New Guidance on Dyscalculia

Produced by Working Group on Dyscalculia

AIMS

To provide assessors with **evidence based**, **operationally effective** working definitions and procedures which will enable them to differentiate between **maths difficulties** arising

- **from developmental disorders**
- **from environmental or medical factors**,

in order to target interventions effectively.

THREE CATEGORIES OF MATHS DIFFICULTIES

1. A Specific Learning Difficulty which is **a core problem with number** sense (which we have defined as Dyscalculia)
2. **Other Specific Learning Difficulties** which do not include a problem with number sense but which may have an impact upon mathematics
3. Maths difficulties arising from **environmental factors or other medical conditions.**

DIFFERENTIATING BETWEEN MATHS DIFFICULTIES ARISING FROM ENVIRONMENTAL FACTORS AND THOSE ARISING FROM SPLDS

4 Key Principles differentiate

Dyscalculia and **Specific Learning Difficulties**

from **other maths difficulties**.

ONE

Difficulties must be unexpected in relation to

- **Age**
- Level of
  - **Education**
  - **Experience**
  - **Other attainments**

TWO

Difficulties should be

- **Specific**
- and **Persistent**

THREE

Difficulties must not be **solely** caused by other factors such as:

- Inappropriate teaching or gaps in maths education
- Social and personal factors which affected attitude/motivation with regard to learning maths
- Incomplete mastery of the language of instruction (eg EAL/ESL)
- Maths anxiety
- General learning difficulties

FOUR

Difficulties should not arise from another condition:

- Neurological
- Physical
- or Mental Health

ADDITIONAL CRITERIA FOR DYSCALCULIA

Core feature of Dyscalculia =

a domain specific deficit in sense of number.

SENSE OF NUMBER

Difficulties with

- **subitising**,
- **symbolic and non-symbolic magnitude comparison**
- **ordering (cardinality, ordinality).**

WIDER IMPACT ON MATHEMATICS

Arithmetic is the first stage of maths teaching.

Understanding of number is essential to development of arithmetic skills.

THEREFORE:

Deficit in core sense of number is likely to have a negative impact upon all subsequent maths learning.

CO-OCCURRENCE WITH OTHER SPLDS

Dyscalculia can co-occur with other SpLDs.

DYSCALCULIA DEFINITION

Dyscalculia is a specific and persistent difficulty in understanding numbers which can lead to a diverse range of difficulties with mathematics. It will be unexpected in relation to age, level of education and experience and occurs across all ages and abilities.

Mathematics difficulties are best thought of as a continuum, not a distinct category, and they have many causal factors. Dyscalculia falls at one end of the spectrum and will be distinguishable from other maths issues due to the severity of difficulties with number sense, including subitising, symbolic and non-symbolic magnitude comparison, and ordering. It can occur singly but often co occurs with other specific learning difficulties, mathematics anxiety and medical conditions.

MATHS DIFFICULTIES WHICH FORM PART OF OTHER SPLDS

- **No deficit in sense of number**
- **Domain general deficits** (eg, language, working memory, processing speed, attention, perceptual reasoning, visual-spatial skills and motor coordination)
- May present with difficulties in mathematics **and/or** literacy.

- Maths difficulties arising from Specific Learning Difficulties are often less well understood than co-occurring literacy difficulties, and possibly underdiagnosed.

- Where maths difficulties are found to be similar to, or greater than the difficulties with literacy it would be appropriate to highlight those difficulties in the diagnosis by noting that **the specific learning difficulty has *a clear and specific impact upon mathematics*.**

WHAT TO INCLUDE IN AN ASSESSMENTOF DIFFICULTIES WITH MATHEMATICS?

Should form part of a **holistic** assessment designed to explore **the full range of**

- Specific Learning Difficulties
- and cognitive, medical and environmental factors

that may be contributing to difficulties with learning.

QUALITATIVE INFORMATION

Diagnostic assessment of mathematics difficulties should include the following:

- A Framework for a thorough and appropriate **history taking** which covers maths, literacy and wider barriers to learning.
- **Observation/questioning about attitudes and motivation**, including avoidance of maths activities, and maths anxiety
- Qualitative evaluation of patterns of errors, strategies used, and conceptual understanding of procedures.

COGNITIVE PROFILE

Tests of

- **Verbal reasoning, visual reasoning and visual spatial reasoning**
- **Cognitive processing**

to identify patterns of **domain general** **strengths** and **deficits.**

ATTAINMENT

Tests of

- **Literacy and**
- **Mathematics skills**

to identify patterns of **strengths** and **weaknesses.**

STANDARDISED MEASURES

- **Arithmetic** (+,-, x, ÷) (timed and untimed to differentiate between speed and knowledge/understanding) including **Speed and accuracy of recall of maths facts and procedures**

- **Maths reasoning and problem solving,** including **Word problems** (to explore whether the difficulties are language related)

Tests used should, if possible, allow for **qualitative analysis of strategies used/difficulties encountered,** or additional questioning should be conducted after the test to investigate these areas.

CORE SENSE OF NUMBER

Informal, qualitative tests of **understanding of number** that use

- **Subitising**
- **Symbolic and non-symbolic magnitude comparison**
- **Ordering (Cardinality and Ordinality)**
- **Concrete tools**

to explore concept of number. This could include screeners designed to explore number sense.

RECOMMENDATIONS

Recommendations for interventions and reasonable adjustments should **be clearly linked to**

- Difficulties reported in the background information, and/or evidenced in the assessor's quantitative/qualitative analysis of performance in tests.

- The individual's needs within the classroom, course or job.

- Wherever possible recommendations should be developed collaboratively with relevant maths specialists in the individual's school, course or workplace.

- Reasonable adjustments should be appropriately targeted to address the need without potentially giving the individual an unfair advantage. Assessors should bear in mind that adjustments such as use of a calculator or provision of rest breaks can sometimes target the need more effectively than additional time.

WHO CAN ASSESS FOR DYSCALCULIA AND MATHS DIFFICULTIES?

Assessors should have:

- Experience of teaching mathematics at the assessee's age or level of maths experience

- Level 7 qualification (or equivalent) in diagnostic assessment which explicitly and extensively covers the teaching and assessment of mathematics

- Detailed knowledge of
  - the processes by which maths skills develop,
  - methods used to teach those skills,
  - the range of strategies individuals might use,
  - typical patterns of error.

PROFESSIONAL BOUNDARIES

Where an individual's mathematics difficulties fall beyond the scope of an assessor's professional boundaries, that individual should be referred on for further assessment by a suitably qualified Assessor.

This is most likely to occur when:

- An assessor has only been trained in literacy skills (or has minimal training in mathematics) and has no experience of teaching mathematics

- And/or where Dyscalculia (as defined in this guidance) is suspected and the assessor does not have sufficient experience, training and knowledge to evaluate sense of number

- And/or where the maths difficulties are having a very major impact upon the individual's ability to perform effectively in education, the workplace and/or daily life and the assessor does not have sufficient experience, training and knowledge to understand or assess that impact.