and monitoring of students with poor Numeracy skills;
- Contribution to the lesson planning, differentiation and staff training to meet the individual needs of students with poor Numeracy skills.

3.7 For the College Leadership Team:

- To ensure that each subject area has an appropriate range of Numeracy skills embedded within the schemes of work, and that the quality of Numeracy teaching and learning is of a high standard, through monitoring of SOW, focused learning walks and lesson observations;
- Regular analysis of whole school data to assess the impact of College Numeracy across the curriculum policy.
- To be responsible for intervening where staff development and support is required, offering appropriate training programmes.
- To ensure that the Numeracy needs of all students within the College are met through the curriculum and to keep abreast of successful, innovative current practice to improve the Numeracy skills of students at every attainment level.

3.8 For the Governors:

- To annually review and agree the College Numeracy Policy and Mathematics performance targets.

4 Schemes of Work

When writing schemes of work, staff should incorporate the Numeracy codings listed below:

- Num 1 Counting: e.g. ordering number.
- Num 2 Measuring: e.g. time, lengths, angles, temperature, mass, direction, position etc.
- Num 3 Calculating: e.g. means, averages, time, etc.
- Num 4 Estimating: e.g. amount required, time taken, cost involved, etc.
- Num 5 Representing data: e.g. drawing tables or graphs.
- Num 6 Formulae: e.g. correctly applying formulae, rearranged etc.
- Num 7 Properties of shape: e.g. recognising and drawing geometric shapes.
- Num 8 Transformation: e.g. symmetry, enlargement or reduction of the size of shapes.
- Num 9 Analysing Results: e.g. making conclusions based on statistics gathered, recognizing bias and misleading data.
- Num 10 Interpretations of graphs, charts and tables: e.g. comparing different data samples, looking for trends, etc.
- Num 11 Using and applying: e.g. applying Mathematics to problems set in financial or other real life situations.
- Num 12 Reasoning: e.g. choosing the correct direction, position, course of action

A fundamental requirement is that each subject area will plan for Numeracy in their schemes of work. The Numeracy skills to be covered in each unit of work must be clearly outlined, with suggestions of how the skills can be delivered to maximise student achievement.

A copy of each subject area's schemes of work, including the relevant Literacy skills to be covered, should be available for line managers at the start of each year. As well as detailed schemes of work this will include an overview of the year which includes the framework for assessment.

5 Monitoring evaluation and review

Numeracy should be regularly monitored by all Subject Leaders as part of the College procedures for monitoring, evaluation and review.

6 Numeracy in every classroom

6.1 Supporting Staff and raising the profile of Numeracy skills

Not every teacher is confident enough in their own Mathematics to teach the required skills well. There have been several changes in recommended methods over the last 10 years and there will be a variety of approaches across the different subjects. Teachers may not always recognise when they are teaching and using maths skills. Here is some general guidance for getting Numeracy identified and taught in every classroom.

- An audit to establish your starting point. This can be done through focussed learning walks and scouring schemes of learning;
- Establish a working group with a focus of developing Numeracy across the curriculum made up of members of all subjects so progress, ideas, views and opinions are regularly shared;
- Provide a Maths subject link for each department. Working collaboratively with a Maths partner can build confidence. With this regular input you can really get to the fine detail of explanations of methods, misconceptions and subject specific Maths skills;
- Provide opportunities for whole staff training delivered by the Maths department with a termly focus on a cross curricular skill. This will keep Maths across the curriculum fresh throughout the year.
- Every briefing have a 5 minute Maths skills section where a Numeracy expert gives an idea to try for the week. Include a Numeracy fact of the day, week or month;
- Maths posters displayed in every classroom to support consistent methods, language and notation;

- Mathematical Posters and displays in all subject areas making Maths a tangible part of all other subjects;
- Support non-specialist staff to produce Maths Assemblies promoting Maths skills through other subjects;
- Maths Month- also reading week and Science week can be used as a platform to produce cross-curricular collaboration.
- Launch Numeracy with a whole school Twilight led by the Maths department:
 - Establish the importance of Numeracy skills and all teachers being teachers of Numeracy;
 - Build confidence in commonly used Maths skills and those relevant to subject;
 - Develop collaboration with the Maths department;
 - Should result in real working resources to support Numeracy across the curriculum.

6.2 Teaching and Learning

General strategies used in order to develop effective Numeracy learning:

- Find out in advance how students would learn a topic in Mathematics before using it. A consistent approach across subjects will support students' development, understanding and transfer of skills;
- Use a Numeracy Display for Learning in the classroom, including number facts and charts and graphs relevant to the subject area. Skills poster promoting consistent methods for methods and calculations should be displayed;
- Identify when Numeracy skills are used in a lesson on the board and in students' books when marking;
- Encourage estimating before calculating and strategies for checking answers;
- Use questioning to draw out Mathematical knowledge rather than directly giving students the Maths answer. Maths-related questioning will need to be patient and build understanding, giving clues and using known facts and guidance. Involve as many students as possible, give them time to think before answering, target individuals taking into account their attainment and needs, exploring reasons for any wrong answers and clarify any misconceptions.
- Use diagrams or practical equipment, number lines, ICT to model Mathematical ideas and to help pupils make sense of Mathematics. See which resources the Maths department use regularly and try the same to support the transfer of skills;
- Encourage and develop mental calculation strategies and rapid recall skills by providing the opportunity for regular oral and mental work;
- Use and develop an understanding of the historical and cross-cultural nature of Numeracy to engage students and raise awareness of its many applications;
- Promote regular self and peer assessment of Numeracy skills.

6.3 Calculation Methods

The following is an excerpt from the Ofsted document "Mathematics: made to measure", May 2012. It refers to the importance of a primary school having a clear calculations policy.

"Maths Skills relates to more than an ability to do basic arithmetic. Students will need to develop confidence and competence with numbers and measures. Without such policies to guide primary staff and ensure consistency between teaching approaches, interim calculation methods grow a life of their own. Too many pupils were becoming bogged down in them and were not always progressing to more efficient methods. These weaknesses extended beyond the primary years. For instance, some low-attaining pupils in the secondary schools relied on repeated addition to multiply because they had never mastered multiplication tables or methods or understood place value."

Interim methods are taught to support students' understanding, but often end up being used as preferred methods as once students are comfortable with a method they seem reluctant to change, despite how long it takes or whether it gives the correct answer. This is why we tend to come across so called "non-standard" methods and informal jottings these may include methods that teachers were not taught at school themselves such as the grid method, chunking and calculation through partitioning etc. The Maths department Maths can explain these methods to teachers from other departments if necessary. The teachers of Mathematics and teachers of all other subjects need to co-operate on agreed strategies, so that students are given the confidence to build their written calculation skills throughout all of their subject lessons throughout each week.

To encourage consistency when teaching Numeracy skills we should deliver a common method across subject areas, however this needs to be approached with combination of common sense and good subject knowledge.

If students have an alternative method which they can use confidently, efficiently and most importantly should result in accurate answers every time. Then it is not a problem for them to use it, for example, some students can use a grid method as efficiently as a column method, another example is with EAL students who may have learnt alternative, but effective strategies elsewhere, but be aware these methods will need checking.

Deliver a common method but take the following steps:

- Allow students the opportunity to use their own methods, but check that they are using a method that is efficient and makes sense;
- If students are using a correct but inefficient method, encourage them to progress to a more efficient method by building on their understanding;
- If students are using an incorrect method, use questioning to draw out misconceptions and encourage them to use common method.

6.4 Use of a calculator

The calculator is a powerful and efficient tool in cross-curricular Mathematics. Used properly students are able to calculate efficiently with large numbers or complex decimals. It has an important part to play in subjects such as Design and Technology, Geography, History or Science, since it allows students to make use of real data from their research or experiments often complex calculations involving numbers with several digits. All subjects need to adopt a similar approach to the use of calculators as these skills do not occur naturally, but need to be taught in Mathematics and applied across the curriculum whenever calculators are used.

All students need to learn when it is, and when it is not, appropriate to use a calculator, and that their first-line strategy should involve mental calculations. They should have sufficient understanding of the calculation in front of them to be able to decide which method to use – mental, written or calculator, or a combination of these. Where possible students should have their own calculators, and be able to use them in any subject.

Students should be able to:

- select from the display the number of figures appropriate to the context of the calculation;
- interpret the calculator display in context (e.g. 5.3 is £5.30 in money calculations);
- write down what they are typing in to the calculator before they use it;
- have the technical skills required to use the basic facilities of a calculator constructively and efficiently, the order in which to use keys, how to enter numbers as money, measures, fractions, etc.;
- know how to use facilities such as the memory, brackets, the square root and cube root keys, the sign change key, the fraction key, the constant facility, and so on;

- understand the four arithmetical operations, recognise which to use to solve a particular problem and the order in which to use the keys for calculations involving more than one step;
- be aware of the processes required and are able to say whether their answer is reasonable by having made an estimate of the answer by rounding;

6.5 Maths Vocabulary

The following are all important aspects of helping students with the technical vocabulary of Mathematics:

- Highlighting the words that have the same meaning in Maths e.g. add, plus, sum;
- Encouraging students to be less dependent on simple words e.g. exposing them to the word “multiply” as a replacement for “times”;
- Using the correct terminology, for example negative 7, not minus 7 for -7°C ;
- Discussion about words that have different meanings in Mathematics from everyday life e.g. take away, volume, product, similar etc.;
- Reading 3.14 as three point one four, rather than three point 14.
- Highlighting word sources e.g. quad means 4, lateral means side so that students can use them to help remember meanings. This applies to both prefixes and suffixes to words;
- Illustrate key Maths words with pictures and diagrams on word walls.