

Technical School at Broadstairs College Numeracy Policy

Mission Statement

The Technical School is committed to raising the standards of numeracy of all of its students, so that they develop the ability to use numeracy skills effectively in all areas of the curriculum and the skills necessary to cope confidently with the demands of further education, employment and adult life.

Introduction

The purposes of our whole-school numeracy policy:

- I. to develop, maintain and improve standards in numeracy across the school;
- II. to ensure consistency of practice including methods, vocabulary, notation, etc.;
- III. to indicate areas for collaboration between subjects;
- IV. to assist the transfer of students' knowledge, skills and understanding between courses.

A current definition of numeracy

Numeracy is a proficiency which is developed mainly in mathematics but also in other subjects. It is more than an ability to do basic arithmetic. It involves developing confidence and competence with numbers and measures. It requires 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. Numeracy also demands understanding of the ways in which data are gathered by counting and measuring, and presented in graphs, diagrams, charts and tables. (Framework for Teaching Mathematics – yrs 7 to 9 – DfES).

Practice at The Technical School

I. Raising Standards

Raising Standards in Numeracy across the school cannot be solely judged in increased test percentages. There is a need to evaluate the students' ability to transfer mathematical skills into other subject areas, applying techniques to problem solving. Their confidence in attempting this is initially as important as achieving the correct solution.

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Page 1 of 5

II. Consistency of Practice

The Mathematical Association recommend that teachers of Mathematics and teachers of other subjects co-operate on agreed strategies. In particular that:

Teachers of mathematics should:

1. be aware of the mathematical techniques used in other subjects and provide assistance and advice to other programme areas, so that a correct and consistent approach is used in all courses.
2. provide information to other subject teachers on appropriate expectations of students and difficulties likely to be experienced in various ability groups.
3. through liaison with other teachers, attempt to ensure that students have appropriate numeracy skills by the time they are needed for work in other programme areas.
4. seek opportunities to use topics and examination questions from other courses in mathematics lessons.

Teachers of courses other than mathematics should:

1. ensure that they are familiar with correct mathematical language, notation, conventions and techniques, relating to their own course, and encourage students to use these correctly.
2. be aware of appropriate expectations of students and difficulties that might be experienced with numeracy skills.
3. provide information for mathematics teachers on the stage at which specific numeracy skills will be required for particular groups.
4. provide resources for mathematics teachers to enable them to use examples of applications of numeracy relating to other courses in mathematics lessons.

III. Areas of Collaboration

Mental Arithmetic Techniques

There is an acceptance that students are able to tackle the same questions with a variety of methods. These approaches rely on mixing skills, ideas and facts; this is done by students drawing on their personal preferences and the particular question. All programme areas should give every encouragement to students using mental techniques but must also ensure that they are guided towards efficient methods and do not attempt convoluted mental techniques when a written or calculator method is required.

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Page 2 of 5

Written Calculations

Particular emphasis is made of “non-standard” methods, particularly for grid multiplication and division by chunking. The desire for students to progress to formal algorithms and the most efficient methods can be made but not at the expense of having only a method rather than a cohesive and full understanding.

Role & Use of Calculators

ALL programme areas are expected to have consistent practice on the use of calculators. Consideration of these 3 questions will help them with this. (a) Where in your course do you expect students to be able to use a calculator? (b) Are there, and should there be, situations in your course when you would not wish students to use calculators? (c) Are the calculator skills required of student in line with expectations in the Framework for teaching mathematics? In simple terms, each programme area needs to decide and then plan into each module of work whether calculators are banned, ignored, allowed, encouraged or compulsory!

The school supplies all students with calculators to lessons when required. In deciding when students use a calculator in lessons we should ensure that:

- students’ first resort should be mental methods;
- students have sufficient understanding of the calculation to decide the most appropriate method: mental, pencil and paper or calculator;
- students 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.;
- students understand the four arithmetical operations and recognise which to use to solve a particular problem;
- when using a calculator, students are aware of the processes required and are able to say whether their answer is reasonable;
- students can interpret the calculator display in context (e.g. 5.3 is £5.30 in money calculations);
- we help students, where necessary, to use the correct order of operations – especially in multistep calculations, such as $(3.2 - 1.65) \times (15.6 - 5.77)$.

Vocabulary

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

- Use of Word walls
- Using a variety of words that have the same meaning 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
- Discussion about words that have different meanings in Mathematics from

Owner: Deputy Principal Broadstairs College

Approving Body: Policy Committee

Stage of approval: Approved

Date of approval: May 2017

Page 3 of 5

- everyday life e.g. take away, volume, product etc
- 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. Students should become confident that they know what a word means so that they can follow the instructions in a given question or interpret a mathematical problem. For example a student reading a question including the word perimeter should immediately recall what that is and start to think about the concept rather than struggling with the word and then wondering what it means and losing confidence in his / her ability to answer the question. The instant recall of vocabulary and meanings can be improved through flash card activities in starters.

Measures

We need to help students so that they can use all the divisions of a metre confidently, converting between them and, perhaps most importantly, having a sense of the relative size of them and visualising what a particular dimension looks like. We are also aware that QCA and HMI have highlighted the use of rulers and protractors as a national weakness at Key Stage 2 and we are doing all we can to increase student confidence and competence with these and other practical equipment.

Handling Data

Students use this four stage cycle:

1. Specify the problem and plan
- ↓2. Collect data from a variety of sources
- ↓3. Process and represent data
- ↓4. Interpret and discuss data

Our aim is to make it interesting and relevant with an emphasis on all aspects, not just colouring in columns on graph paper. Many courses use graphical representation and we want staff to become more confident in combining Data Handling & ICT to ensure progression in sophistication of different graphical representations.

IV. Transfer of Skills

“It is vital that as the skills are taught, the applications are mentioned and as the applications are taught the skills are revisited.”

The Mathematics team will deliver the National Curriculum knowledge, skills and

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Approving Body: Policy Committee

Stage of approval: Approved

Date of approval: May 2017

Page 4 of 5

understanding using direct interactive teaching, predominantly in “3 part” lessons. They will make references to the applications of Mathematics in other programme areas and give contexts to many topics. Other programme areas will build on this knowledge and help students to apply them in a variety of situations. Liaison between programme areas is vital to students being confident with this transfer of skills and the Maths team willingly offers support to achieve this. The transfer of skills is something that many students find difficult. It is essential to start from the basis that students realise it is the same skill that is being used; sometimes approaches in courses differ so much that those basic connections are not made. Data Handling should be about all four stages of the cycle and combining stages from different courses is a powerful tool. Programme areas are becoming more aware of the underlying maths skills and approaches that go with the applications that they use.

In particular we are making better links with

Catering – recipes as a ratio context, reading scales

Child Care – ordering dates of birth, ratio of staff: students

Computer science – representing data; considered use of graphs

English – comparison of 2 data sets on word and sentence length

Physical Education – collection of real data for processing in Maths

Religious Education – interpretation and comparison of data gathered from secondary sources (internet) on e.g. developing and developed world

Science – calculating with formulae, 3 way relationships

Owner: Deputy Principal Broadstairs College

Approving Body: Policy Committee

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Page 5 of 5