



The daily mathematics lesson

Guidance to support pupils with hearing impairments

Teachers and
Teaching Assistants
in Primary Schools

Status: Recommended

Date of issue: 09/01

Ref: DfES 0514/2001



Hearing impairments

There are two main kinds of hearing loss:

- Conductive deafness, where sound may not pass through either the outer or the middle ear;
- Sensorineural deafness, where the cause of deafness is located in the cochlea or the auditory nerve.

Sensorineural deafness is permanent and can vary in degree. Conductive deafness is usually mild or moderate in degree and may be temporary or fluctuating.

Deafness varies widely in nature and degree, and can affect:

- the ability to hear high-frequency sound only, or the ability to hear across the frequency range;
- both ears (bilateral hearing loss) or only one ear (unilateral hearing loss).

Deafness may be:

- permanent or fluctuating;
- mild, moderate, severe or profound;
- congenital or acquired at any stage after birth.

Deafness can affect:

- language development, social and emotional development and academic progress;
- the development of spoken language, if it prevents a child hearing the speech used by others or if the child receives incomplete or distorted information.

Most children with significant degrees of deafness benefit from the consistent and effective use of hearing aids. Some deaf children use British Sign Language as their preferred language. Others may use sign communication to support their spoken language. In general, the more severe or profound the hearing loss, the more obvious the effects of deafness and the greater the need for carefully targeted support from teachers with relevant specialist knowledge.

It is important to understand that there is no direct correlation between deafness and intelligence. The normal range of intelligence is observed amongst deaf pupils and therefore teachers should maintain high expectations.



How do pupils with hearing impairments learn mathematics differently?

Numbers and the number system

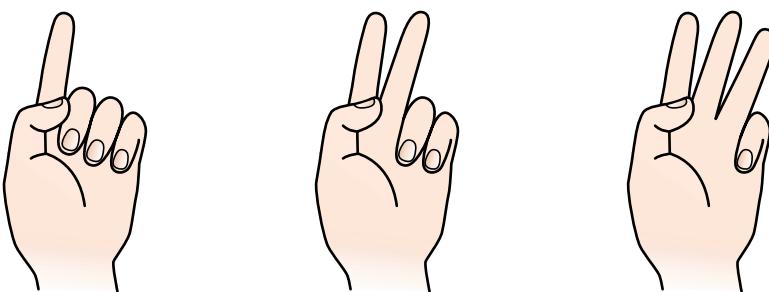
Pupils with hearing impairments:

- *may have missed early language opportunities that are important to develop their understanding of mathematical concepts.*

Some pupils may have missed early number rhymes, fixed counting sequences such as counting the stairs up to bed, and the incidental use of number, such as house numbers, ages and birthdays. The language opportunities that have been missed form an essential part of pupils' early mathematical development; it is essential that similar practical experiences are provided to allow pupils to develop their early understanding of number in a real-life context. Teaching strategies that emphasise conversation-based, oral, interactive learning are good for linguistic development.

- *may rely on the support of signing systems for counting.*

It is essential to use the pupil's own number-signing system, rather than a standardised signing system. Hearing pupils tend to use their fingers as objects when counting, so if they count a set of elephants, their fingers represent the elephants. Pupils with hearing impairments use their fingers to represent number words, *one, two, three*, and so on, in British Sign Language.



- *may need to target specific vocabulary to support mathematical concepts.*

It is important to identify the vocabulary level of pupils and to ensure that if modification to the vocabulary is required, it does not adversely affect the level of mathematics being taught. New vocabulary needs to be linked to an activity that is based in real-life practical experiences which are appropriate to the pupil. It may also be useful to introduce a personal vocabulary booklet, which contains lists of new mathematical vocabulary. This can be used in a pre-lesson tutorial or to support homework activities as well as for general use within the mathematics lesson.

- may have reduced access to incidental learning.

A great deal of learning takes place within the mental/oral session as a result of the comments made by pupils to one another and in their response to the teaching. Pupils with hearing impairments may miss out on incidental learning as they will be unable to listen in to the comments and discussions of their peers. This will have an effect not only on their grasp of mathematical concepts, but also on their ability to express their own ideas.

It is essential to consider ways of providing access for hearing impaired pupils to all of the information being shared within the teaching situation. Pupils need to be encouraged to present their comments visually as well as orally, and key points need to be summarised on a board or flipchart.

A structured approach to peer partnerships for joint working can also allow pupils to have easier access to informal conversations. One-to-one relationships can be encouraged for pupils to share their thinking during oral/mental sessions.

Calculations

Pupils with hearing impairments:

- may need thinking time to process questions prior to working out calculations.

If pupils need the support of sign language, time will need to be given for translation of the calculation into sign language. Teachers should take advantage of the visual element of mathematics to illustrate the calculation and to consolidate meaning at the same time. At times it may be necessary to support small groups directly in addition to whole-class teaching.

- need to have opportunities to make structured mistakes in the mental/oral session.

Often the situation in which we teach pupils with hearing impairments results in a fairly safe environment where pupils are led through a task step by step, with mistakes occurring infrequently. Pupils do need a positive environment in which to learn, but they also need experiences of responding to the use of negatives in speech. There are a range of language experiences the pupils need to be exposed to through questioning and discussion around mistakes in calculations. The greater exposure hearing impaired pupils have to these discussions (supported by visual representations) the better their understanding.



- *may find it very difficult to concentrate for long periods, especially involving new teaching.*

Pupils may need a range of relevant activities to consolidate new mathematical skills when the initial teaching of a new operation relies heavily on oral explanations.

When teaching a new operation it is important to:

- communicate clear objectives for the lesson;
- modify the relevant language without simplifying the mathematical skills involved;
- allow pupils to demonstrate their calculations visually as well as talking about them.

New teaching needs to be carefully scaffolded to ensure that the oral teaching input is supported, allowing pupils to carry out the associated activities.

A typical scaffold might include:

- a list of key words (supported by signs and/or symbols);
- visual support (clear and uncluttered);
- colour-coded operations;
- clear modelling of the layout of calculations.

Careful attention needs to be given to the mathematical language.

Solving problems

Pupils with hearing impairments:

- *may be unaware of the overall mathematics target they are working towards when they are solving a mathematics problem.*
As they begin the activity it might be helpful to write the objectives of the lesson on the board. It is also useful to have an overview of the lesson outline, in order that pupils with hearing impairments can plan their approach and timing as they begin the activity.
- *may proceed too quickly towards solving a problem without pausing to think about it or to develop a coherent plan.*
As pupils with hearing impairments find it hard to access some parts of the direct teaching, they may feel inclined to embark on a mathematics problem impulsively.

In class they may:

- rush their work;
- be unable to attend to or identify relevant features or information when given a task;
- find it difficult to analyse a problem carefully.

To overcome these difficulties, it is important to encourage pupils to:

- set their own problems;
- draw a representation of the problem, considering all possible data;
- help pupils to explain verbally or in sign how to solve the problem;
- make predictions;
- discuss/draw or sign all the options;
- give explanations visually instead of orally;
- consider trial and improvement.

Teachers should take advantage of the visual element of the mathematics to illustrate and consolidate meaning. The use of number lines, displays or flashcards can be beneficial. It may be necessary to pre-tutor pupils to prepare them for different types of questions used in problem-solving.



- *may need enhanced opportunities to think for themselves.*

It is important to develop the thinking skills of pupils with hearing impairments in order that they do not rely solely on rote memory. The content of problems should not be impeded by unnecessarily complex language. Pupils need a variety of ways to demonstrate their understanding.

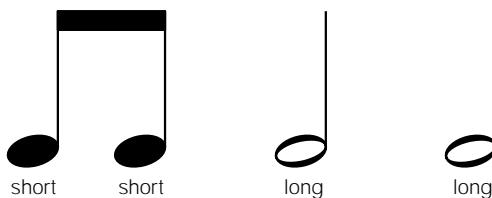
2 - 3
12 - 7
12 × 2
12 ÷ 2
3
2 - 1
3 + 5
6 ÷ 3
7 × 3
4 + 3
10 - 5
- 3
13 × 2
4 - 0
12 + 2
12 × 4
77 + 6
11 - 0

Measures, shape and space

Pupils with hearing impairments:

- may find the language used to compare measures difficult.

When comparing the height and length of objects, pupils will often be able to describe an item as being short or tall or long. They will, however, find it more difficult to use the terms *shorter*, *longer* and *taller* with confidence. A positive way to overcome this difficulty is to make a link to music. Long and short time values of music may be used to help give an idea of the contrast in length.



- may need to continue to support all new skill-learning with practical situations.

The language experience that pupils have had will be very different, and it is essential that independent activities are developed to fill some of the gaps in early mathematical understanding. Pupils will continue to need practical experiences using different weights and measures. These will provide ideal opportunities to develop skills around the questions 'what if ...?' and 'why ...?'. These are areas of language that pupils with hearing impairments often mix up, and yet which can – when understood – support further mathematical thinking.

Handling data

Pupils with hearing impairments:

- may find it useful to develop some skills in the reading and interpretation of mathematical language before they try to deal with the complexity of the language in a mathematical context.

Large non-fiction books used in the Literacy Hour are a useful way to teach the language of data-handling to pupils prior to whole-class number work. Language needs to be targeted and then pre-taught in order to prepare pupils for new mathematical topics.



References

Organisations

British Association of Teachers of the Deaf (BATOD)

21 The Haystacks

High Wycombe

Buckinghamshire

HP13 6PY

Tel: 01494 464190

Website: www.batod.org.uk

E-mail: secretary@batod.org.uk

British Deaf Association

1-3 Worship Street

London

EC2 2AB

National Deaf Children's Society (NDCS)

15 Dufferin Street

London

EC1Y 8UR

Tel: 020 7490 8656

Website: www.ndcs.org.uk

National Grid for Learning (NGfL)

The SEN Inclusion website on the National Grid for Learning provides an interactive on-line catalogue of teaching materials and sources of information for mainstream teachers who have pupils with special educational needs in their class. This is a rich source of information on teaching resources, which may help the deaf pupil in your class.

Website: www.inclusion.ngfl.gov.uk

The Royal National Institute for Deaf People (RNID)

19-23 Featherstone Street

London

EC1Y 8SL

Tel: 020 7296 8000

Website: www.rnid.org.uk

E-mail: informationline@rnid.org.uk



Copies of this document can be obtained from:

DfES Publications

Tel 0845 60 222 60

Fax 0845 60 333 60

Textphone 0845 60 555 60

e-mail dfes@prolog.uk.com

Ref: DfES 0514/2001

© Crown copyright 2001

Produced by the Department for Education and Skills
Extracts from this material may be reproduced
for non-commercial or training purposes
on condition that the source is acknowledged.

www.standards.dfes.gov.uk

www.dfes.gov.uk