Supporting Access to Maths Lessons

Many factors affect understanding and progress in maths. The impact of **working memory** difficulties, **processing** difficulties, the **language** of maths, and **reading** and **writing** demands all need to be considered. Learning times tables, number bonds and telling the time may present specific difficulties for children/young people (CYP) who do not have generalised difficulties with maths, but who do find **automatic recall** challenging. Accessible classroom strategies are relevant for all pupils and will be particularly beneficial for those who find learning difficult.

With core inclusive classroom strategies in place, the need for additional intervention is likely to decrease. Through listening to pupils' views, teaching memory strategies, adapting language, supporting emotional regulation, and relating mathematical learning to everyday experiences, students are likely to experience greater success in accessing maths lessons.

Supporting processing speed

Verbal processing speed is the time taken to process familiar verbal information including words, letters and digits. Students experiencing processing speed difficulties may take longer to process and remember instructions, they may take longer to respond and may only partially complete tasks. This may also affect emotional responses and resilience to learning.

Strategies to help could include:

- Use of reasonable adjustments such as additional time both to process instructions, and to complete work
- Providing 'thinking time' for all the class, e.g., no hands up for 20 seconds; supplying the answer and then asking what the question might be
- In timed multiplication assessments, the test can be paused in between questions
- Giving verbal instructions clearly and one at a time, stressing key words and asking the pupil to repeat back to check understanding
- Reinforcing instructions with visuals e.g., written/visual reminders displayed on class board, personal memo card or post-it note.

Supporting memory

Working memory is the ability to hold and manipulate information in the mind over short periods of time (Gathercole & Packiam Alloway, 2008). Mental arithmetic, which relies on storing, retrieving and processing information, often at speed, places a particularly high demand on working memory. It is important to consider whether the memory load of a task, rather than conceptual understanding, presents a barrier to learning.

Strategies to support include:

- Use of manipulatives, models and images
- Use of multiplication grids, calculators etc.
- Specific teaching of memory strategies
- Reducing language
- Use of task breakdown sheets for problem-solving.

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Supporting language

Some students require additional support to understand mathematical vocabulary, complex sentence structure, verbal and written instructions. They may also find it difficult to sustain attention during a lengthy explanation.

Strategies to help could include:

- Using **unambiguous**, clear and succinct language
- Varying tone of voice; **signposting** when delivering important messages
- **Pre-teaching** subject specific vocabulary, e.g., using a personalised maths dictionary
- Repeating **key words** and checking for understanding
- Being aware when using words which have **different meanings** in mathematical contexts (e.g., bigger, smaller, proportions, take away, difference etc.)
- Using **visual cues** to support language where possible
- Teaching both **semantic and phonological** elements of new words
- Encouraging pupils to use new mathematical vocabulary in both **written and spoken** contexts.

Supporting emotional responses to maths

Confidence, resilience and self-belief are necessary for success in maths – students need to be willing to tackle a problem even if they are not immediately clear what the answer may be. Lack of success can lead to feelings of discouragement and inadequacy, which can then lead to disengagement and task avoidance strategies.

Anxiety about maths can impede progress. **Maths anxiety** is defined as "*a negative emotional reaction to mathematics, which can interfere with the ability to perform mathematical tasks"* (Carey et al., 2019. p. 6); this can be influenced by environmental, intellectual, and personality factors. Maths anxiety can cause cognitive interference and reduced working memory capacity. Teachers' and parents' own maths anxiety might influence students' maths anxieties, therefore tackling one's own anxiety and belief systems could be the first step in supporting students.

Strategies to help maths anxiety could include:

- Talking to children about their experiences
- Developing a collaborative classroom environment where it is OK to learn through trial and error; when appropriate, reducing the expectation to respond quickly
- Encouraging a reflective approach to problem-solving
- Teaching self-regulating strategies, such as effective breathing.

Useful References and Links

- Carey, E., Devine, A., Hill, F., Dowker, A., McLellan, R., & Szucs, D. (2019). *Understanding Mathematics Anxiety: Investigating the experiences of UK primary and secondary school students*. Centre for Neuroscience in Education. https://doi.org/10.17863/CAM.37744
- Gathercole, S.E., & Packiam Alloway, T. (2008). Working Memory & Learning: A Practical Guide for Teachers. SAGE.
- Resources / Media – Mathematics Anxiety Research Group

Further maths 'How to' guides are available on the SEND OAP Toolkit here:
Cognition and Learning: Maths

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