

# **Complex Needs Service**

## **Guidelines for Specific Learning Difficulties in Maths/ Dyscalculia**

**These guidelines have been developed by members of the Complex Needs Service**

## **Contents**

1. Aim
2. Introduction
3. Definition
4. Assessment
5. Intervention and Support
6. Examinations
7. Frequently Asked Questions
8. References

### **Appendices**

Appendix 1. Flow Chart for SpLD in Maths/ Dyscalculia Provision and Support

Appendix 2. Information for Parents

Appendix 3. Access Arrangements

Appendix 4. Useful contacts

Appendix 5. Features of Dyscalculia

Appendix 6. Types of Mathematical Difficulties

Appendix 7. Useful Approaches

## 1. Aim

The aim of these guidelines is to promote a shared rationale and understanding of dyscalculia/ specific learning difficulty in maths within the Complex Needs Service at Leeds City Council. By reviewing definitions of the term 'dyscalculia', we will consider implications for assessment and support at school level. They have been compiled following a review of literature and information from other sources. (See References) and can be shared with schools, settings, parents/carers, children and services.

## 2. Introduction

Developing the guidelines has raised a number of important issues:

The use of the word **dyscalculia** can generate heated debate about 'diagnosis', concerns about labelling children and the need for specialist support. There is much debate as to what dyscalculia is, whether and when the term should be used; and whether it should be seen as a separate disorder or the lower end of a continuum of ability or achievement in mathematics (Dowker, 2009). Our present understanding of dyscalculia and its effect on learning mathematics is more limited than our understanding of dyslexia and its effect on literacy. Dyscalculia might also be seen as a specific learning difficulty in maths

Not all students who display low mathematical ability have dyscalculia, as this could be due to a range of causes, for example: low attendance, general learning difficulties, language disorder, poor teaching methods or sensory processing difficulties. It is therefore necessary to rule out other causes before arriving at an identification of dyscalculia. The characteristics of dyscalculia may overlap with those of dyslexia, or other specific learning difficulties; many, but not all, dyslexic learners also have resultant difficulties in mathematics. Learners may, of course, have both dyslexia and dyscalculia. Like dyslexia, dyscalculia is not caused by poor or interrupted teaching, nor by low intelligence, although both of these may result in the appearance of characteristics similar to those of dyscalculia. However, dyscalculia appears to be a difference relating specifically to arithmetical skills. This means that purely dyscalculic learners do not have the difficulties with language that are associated with dyslexia. In fact, their language ability may be above average. (See Appendix 6)

### 3. Definition

'Dyscalculia' is derived from the Greek and means literally 'difficulty with counting'. There is no one agreed definition of dyscalculia and, despite considerable research, the findings regarding the numbers of pupils and causes of dyscalculia vary widely.

Current definitions are primarily descriptions of the characteristics of particular learners. They offer little help to practitioners in understanding the causes, but there is some evidence to suggest that dyscalculia is a brain-based disorder with a genetic predisposition (Shalev and Gross-Tsur (2001)). There is some agreement that dyscalculic learners have a poor concept of numerosity, demonstrated by a deficit in **subitising**. This is the ability to know, from a brief glance and without counting, how many objects there are in a small group. It is an innate ability, present in human infants from birth. Some medical conditions are associated with dyscalculia: Turners Syndrome, a genetic condition more prevalent in females, is associated with mild dyscalculia; and Gerstmann's Syndrome, which also includes an inability to count fingers or point accurately, right/ left disorientation, poor writing and inability to copy letters, is associated with severe dyscalculia. (Squires 2004). Individuals can also acquire dyscalculia through brain injury.

Definitions include:

'A cognitive disorder of childhood affecting the ability of an otherwise intelligent child to learn arithmetic' Ta'ir, Brezner and Ariel (1997).

'Dyscalculia is characterised by incomplete procedural knowledge and inefficient strategies to solve numerical problems.' Shalev and Gross-Tsur (2001).

'Educational psychologists might want to adopt the scientifically less interesting but educationally more useful approach of taking dyscalculia by its literal meaning (an inability to calculate). They can then start from the assumption that all children who struggle with numbers or the number system are to some extent dyscalculic.' Gross (2007), p.5

'The term 'dyscalculia' is contentious. Does it relate to a discrete difficulty or part of a continuum? Should the criteria of discrepancy between IQ and mathematical ability be used? Should mathematical difficulties be seen as related to dyslexia and language difficulties (but evidence suggests that they can sometimes be dissociated) ... Arithmetic is NOT a single unitary ability'. Dowker (2009).

While we recognise other definitions of dyscalculia, for our working practices the Service will use the following definition of dyscalculia, which is currently recognised by the Department for Education:

'A condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concept, lack an intuitive grasp of number, and have problems learning number facts and procedures. Even if they produce a correct answer, or use a correct method, they may do so mechanically and without confidence.' DfES (2001)

It goes on to state:

‘Very little is known about the prevalence of dyscalculia, its causes or treatment. Purely dyscalculic learners who have difficulties only with number will have cognitive and language abilities within the normal range, and may excel in non-mathematical subjects.’

## 4. Assessment

**The primary purpose of an assessment will be to suggest objectives for an appropriate teaching programme, rather than to arrive at a ‘diagnosis’.** Intervention should be based on detailed diagnostic assessment of individual strengths and weaknesses, with activities targeted to these. The success of an intervention scheme also depends significantly on effective management and training. The provision of materials and activities will not in themselves result in improved performance. There must be support within school for the intervention, including ensuring that time is available to carry it out. Interventions that focus on the particular components with which an individual child has difficulty are likely to be more effective than those which assume that all children’s arithmetical difficulties are similar. (Dowker, 2009)

Before an assessment can take place it will be necessary for procedures at School Action to have been fully carried out for an extended period of time (at least two to three terms) and for the pupil to have been provided with appropriate programmes and interventions, which have been monitored and evaluated for effectiveness.

There is not a single test for dyscalculia. The screening tests that are available show whether pupils show characteristics of dyscalculia. Assessment without access to information about the learning context and progress over time can contribute to an overall profile of the child’s difficulties and needs but cannot stand alone if it does not tell us about a child’s prior learning opportunities.

### ***Individual work with a child:***

The assessor may conduct some specific assessment of the child’s numeracy difficulties, for example:

- Initial screening for difficulties with numerosity.
- A standardised assessment of mathematical ability.
- An assessment of verbal and non-verbal cognitive abilities, short term memory and speed of processing.
- Diagnostic assessment, using the SENSIT Mental Maths Assessment, which includes looking at strategies used by the child.
- A personal history, particularly with regard to mathematics, including how the child copes with everyday situations in which number/ mathematics are used.

As well as the child’s actual performance, an assessment may also include evaluating emotional and motivational aspects of the child or young person’s functioning, including:

- the child’s confidence and motivation as a learner;
- level of anxiety experienced with regard to mathematics;
- the extent to which they feel able to take risks with their learning;
- how they respond when they make a mistake;
- how they respond to praise.

**Observation in class:**

Observing a child in context provides useful information about the child's listening skills, motivation, independent learning skills and social skills.

**Evidence provided by the school:**

Assessment should be conducted over time through ongoing intervention and review. It is helpful to see examples of the child's work, school reports, IEPs and any records of achievement such as SATs scores, NC and P Levels. It is also important that any other factors that could be contributing to the child's difficulties are considered such as access to appropriate learning opportunities, possible hearing or visual impairment, poor attendance, changes of school and emotional or motor difficulties.

**Information from Parents/Carers:**

Involvement of Parents/Carers is an essential part of the assessment process. They can provide unique and detailed information which contributes to the picture of the whole child. (See Appendix 2 – Information for Parents)

## 5. Intervention and Support

Support for pupils with dyscalculia should be consistent with national guidance following the three 'waves' of support and provision.

**Wave One** – high quality inclusive teaching supported by effective whole school policies and frameworks, clearly targeted on all learners' needs and prior learning. This should include a range of concrete materials to develop rich number concepts

**Wave Two** – Wave One high quality inclusive teaching plus additional time - limited Wave Two interventions, designed to increase rates of progress and put children back on course to meet or exceed national expectations.

*Examples of Wave Two provision include the use of the National Numeracy Strategy Additional Programmes:*

- Springboard 3,4,5,6,7
- Supporting children with gaps in their mathematical understanding (National Strategies 2005)
- Overcoming Barriers in Maths Levels 1-2, 2-3, 3-4
- Closing the Gap with Numicon
- The Numicon Intervention Programme

**Wave Three** – Wave One high quality inclusive teaching plus personalised interventions to maximise progress and minimise gaps in achievement.

Pupils requiring Wave Three personalised support are likely to be on the school's SEN register at School Action and may also have an IEP or equivalent. When difficulties persist, Wave Three provision may be modified and it may be considered necessary to involve an outside agency for specialist advice and register the child at School Action Plus. Children with a Statement of SEN from the LA are also likely to be in receipt of Wave Three provision although, if their difficulties are severe, they may need a completely individualised programme. Some of the interventions used successfully in Leeds schools are:

- Catch Up Numeracy
- Numbershark
- Every Child Counts
- Talking Maths
- Numicon: Foundation Kit, Kits 1, 2 and 3
- Closing the Gap with Numicon
- Numicon Intervention Programme
- Visual Models and Images (Brighton and Hove)

Wave Three provision, together with specialist advice, may involve the adjustment of learning objectives and teaching styles and/or individual support. It aims to reduce gaps in attainment and facilitate greater access to Wave One teaching or Wave Two interventions.

The DfE provided the following advice to boost achievement:

1. DfES (2001) The National Numeracy Strategy: Guidance to Support Pupils with Dyslexia and Dyscalculia. Ref: DfES 0512/2001
2. DfES (2002) The National Literacy and Numeracy Strategies: Including all children in the literacy hour and mathematics lesson. Ref: DfES 0465/2002

### ***Expectations of Schools***

- Teachers should appropriately differentiate the curriculum to enable children with mathematical difficulties to access quality first teaching, which should reflect the pupil's individualised targets.
- Children with mathematical difficulties should be monitored and supported appropriately using IEPs (or equivalent) where necessary.
- Schools should be in a position to make appropriate Wave Two catch up provision. This could be daily group work with a teaching assistant using an evidence based intervention, which is carefully monitored and evaluated by teachers. Schools should also work in partnership with parents/carers. Schools should then be able to provide further intensive provision for children whose difficulties persist.
- For children whose difficulties are complex or continue to persist, schools should continue to work in partnership with parents/carers and make appropriate Wave 3 provision.
- Teaching methods should include structured, systematic and multi-sensory methods. They should be monitored and evaluated continuously. For more information, see Appendix 7, which gives a list of useful approaches.

### ***The Complex Needs Service can:***

- Undertake individual pupil assessment, dependent on eligibility for the criteria.
- Work with the school staff and usually with the pupil, to offer advice and support and to develop a personalised learning programme in order to aid the school in meeting the pupil's needs and raising achievement.
- Provide support and advice on group intervention.
- Provide schools with information and advice on best practice in providing Wave Two and Three interventions to raise achievement in numeracy skills.
- Provide information for parents/carers of children with mathematical difficulties, including how to get in touch with Parent Partnership Services and/or the British Dyslexia Association parent /carer helpline if necessary (which also provides advice on dyscalculia).
- Provide training to school staff on mathematical interventions.

Schools can request intervention from the Educational Psychology Team or the SEN Support and Inclusion Team for individual pupils providing the pupil meets the criteria for intervention. Where there are a number of pupils who meet the criteria, requests for group interventions can also be made.

(See Appendix 1 for flow chart 'Dyscalculia Provision and Support' which describes the 2001 SEN Code of Practice processes and the Waves of Intervention).

## 6. Examinations

Identification of dyscalculia, whether from school or an independent assessment, does not qualify a child for access arrangements. In order to receive access arrangements for GCSEs, the learner must meet the criteria set out by the JCQ Regulations. These are updated every year. (See appendix 3 Access Arrangements)

## 7. Frequently asked questions

### ***Are all children with numeracy difficulties dyscalculic?***

Not all students who display low mathematical ability have dyscalculia, as this could be due to a range of causes. Furthermore, numeracy difficulties exist on a continuum. There is no clear or absolute cut off point where a child can be said to have a specific learning difficulty in mathematics. Purely dyscalculic learners, who have difficulties only with arithmetical skills, will have cognitive and language abilities within the normal range, and may excel in non-mathematical subjects. However, there is also a degree of overlap between dyscalculia and other specific learning difficulties, such as dyslexia and dyspraxia; many, but not all, dyslexic learners also have resultant difficulties in mathematics.

In describing a child as dyscalculic, many factors should be taken into account. Some cases will not be clear cut and whether or not to describe a child's numeracy difficulties as having dyscalculia, or a specific difficulty in mathematics, will be a matter for professional judgement, subject to peer validation.

Consideration should also be given as to whether using the term dyscalculia will be helpful for the individual child concerned. Some pupils find it reassuring to have their difficulties described in this way but professionals and parents/carers should also be aware of the possibility of creating low expectations through the use of such a label. In an educational environment, it is often more helpful to focus on supporting the development of a child's numeracy skills rather than searching for a cause.

### ***Why do some children experience numeracy difficulties and/or dyscalculia?***

Professionals have not come to an agreement regarding the factors that underlie dyscalculia. The processes underlying the development of mathematical skills are complex and it is likely that there are a number of different reasons as to why a child experiences numeracy difficulties.

There are many other reasons why children may be behind with numeracy that do not relate to their cognitive processing (thinking skills). For example, some children miss learning opportunities due to emotional and behavioural difficulties in the classroom,

frequent or lengthy absences or changes of school or there may have been inadequate or inappropriate teaching.

### ***Is dyscalculia hereditary?***

It is not known to what extent dyscalculia tends to run in families, but there is some evidence to suggest that dyscalculia is a brain-based disorder with a genetic predisposition (Shalev and Gross-Tsur , 2001). Brain scanning studies suggest that, in dyscalculic people, the connections between mathematical areas of the brain work differently. However, these differences are not linked to intelligence and there is evidence that many dyscalculic people have strengths and abilities in other areas.

Problems with numeracy may appear to run in families but this could relate to the central role parents and carers play in children's numeracy development. Understanding the complex interaction between genes and environment is difficult. However, research evidence shows that children are highly responsive to changes in their educational and social environment. These have a significant impact on their sense of themselves as learners, their confidence and motivation. These in turn help determine their performance in school.

### ***Who identifies specific learning difficulties in mathematics, or dyscalculia?***

If there are concerns regarding a child's numeracy development, it is often helpful for there to be a dialogue between parents/carers and school staff, as these are the people who have the most important information and will be those involved in working to help with identified difficulties. Staff in schools will often find it helpful to discuss children, whose progress causes concern, with outside agencies such as a member of the SEN Support and Inclusion Team (SENSIT) or the Educational Psychologist assigned to the school. The primary purpose of an assessment will be to suggest objectives for an appropriate teaching programme, rather than to arrive at a 'diagnosis'. There is significantly less research about the development of mathematical skills than literacy skills, and therefore the identification of dyscalculia is not straightforward. In practice, dyscalculia would be identified only in exceptional circumstances, after peer validation and using all the evidence available.

### ***If a child is recognised as dyscalculic, should a statutory assessment be carried out?***

Children with dyscalculia should receive a graduated response to their identified needs as outlined in the SEN Code of Practice. The needs of most can be met through normal curriculum provision and quality first teaching at Wave One and interventions at Waves Two and Three, alongside careful monitoring and evaluation of this provision. (see Appendix 1).

*Identification of dyscalculia, whether from school or an independent assessment, does not necessarily qualify a child for extra funding, for a Statement of Special Educational Needs or for specialist provision.*

Schools are expected to meet the first £6000 of the cost of special educational needs provision for a pupil. However, school may be able to obtain 'top-up' funding through Funding for Inclusion if the pupil meets the criteria. To qualify, pupils will have accessed specialist programmes, differentiated Quality First Teaching and appropriate ICT (as part of a costed provision map) and this must be in place for at least two terms. Pupils will also

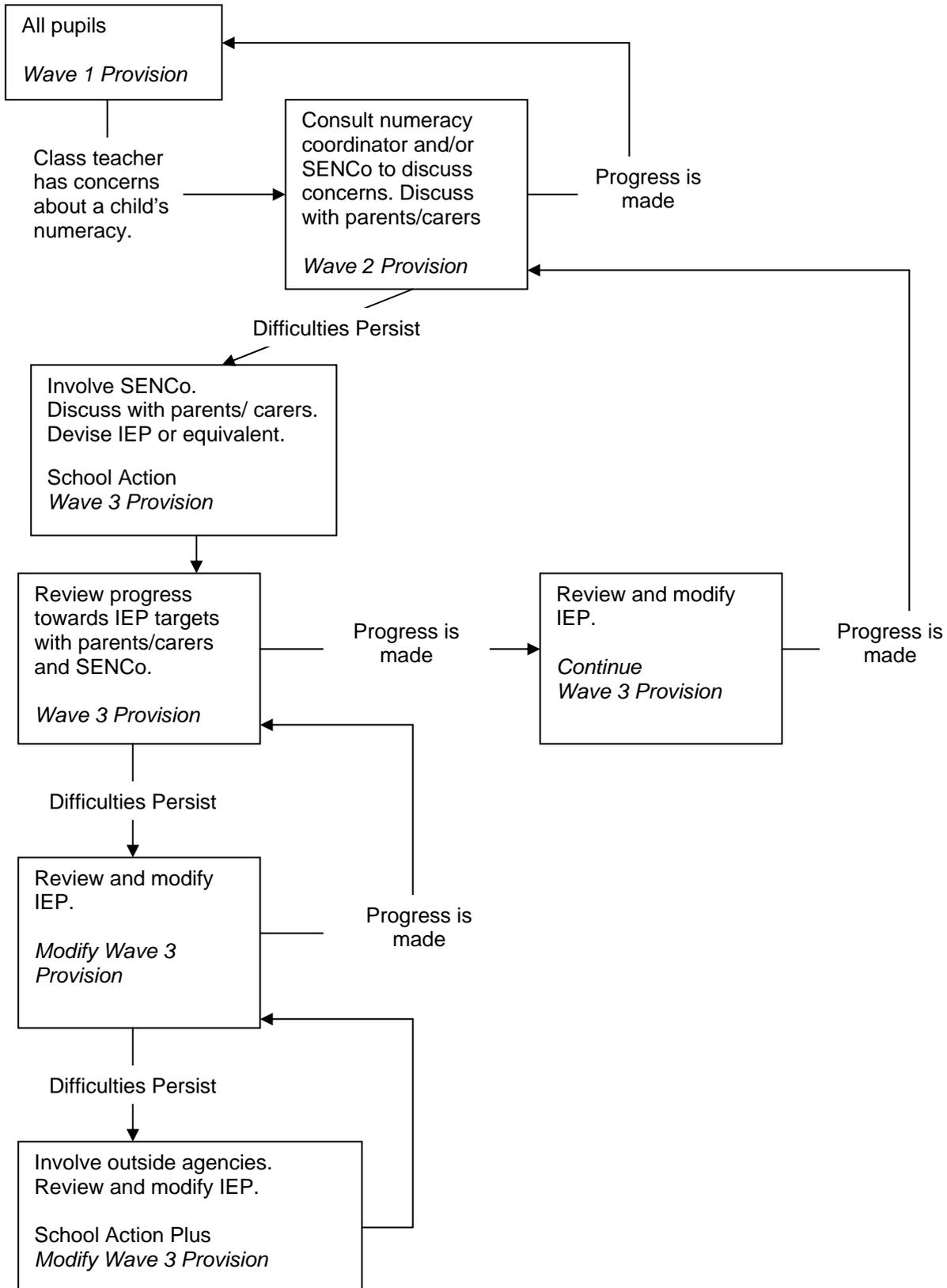
need an assessment by an SEN Officer or educational psychologist, who will also take into account the length and quality of the intervention.

## 8. References

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***Guidelines due for review September 2014***

## SpLD Maths/ Dyscalculia Provision and Support



# COMPLEX NEEDS SERVICE GUIDELINES FOR SpLD MATHS/ DYSCALCULIA - INFORMATION FOR PARENTS

## A definition of dyscalculia

The use of the word **dyscalculia** has generated debate about how we recognise it, concerns about labelling children and the need for specialist support.

This leaflet aims to provide a definition of the term 'dyscalculia' and the implications for assessment and support at a school level. It has been compiled following a review of literature.

While we recognise other definitions of dyscalculia for our working practices the Service will use the following definition of dyscalculia:

*"A condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence" (Department for Education and Science, 2001).*

Furthermore:

'Very little is known about the prevalence of dyscalculia, its causes or treatment. Purely dyscalculic learners who have difficulties only with number will have cognitive and language abilities within the normal range, and may excel in non-mathematical subjects.'

## How we assess children

**The primary purpose of an assessment will be to suggest objectives for an appropriate teaching programme, rather than to arrive at a 'diagnosis'.** Intervention should be based on detailed diagnostic assessment of individual strengths and weaknesses, with activities targeted to these.

Before an assessment can take place it will be necessary for procedures at School Action to have been fully carried out for an extended period of time (at least two to three terms) and for the pupil to have been provided with appropriate programmes and interventions, which have been monitored and evaluated for effectiveness.

There is not a single test for dyscalculia. The screening tests that are available show whether pupils show characteristics of dyscalculia. Assessment without access to information about the learning context and progress over time can contribute to an overall profile of the child's difficulties and needs but cannot stand alone if it does not tell us about a child's prior learning opportunities.

### **Individual work with a child:**

The assessor may conduct some specific assessment of the child's numeracy difficulties, for example:

- Initial screening for difficulties with numerosity.

- A standardised assessment of mathematical ability.
- An assessment of verbal and non-verbal cognitive abilities, short term memory and speed of processing.
- Diagnostic assessment, using the SENST Mental Maths Assessment, which includes looking at strategies used by the child.
- A personal history, particularly with regard to mathematics, including how the child copes with everyday situations in which number/ mathematics are used.

As well as the child's actual performance, an assessment may also include evaluating emotional and motivational aspects of the child or young person's functioning, including:

- the child's confidence and motivation as a learner;
- level of anxiety experienced with regard to mathematics;
- the extent to which they feel able to take risks with their learning;
- how they respond when they make a mistake;
- how they respond to praise.

***Observation in class:***

Observing a child in context provides useful information about the child's listening skills, motivation, independent learning skills and social skills.

***Evidence provided by the school:***

Assessment should be conducted over time through ongoing intervention and review. It is helpful to see examples of the child's work, school reports, IEPs and any records of achievement such as SATs scores, NC and P Levels. It is also important that any other factors that could be contributing to the child's difficulties are considered such as access to appropriate learning opportunities, possible hearing or visual impairment, poor attendance, changes of school and emotional or motor difficulties.

***Information from Parents/Carers:***

Involvement of Parents/Carers is an essential part of the assessment process. They can provide unique and detailed information which contributes to the picture of the whole child.

***Intervention and Support:***

Support for pupils with dyscalculia should be consistent with national guidance following the three 'waves' of support and provision.

***Wave One*** – high quality inclusive teaching supported by effective whole school policies and frameworks, clearly targeted on all learners' needs and prior learning. This should include a range of concrete materials to develop rich number concepts

***Wave Two*** – Wave One high quality inclusive teaching plus additional time - limited Wave Two interventions, designed to increase rates of progress and put children back on course to meet or exceed national expectations.

*Examples of Wave Two provision include the use of the National Numeracy Strategy Additional Programmes:*

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- Overcoming Barriers in Maths Levels 1-2, 2-3, 3-4

- Closing the Gap with Numicon
- The Numicon Intervention Programme

**Wave Three** – Wave One high quality inclusive teaching plus personalised interventions to maximise progress and minimise gaps in achievement.

Pupils requiring Wave Three personalised support are likely to be on the school's SEN register at School Action and may also have an IEP or equivalent. When difficulties persist, Wave Three provision may be modified and it may be considered necessary to involve an outside agency for specialist advice and register the child at School Action Plus. Children with a Statement of SEN from the LA are also likely to be in receipt of Wave Three provision although, if their difficulties are severe, they may need a completely individualised programme. Some of the interventions used successfully in Leeds schools are:

- Catch Up Numeracy
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- Closing the Gap with Numicon
- Numicon Intervention Programme
- Visual Models and Images (Brighton and Hove)

Wave Three provision, together with Specialist advice, may involve the adjustment of learning objectives and teaching styles and/or individual support. It aims to reduce gaps in attainment and facilitate greater access to Wave One or Wave Two interventions.

The DfE provided the following advice to boost achievement:

3. DfES (2001) The National Numeracy Strategy: Guidance to Support Pupils with Dyslexia and Dyscalculia. Ref: DfES 0512/2001
4. DfES (2002) The National Literacy and Numeracy Strategies: Including all children in the literacy hour and mathematics lesson. Ref: DfES 0465/2002

### ***Expectations of Schools***

- Teachers should appropriately differentiate the curriculum to enable children with mathematical difficulties to access quality first teaching, which should reflect the pupil's individualised targets.
- Children with mathematical difficulties should be monitored and supported appropriately using IEPs (or equivalent) where necessary.
- Schools should be in a position to make appropriate Wave Two catch up provision. This could be daily group work with a teaching assistant using an evidence based intervention, which is carefully monitored and evaluated by teachers. Schools should also work in partnership with parents/carers. Schools should then be able to provide further intensive provision for children whose difficulties persist.
- For children whose difficulties are complex or continue to persist, schools should continue to work in partnership with parents/carers and make appropriate Wave 3 provision.

- Teaching methods should include structured, systematic and multi-sensory methods. They should be monitored and evaluated continuously. For more information, see Appendix 7, which gives a list of useful approaches.

***The Complex Needs Service can:***

- Undertake individual pupil assessment, dependent on eligibility for the criteria.
- Work with the school staff and usually with the pupil, to offer advice and support and to develop a personalised learning programme in order to aid the school in meeting the pupil's needs and raising achievement.
- Provide support and advice on group intervention.
- Provide schools with information and advice on best practice in providing Wave Two and Three interventions to raise achievement in numeracy skills.
- Provide information for parents/carers of children with mathematical difficulties, including how to get in touch with Parent Partnership Services and/or the British Dyslexia Association parent /carer helpline if necessary (which also provides advice on dyscalculia).
- Provide training to school staff on mathematical interventions.

Schools can request intervention from the Educational Psychology Team or the SEN Support and Inclusion Team (SENSIT) for individual pupils providing the pupil meets the criteria for intervention. Where there are a number of pupils who meet the criteria, requests for group interventions can also be made.

(See Appendix 1 for flow chart 'Dyscalculia Provision and Support' which describes the 2011 SEN Code of Practice processes and the Waves of Intervention).

## Frequently asked questions

### ***Are all children with numeracy difficulties dyscalculic?***

Not all students who display low mathematical ability have dyscalculia, as this could be due to a range of causes. Furthermore, numeracy difficulties exist on a continuum. There is no clear or absolute cut off point where a child can be said to have a specific learning difficulty in mathematics. Purely dyscalculic learners, who have difficulties only with arithmetical skills, will have cognitive and language abilities within the normal range, and may excel in non-mathematical subjects. However, there is also a degree of overlap between dyscalculia and other specific learning difficulties, such as dyslexia and dyspraxia; many, but not all, dyslexic learners also have resultant difficulties in mathematics.

In describing a child as dyscalculic, many factors should be taken into account. Some cases will not be clear cut and whether or not to describe a child's numeracy difficulties as having dyscalculia, or a specific difficulty in mathematics, will be a matter for professional judgement, subject to peer validation.

Consideration should also be given as to whether using the term dyscalculia will be helpful for the individual child concerned. Some pupils find it reassuring to have their difficulties described in this way but professionals and parents/carers should also be aware of the possibility of creating low expectations through the use of such a label. In an educational environment, it is often more helpful to focus on supporting the development of a child's numeracy skills rather than searching for a cause.

### ***Why do some children experience numeracy difficulties and/or dyscalculia?***

Professionals have not come to an agreement regarding the factors that underlie dyscalculia. The processes underlying the development of mathematical skills are complex and it is likely that there are a number of different reasons as to why a child experiences numeracy difficulties.

There are many other reasons why children may be behind with numeracy that do not relate to their cognitive processing (thinking skills). For example, some children miss learning opportunities due to emotional and behavioural difficulties in the classroom, frequent or lengthy absences or changes of school or there may have been inadequate or inappropriate teaching.

### ***Is dyscalculia hereditary?***

It is not known to what extent dyscalculia tends to run in families, but there is some evidence to suggest that dyscalculia is a brain-based disorder with a genetic predisposition (Shalev and Gross-Tsur, 2001). Brain scanning studies suggest that, in dyscalculic people, the connections between mathematical areas of the brain work differently. However, these differences are not linked to intelligence and there is evidence that many dyscalculic people have strengths and abilities in other areas.

Problems with numeracy may appear to run in families but this could relate to the central role parents and carers play in children's numeracy development. Understanding the complex interaction between genes and environment is difficult. However, research evidence shows that children are highly responsive to changes in their educational and social environment. These have a significant impact on their sense of themselves as

learners, their confidence and motivation. These in turn help determine their performance in school.

***Who identifies specific learning difficulties in mathematics, or dyscalculia?***

If there are concerns regarding a child's numeracy development, it is often helpful for there to be a dialogue between parents/carers and school staff, as these are the people who have the most important information and will be those involved in working to help with identified difficulties. Staff in schools will often find it helpful to discuss children, whose progress causes concern, with outside agencies such as a member of SENSIT or the Educational Psychologist assigned to the school. The primary purpose of an assessment will be to suggest objectives for an appropriate teaching programme, rather than to arrive at a 'diagnosis'. There is significantly less research about the development of mathematical skills than literacy skills, and therefore the identification of dyscalculia is not straightforward. In practice, dyscalculia would be identified only in exceptional circumstances, after peer validation and using all the evidence available.

***If a child is recognised as dyscalculic, should a statutory assessment be carried out?***

Children with dyscalculia should receive a graduated response to their identified needs as outlined in the SEN Code of Practice. The needs of most can be met through normal curriculum provision and quality first teaching at Wave One and interventions at Waves Two and Three, alongside careful monitoring and evaluation of this provision. (see Appendix 1).

*Identification of dyscalculia, whether from school or an independent assessment, does not necessarily qualify a child for extra funding, for a Statement of Special Educational Needs or for specialist provision.*

Schools are expected to meet the first £6000 of the cost of special educational needs provision for a pupil. However, school may be able to obtain 'top-up' funding through Funding for Inclusion if the pupil meets the criteria. To qualify, pupils will have accessed specialist programmes, differentiated Quality First Teaching and appropriate ICT and this must be in place for at least two terms. Pupils will also need an assessment by an SEN Officer or educational psychologist, who will also take into account the length and quality of the intervention.

## Access Arrangements for General and Vocational Qualifications.

The Joint Council for Qualifications (JCQ) lists many different types of Access Arrangements – ranging from Alternative Accommodation through to Word Processor (use).

It is worth noting that: *'The intention behind many access arrangements is to meet the particular needs of the disabled candidate without affecting the integrity of the assessment.'* Therefore, if mathematics is being assessed, there is no duty on the awarding bodies to make any adjustment to the assessment objectives being tested.

The duty to make reasonable adjustments is underpinned by the Equality Act 2010.

Eligibility and/or evidence requirements are listed for each of the Access Arrangements in the 'JCQ Access Arrangements, Reasonable Adjustments & Special Consideration' handbook for the current academic year.

Assessment for Access Arrangements can be carried out by an Educational Psychologist or Specialist Teacher named by the Head of Centre (Form 8). The Handbook gives guidance on who can carry out assessments.

All applications for Access Arrangements are made on line. It is worth noting that Educational Psychologists / Specialist Teachers **not** employed in a particular centre should fill in 'Form 8' (as previously) and leave the testing evidence in the school.

Dyscalculia is not mentioned as an eligibility requirement. Arrangements which may be applicable, if this is the candidate's **normal way of working**, are:

- 25% extra time; granted if the candidate has slower than average cognitive processing skills (standardised assessment needed), or a Statement of Special Educational Needs relating to Secondary Education.
- A computer reader, or reader; granted only if the candidate demonstrates below average reading accuracy, speed or comprehension (standardised assessment needed).
- Scribe; granted only if the candidate's writing is illegible (standardised assessment needed).
- Prompter

Also

- Rest breaks may be possible if the candidate suffers from severe anxiety with regard to mathematics, if this was felt to be beneficial.

**Please note that the above is a personal interpretation of JCQ material. For more detailed information, it is recommended that the reference below is consulted.**

### Reference:

'Access Arrangements, Reasonable Adjustments and Special Consideration'  
1 September 2011 – 31 August 2012.

Joint Council for Qualifications (JCQ)

This reference is updated each year. View at <http://www.jcq.org.uk>

## Useful Contacts

**Leeds City Council, Complex Needs Service  
SEN & Inclusion Team & Educational Psychology Team**

Adams Court,  
Kildare Terrace,  
Wortley,  
Leeds LS12 1DB  
0113 3951039

**Parent Partnership Service**

Adams Court,  
Kildare Terrace,  
Wortley,  
Leeds LS12 1DB  
Helpline 0113 395 1200  
General Enquiries 0113 395 1222

**British Dyslexia Association**

The British Dyslexia Association  
Unit 8, Bracknell Beeches, Old Bracknell Lane, Bracknell, Reading RG12 7BW  
Helpline Tel: 0845 2519002- [helpline@bdadyscalculia.org.uk](mailto:helpline@bdadyscalculia.org.uk)  
Admin Tel:0845 2519003- [admin@bdadyscalculia.org.uk](mailto:admin@bdadyscalculia.org.uk)  
Fax: 0845 2519005  
<http://www.bdadyslexia.org.uk/>

**Leeds and Bradford Dyslexia Association**

Helpline: 01274 771153

**Dyslexia Action Head Office**

Park House  
Wick Road  
Egham  
Surrey  
TW20 0HH  
Tel: 01784 222333  
<http://info@dyscalculiaaction.org.uk>

**Dyslexia Action Leeds Centre**

188A Woodhouse Lane, Leeds, LS2 9DX  
Tel no: 0113 242 9626  
Fax no: 0113 244 0893  
Email: [leeds@dyslexiaaction.org.uk](mailto:leeds@dyslexiaaction.org.uk)

## Appendix 5

### Features of Dyscalculia

Clearly defined criteria have yet to be established, and work to reliably assess the individual is still developing.

General characteristics of dyscalculic pupils include:

- Very poor intuitive number sense; they have no natural 'feel' for quantities and numbers.
- A 'ones-based' concept of number. They see small numbers as small indistinct groups or 'clumps' of ones and large numbers as even hazier, large clumps of ones.
- A number concept which remains static and extremely poorly developed over time. They become muddled very easily.
- Inability to see numbers as entities which contain many patterns, such as doubles patterns e.g. '8' is 8 *ones*, but is also 4+4.
- Difficulties in seeing structures within numbers e.g. 24 represents 24 *ones*, but it also represents 2 *tens* and 4 *ones*.
- Difficulties in picturing the base ten structure of the number system or even the decade structure to 100 e.g. can count in *ones* to 39, but not see that it is also 9 more than 30 and 1 less than 40.

Other features may include (age appropriateness should be considered) the following list, which may be helpful in identifying specific areas of difficulty:

#### **Numbers**

- pupils may read and write numbers competently but numbers over 1,000 can prove difficult
- there may be an impaired sense of number size, affecting the comparison of numbers etc.

#### **Slowness**

- in giving answers to mathematics questions
- in working, compared to others in the class.

#### **Difficulties with mental calculation**

- relies on tangible counting supports such as fingers, tally marks
- uses the 'counts all' method instead of 'counting on' for addition
- finds it difficult to estimate or give approximate answers.

#### **Difficulties with the language of mathematics**

- finds it difficult to talk about mathematical processes
- does not ask questions, even when he or she evidently does not understand
- finds it difficult to generalise learning from one situation to another
- makes mistakes in interpreting word problems
- gets mixed up with terms such as 'equal to', 'larger than'.

#### **Poor memory retention**

- difficulty in remembering basic mathematics facts (e.g. number bonds)
- cannot remember what different symbols mean
- forgets previously mastered procedures very quickly
- recites the entire multiplication table to get an answer for  $9 \times 3 =$
- forgets the question before the answer can be worked out.

#### **Ineffective use of visual images**

- may not be able to locate a number on a number line without searching up and down; may have difficulty understanding number square
- will not notice visual patterns such as the 0 in 10, 20, 30, 40 etc
- cannot relate to visual representation of fractions/decimals such as circles divided in half etc.

### **Poor working memory**

- difficulties with sequences
- loses track when counting/reciting tables
- has difficulty in navigating back and forth, especially in twos and threes etc
- has difficulty remembering the steps in a multi-stage process.

### **Difficulties with position and visuo-spatial organisation**

- is confused about the difference between 21 and 12
- puts numbers in the wrong place when redistributing or exchanging
- poor setting out of calculations and of work on a page
- may not understand the importance of working left-right or taking the bottom number away from the top.
- scatters tally marks instead of organising them systematically
- gets confused with division: Is it 3 into 6, or 6 into 3?
- in tens and units takes the smaller number from the larger, regardless of position
- finds rounding numbers difficult
- finds telling the time on an analogue clock difficult
- is easily overloaded by pages/worksheets full of figures
- copies work/shapes inaccurately
- measurement and understanding of space may cause problems
- symmetry, tessellation and geometry present a real challenge.

### **Reliance on imitation and rote learning instead of understanding**

- can 'do' sums mechanically but cannot explain the process
- sometimes uses the wrong working method such as treating a ten as a one (or vice-versa) in exchanging or redistribution
- cannot decide what arithmetical operation is required
- cannot build on known facts, eg they may work out that  $3 + 4 = 7$  but not realise that, therefore,  $4 + 3 = 7$  as well.

[Amended from Hannell, 2005 from SENCO Update April 2006]

The above difficulties may also lead to:

- anxiety about maths (fear of maths can in itself affect performance)
- confidence and self-esteem issues

## Appendix 6 Types of Mathematical Difficulties

General Maths difficulties	Dyscalculia	Dyslexia	Dyslexia and Dyscalculia
<ul style="list-style-type: none"> <li>• May have global difficulties, including poor non-verbal processing, poor literacy skills etc</li> <li>• May have language delay and poor verbal ability; may not understand the language of Maths. EAL may be a factor.</li> <li>• Maths teaching or interventions may not have been appropriate to learner's needs, or pace of teaching may have been too fast; learner may have missed vital stages in the foundations of Maths</li> <li>• May experience anxiety in relation to Maths</li> <li>• Difficulties may have been caused by a range of factors including absence, moving schools, poor motivation, concentration difficulties etc</li> </ul>	<ul style="list-style-type: none"> <li>• Uneven profile – may be able in other areas, including literacy; may have good verbal ability</li> <li>• Severe difficulties with concepts of number e.g. subitising, estimating numbers</li> <li>• Severe difficulties with mathematical concepts e.g. place value</li> <li>• May have difficulties in short term memory, speed of processing, visual processing and sequencing</li> <li>• Has difficulty generalising learning or applying it to everyday life</li> <li>• May experience anxiety in relation to Maths</li> <li>• Does not make progress in Maths despite appropriate interventions</li> <li>• Other causes of difficulties have been ruled out</li> <li>• Thought to be caused by differences in 'maths areas' of the brain</li> </ul>	<ul style="list-style-type: none"> <li>• Uneven profile – literacy difficulties at the word level but may be able in other areas, including Maths; may have good verbal ability</li> <li>• May experience difficulties in Maths because of literacy demands</li> <li>• Despite difficulties in short term memory, speed of processing, visual processing and sequencing, understands basic concept of number and mathematical concepts</li> <li>• May experience anxiety in relation to literacy, Maths and other areas of learning</li> <li>• Caused by differences in areas of the brain that govern skills needed for reading and spelling</li> </ul>	<ul style="list-style-type: none"> <li>• Uneven profile, demonstrating features of both dyscalculia and dyslexia</li> </ul>

## **Appendix 7**

### **Useful Approaches (Adapted from the Advanced Training Materials 2012 section on Dyslexia or specific learning difficulties, SpLD Unit 16 Dyscalculia)**

<http://www.education.gov.uk/lamb/>

- Analyse exactly what the pupil finds difficult and intervene directly in areas of difficulties.
- Use concrete materials and visual representations to help link mathematical symbols to quantity.
- Use multisensory teaching methods, where two or more senses are used at a time in order to support the use of stronger senses and compensate for weaker senses.
- Start at a level which the pupil is comfortable, plan for them to experience success, and slowly increase the challenge.
- Provide a lot of practice for any new skills/ concepts (overlearning).
- Monitor activities to ensure pupils are not under undue pressure and only use competitive games if all pupils have a reasonable chance of success; avoid situations where anxious pupils will have to perform in front of large groups.
- Set up open ended problem solving activities and encourage discussion and experimentation.
- Use scaffolded approaches such allowing pupils to 'phone a friend' or 'go 50/50'.
- Make sure all instructions are clear. Check understanding. Ask several pupils how they would do the first question.
- Give worked example to show how a problem might be solved.
- Allow pupils extra time – even when given work at their level, dyscalculic children often work slowly. Provide extra time for assessments.
- Teach test taking skills, give practice tests and provide study guides.
- Have pupils do projects, organise portfolios of work, make oral presentations, or create a finished product, rather than take a test.
- Encourage an appropriate classroom ethos where pupils are not allowed to make statements such as 'this is easy'.
- Use written rather than verbal instructions and questions to reduce memory overload.
- Focus on understanding rather than rote memory. Try to use fun methods for retention of number facts such as computer or card games. Provide aids such as calculators or number fact grids.