Pedagogy in Mathematics at St. Columba's School

We believe that learning maths is about much more than just learning topics and routines. Successful mathematicians understand the curriculum content and are fluent in mathematical skills and procedures, but they can also solve problems, explain their thinking and have a positive attitude about themselves as learners of mathematics.

Engage

- ★ Maths makes sense and is worth spending time on. I can enjoy Maths and become better at it by persevering.

To promote classroom relationships that allow students to think for themselves, ask questions, and take intellectual risks, we aim to create several opportunities for pupils to take part in a memorable mathematical experience: real life problem solving; practical lessons using apparatus; using natural materials where appropriate.

We plan lessons that will stimulate curiosity and help pupils talk about their prior learning.

Children are introduced to some baseline knowledge before building upon experiences through our progression map.

Develop

- ★ I have a toolkit that I can choose tools from to help me solve problems. Practising using these tools helps me become a better mathematician.

Students need opportunities to practice what they are learning to improve their computational fluency, problem solving skills, and conceptual understanding. Skill development can be incorporated into mathematics; for example, learning about perimeter and area offers opportunities for students to practice multiplication and fractions.

Games can also be a means of developing fluency and automaticity; games are chosen because they meet specific mathematical purposes and because they provide appropriate feedback and challenge for all participants.

With the help of an appropriate tool, pupils can think through a problem or test an idea that their teacher has modelled. For example, ten-frame activities can be used to help students visualise number relationships (e.g. how far a number is from 10) or how a number can be partitioned.

Innovate

- ★ Maths is a network of linked ideas. I can connect new mathematical thinking to what I already know and understand.

The ability to make connections between apparently separate mathematical ideas is crucial for conceptual understanding in maths. While fractions, decimals, percentages, and proportions can be thought of as separate topics, pupils are encouraged to see how they are connected by exploring different representations (for example, 1/2 = 50%) or solving problems that are situated in everyday contexts (for example, fuel costs for a car trip).

We use whole class discussion as an opportunity to select and sequence different pupil approaches with the aim of making explicit links between representations. For example, pupils may solve 103—28 using an empty number line, a base-ten model, or a notational representation. By sharing solution strategies, pupils can develop more powerful, fluent, and accurate mathematical thinking.

Express

- ★ Problem solving is an important part of Maths. I can use my understanding, skills and reasoning to help me work towards solutions.

We pay attention not only to whether an answer is correct, but also to the pupil's mathematical thinking. They know that a wrong answer might indicate unexpected thinking rather than lack of understanding; equally, a correct answer may be arrived at via faulty thinking. To explore pupil's thinking and encourage them to engage at a higher level, teachers may use questions that start at the solution (if the area of a rectangle is 24 cm2 and the perimeter is 22 cm, what are its dimensions?). Questions that have a variety of solutions or can be solved in more than one way have the potential to provide valuable insight into pupil thinking and reasoning.

- ★ Maths is logical. I can convince myself that my thinking is correct and I can explain my reasoning to others.

We provide opportunities for students to evaluate their own work. These may include having pupils design their own test questions, share success criteria or write reflective learning comments in their books. Self-evaluation becomes a regular part of the learning process and students develop greater self-awareness.