

Supporting pupils with special educational needs or disabilities (SEND) in science

This guidance was originally produced by the Cambridgeshire *Science to Raise and Track Achievement in Science (STRATA)* project. Led by a science adviser, the project team from local special schools developed schemes of work and a planning tool to support teachers in mainstream or special schools working with pupils with SEND.

1 What is meant by SEND?

“Children have special educational needs if they have a learning difficulty which calls for special educational provision to be made for them. Children have a learning difficulty if they have a significantly greater difficulty in learning than the majority of children of the same age or have a disability.” (DfES 2001: the revised SEN Code of Practice)

Pupils with SEND are said to require something ‘additional to’ or ‘different from’ that offered to other pupils

The Equality Act defines a disabled person as someone who has ‘a physical or mental impairment which has a substantial and long-term adverse effect on his or her ability to carry out normal day-to-day activities’

A physical or mental impairment includes sensory impairments and also hidden impairments. In the Equality Act ‘substantial’ means ‘more than minor or trivial’. ‘Long-term’ means a year or more.

Support for people with learning disabilities has moved away from the medical model to a social model based on inclusion and integration.

2 Barriers to Learning

SEND pupils may take ages to simply write down the date and the title, or learning objective; they struggle to make a start; they aren’t completely clear about what the teacher wants them to do. A visit to the toilet, a lost pen, a need for a drink of water... a whole variety of displacement activities can follow, sometimes with attendant problematic behaviour.

This is because most SEND pupils will have a range of ‘hidden’ learning needs which will impact on their success in the classroom: Some of these needs will be around speech, language and communication (SLCN).

These include:

- **Weak literacy skills**, Phonological awareness is the ability to be aware of sounds within words and to be able to break down words into syllables and into phonemes. Research shows that about 60-70% of young offenders have a literacy problem.

- **Weak numeracy skills**

Very few people lack the understanding of the value of numbers. Most students who struggle with numbers often lack confidence. Poor understanding of information, visual or auditory, will also mean that the question posed cannot be accessed.

- **Poor memory:** auditory memory; visual memory; short term memory; working memory

For some SEN pupils, the memory is like a net with holes of different sizes. He/she can never predict what information is caught and stored, and ends up remembering irrelevant chunks of some topics and very little of others. The challenge for teachers is to ensure some information has been caught in the net!

Auditory memory is the ability to recall information that has been given orally and visual memory is the ability to recall information that has been presented visually. If this is weak it will cause problems when recalling patterns, shapes and designs.

The short term memory is as the name implies. It is what we can hold in our memory for a few seconds only before transferring it to the longer term memory. Typically this is seven items, (it is possible to remember seven sets of seven etc), but a SEND student is likely to struggle.

The working memory is used when information in the short term memory and/or retrieved from the long term memory has to be manipulated eg mental maths, understanding and then following an instruction, even reading involves this process.

- **Poor discrimination/perception skills:** auditory discrimination; visual discrimination.

Visual sequencing is the ability to recognise, interpret and organise visual images and auditory Sequencing is the same skill for information given orally.

Auditory discrimination includes the ability to detect similarities and differences when listening to sounds e.g. f/th/v which can impact on discriminating between different words. It may also mean that a student cannot identify particular sounds.

Visual discrimination is the ability to recognise similarities and differences between visual images e.g. b/d/p/q. This can also cause problems identifying shades of colour and confusion with shapes and symbols. Learning vocabulary by sight only is difficult.

Visual perception is the ability to recognise, interpret and organise visual images. This can cause difficulties with organisational skills. It will also impact on understanding of abstract concepts involving shape, space and measure. It will give problems with interpreting and organising diagrams, charts, graphs and other visual methods of recording.

- **Poor word finding** i.e. the ability to access the correct vocabulary from the long-term memory. This will give difficulties naming objects; relating words to actions; use of age appropriate vocabulary and a tendency to substitute words that have a similar meaning. These pupils may have visual and kinaesthetic strengths.
- **Poor processing skills** i.e. the ability to listen to information that has been given orally, then remember it, understand it and use the information across a range of

tasks refers to auditory processing and visual processing is this skill where the information is given visually.

- **Poor semantic knowledge** i.e. the ability to understand narrative. This includes the ability to understand the meanings of words in different contexts, as well as a knowledge of the meaning of relationships between words. This can create problems similar to those where word finding is the difficulty, as well as problems in developing more than a literal understanding of a text. Students with this issue will require more time to process information.
- **Poor pragmatics** i.e. a weakness in the ability to use and understand language in context. Context is important because, most of what we say is ambiguous, most of what we intend to communicate is not explicitly stated. Communication needs to be explicit. For example: 'now heat some water' implies, get out a Bunsen burner, mat, tripod and gauze, measure some water into a beaker and put it onto the gauze and light the Bunsen. The SLCN student may not be able to make this inference.

- **Poor motor skills**

Fine motor skills refers to the ability to use the smaller muscles in the body to carry out precise tasks. This can give immature drawing skills and poor manipulative skills for using apparatus.

Gross motor skills refers to the ability to coordinate the large muscles of the body responsible for big movements. Deficiencies here will cause clumsiness in movements.

- **Poor spatial awareness**

Poor spatial awareness may mean it is difficult to see two or more objects in relation to each other and to self. This may result in problems with positional language e.g. before/after, left/right. There may be problems with recognising, and copying, patterns and shapes.

- **Poor social communication skills**

Autistic and students with speech, language and communication needs often fail to develop appropriate understanding of non-verbal communication so do not pick up on the emotion behind the words. This can also be a problem for visually impaired students. This, together with word finding difficulties can lead to inappropriate responses to situations that can escalate into confrontation.

- **Lack of motivation/Fear of failure**

For the learner with learning problems, constant, unremitting lack of success in learning the things he or she needs to learn (and that his or her peers appear to learn quite effortlessly) can lead to self-doubt and low self-esteem.

3 SEND categories

The current Code of Practice recognises four areas of SEND:

- Cognition and Learning
- Communication and Interaction
- Physical and Sensory
- Social, Emotional and Behavioural

However, co-occurrence of difficulties is relatively common.

Medical conditions are not automatically considered as SEND. Neither is an EAL student, where English is a second or third language or a traveller child automatically put into this category.

Approximate percentages of students are as follows:

- Moderate learning difficulty (MLD) =24.2%
- Behaviour, emotional and social difficulties (BESD)=22.7%
- Speech, language and communication needs (SLCN)=16.3%
- Physical disability =3.8%
- Hearing impairment = 3.4%
- Autism spectrum disorder = 8.1%

4 Specific difficulties exhibited by pupils

4.1 Autistic spectrum condition (ASC)

People on the autism spectrum have difficulties with both verbal and non-verbal language. Many have a very literal understanding of language, and think people always mean exactly what they say. They may find it difficult to understand facial expressions or tone of voice, sarcasm or jokes, or they may take common sayings such as 'jump to it' literally. Group situations can be difficult and independent working may be preferable in practical sessions.

It is sometimes more effective to separate out the elements of tasks into the academic and social learning required; e.g. in a science lesson pupils are asked to practise a new skill by working in a small group, and this is known to be a challenge for the pupil on the autism spectrum, so they might:

- practise the new skill without the demands of group work
- practise participating in a group but with personalised outcomes connected to the social skills required (such as taking turns, listening to others, sharing equipment and so on).

Generally, an ASC student may have very good long term memory skills but short term memory can be weak so they may not remember what they have just been told. They may struggle to transfer skills to a different situation. Problem solving tasks can lead to anxiousness and confusion. Logical thinking is generally good but lateral thinking is weak. They will tend to apply a rule consistently once they have learned it.

People with autism may experience some form of sensory sensitivity. This can occur in one or more of the five senses – sight, sound, smell, touch and taste. The student's senses may be either hypersensitive or hyposensitive. For example, someone with autism may find certain background sounds, which other people ignore or block out, unbearably loud or distracting to the extent that they cannot focus on what is being said to them. These noises can cause anxiety or even physical pain. People who are hyposensitive may not feel pain or extremes of temperature, a potential risk in practical situations. For touch sensitive individuals a touch on the shoulder or bumping into someone else may feel like a blow, causing a negative reaction. Some may rock, spin or flap their hands when distressed, others may become aggressive.

Poor body awareness may affect a pupil's potential in practical sessions requiring a high degree of coordination. There may be a co-occurrence of dyspraxia/DCD.

For all pupils on the autism spectrum, information presented visually has the benefit of being static and provides a reference that can be returned to over time.

The ASC student is likely to have clearly defined boundaries between home and school and the concept of homework is difficult for them – school = work not home. A homework club can allow work to be completed before finishing at school.

Strategies:

- Keep instructions short and use visual prompts eg lists
- Identify strengths and focus on these to give best work output
- Use of positive behaviour management strategies
- Classroom position should minimise the chance of distraction
- Avoid unnecessary change; a predictable environment is best

When organising a practical session consider:

- All equipment to be used is kept in clearly labelled, accessible locations
- Only items for current use are out
- Surfaces are kept clear
- Work surfaces are kept organised
- Symbols can be used to represent tasks and these are taught to pupils. Make sure you use clear, concrete images and avoid abstract images.

4.2 Attention deficit disorder (ADD/ADHD)

ADD is a term used to describe the condition of children who have long-term difficulties in attention, if they also show hyperactivity and impulsive behaviour it is ADHD. The ADD students will show the characteristics of the ADHD individual but without the impulsive behaviours so may get overlooked.

Attention deficit behaviour is not a discipline problem where the pupil wilfully ignores school rules and normal punishments are unlikely to work.

ADHD is caused by an imbalance of chemicals in the brain. ADHD is a medical diagnosis. Sometimes doctors prescribe tablets (stimulants such as Ritalin, Concerta, Equasym or a non-stimulant such as Strattera) which help children to focus and have better impulse control. There will be problems with concentration, paying attention and following rules. Students with ADHD find listening to and remembering instructions difficult. They are often out of their seats and distract others. Their classmates sometimes find them irritating.

There are aspects of an ADHD pupil's behaviour that he/she cannot control in all situations. These pupils find it impossible to think through situations before reacting. He/she will find it hard to pull back from criticism and secondary behaviours will often arise. Praise is received well, as is a calm and positive atmosphere; high intensity activity will wind the student up. Use of a time out card with an agreed activity eg running around the field, or an agreed place to go to chill out can help to settle the student.

70% of children with Attention Deficit Hyperactivity Disorder will also have SLCN

Strategies:

- make instructions clear and simple
- use rewards to encourage good behaviour
- give immediate sanctions for poor behaviour
- be consistent and calm
- think ahead about potentially difficult situations and how they might be managed
- encourage and give frequent meaningful praise

When organising a practical session consider:

- Break the task into manageable steps
- The best way to present any instructions e.g. some pupils prefer diagrams, others a checklist
- Using ICT
- Use minimum and least concentrated amounts
- Use plastic containers instead of glass where appropriate
- Best pupil groupings and level of supervision

4.3 Cerebral Palsy

Cerebral palsy is not just one condition but a group of complicated conditions that affect movement and posture, stemming from damage to or failure in the development of the part of the brain that controls movement.. It takes many forms with different students showing a different degree of need. There will be learning difficulties for some students. There will be poor motor skills and hand-eye coordination. It is likely to result in poor spatial awareness and/or perceptual difficulties with associated problems in maths and handwriting. The student is likely to be easily tired especially as the day progresses.

It may include:

- Spasticity – poor movement, stiff/weak limbs.
- Athetosis – involuntary movements, dribbling etc.
- Ataxia – poor balance and muscle coordination, difficulty with walking and speech production.

Strategies (need to be specific to individual):

- Encourage independence
- Be clear about any equipment needed and how to use it to support pupil
- Be aware of any other difficulties e.g. perceptual, communication

When organising a practical session consider:

- Allow additional time for tasks
- Avoid detailed manipulative tasks
- Consider specialist seating in the lab
- Support movement around the lab

4.4 Complex Learning Difficulties and Disabilities (CLDD)

Children and young people with Complex Learning Difficulties and Disabilities (CLDD) have conditions that co-exist. These conditions overlap and interlock creating a complex profile. The co-occurring and compounding nature of complex learning difficulties requires personalised learning. Students with CLDD present with a range of issues and combination of layered needs – e.g. mental health, relationships, behavioural, physical, medical, sensory, communication and cognitive.

Their attainments may be inconsistent, presenting an atypical or uneven profile. In the school setting, learners may be working at any educational level, including the National Curriculum and P scales.

4.5 Developmental coordination disorder (DCD/dyspraxia)

The dyspraxic pupil used to be said to have 'clumsy child' syndrome. However, the issues go way beyond motor issues especially for the older pupil. Where there has not been a diagnosis he/she may not understand what is causing their problems which include:

- difficulty with activities requiring use of both hands together;
- difficulty holding a ruler steady with one hand;
- can't remember how to use equipment;
- difficulty stabilising materials with one hand whilst using equipment with the other;
- poor balance means some students struggle when sitting on high stools;
- the extra concentration required for the physical writing process means individuals lose thread of arguments;
- difficulty in coordinating eye tracking and head movements creates problems when copying from the board;
- poor visual motor integration;
- poor spatial relationships and perceptual difficulties – “sees” diagrams differently if looking at them from the side;
- difficulty locating work to be copied;
- poor auditory processing – may have only just processed one instruction while the next has already been given;
- can't retain verbal instructions;
- poor memory and organisation;
- difficulty listening;
- short attention span, so can appear daydreaming a lot of the time;
- tendency to opt out when things are too difficult;
- sensitivity to noise, light, temperature; direction finding; general organisation.

Strategies:

- Prepare diagrams for the student to label.
- Allow the use of templates.
- Allow individual extra time to complete work, with motor breaks when needed (don't keep in at break time to finish work).
- Provide part-prepared hand outs or photocopied sheets to reduce unnecessary writing.
Provide lists of key concepts or vocabulary spelling.
- Check the student knows what to do
- Don't ask him/her to go first as they will often pick up cues from the others about what to do.
- Use hand-over-hand methods to demonstrate how to handle equipment, or ask a peer to help demonstrate/guide.
- Secure equipment to the desk if possible
- Offer a ridged ruler or one with a cork backing.
- Provide “labelling templates” with measured spaces to help centre underlining
- Provide stools with foot rests and arms or allow the individual to stand up when handling equipment such as a ruler.

When organising a practical session consider:

- Pair with another pupil who can pour or measure for them
- Leave plenty of space to work
- Use plastic equipment as far as possible

- Give single instructions rather than a stream
- Use ICT to record
- Allow extra time
- Encourage pupils to work together for practical work rather than wanting a 1:1 group with a TA

4.6 Down's Syndrome

Down's syndrome is a genetic condition caused at conception, due to a failure in cell division of chromosome 21. A baby born with Down's syndrome thus has three of chromosome 21 instead of the usual two, making a total of 47 instead of 46 chromosomes. In the vast majority of children, every cell in the body will have this extra chromosome (this form of Down's syndrome is called Trisomy 21). In a very small number of cases (1–2 per cent) only some of the cells will contain the extra chromosome – called 'mosaic'.

A five year-old Down's Syndrome pupil will be typically two years behind developmentally but the gap widens as the pupil gets older. These children are not just developmentally delayed – they have a specific learning profile with implications for their learning. A key strength is the fact that they are strong visual learners and a key weakness is the ability to listen to, process and retain speech, ie. they can be poor auditory learners. They will probably have delayed motor skills – fine and gross. They may also have impairments in auditory and visual development, speech and language delay, poor short-term auditory memory, shorter concentration span, difficulties with consolidation and retention, generalisation, thinking and reasoning difficulties, sequencing difficulties and may show avoidance tactics.

Strategies:

- Recognise that they are strong visual learners
- Use simple and familiar language, short sentences and clear instructions
- Give the pupil time to process language and form a response
- Provide short listening activities to develop listening and auditory processing skills
- Provide additional practice to develop and consolidate skills

When organising a practical session consider:

- Coloured tape attached at regular intervals to e.g. lever-arm balances, large rotary thermometers, metre rules to enable pupils with limited numeracy skills to measure 'small', 'medium and 'large' quantities
- Partner up with good role models
- Keep routines consistent
- Keep tasks short and achievable

4.7 Dyscalculia

Only seen in 1-2% of the population. This is not just a pupil who struggles with number but someone who has problems with recognising what numbers represent, they retain a 'ones-based' concept of number. There may be difficulties with some or all of:

- mastering simple number concepts;
- understanding number relationships;
- understanding spatial relationships;

- learning algorithms and applying them.

The main problem areas are language; visual and auditory discrimination; sequencing; speed of information processing; concentration; long term semantic memory (remembering facts) and working memory; confidence and self-esteem.

Dyscalculia can exist without accompanying literacy difficulties. However, the majority of dyslexic individuals will have difficulties in some or all areas of mathematics. These pupils are much more likely to rely on immature strategies such as counting on fingers. Rote learning will not help these pupils; they need to have understanding based learning starting with the basics. This will be helped if concrete materials are used to turn what are essentially very abstract concepts into something more transparent but be aware of the impact this may have on self-esteem where others have moved past this dependence. Many will also benefit from being encouraged to draw, and use, simple diagrams.

Take care with the language of maths and make sure that the student is absolutely clear what is being asked. Avoid lengthy explanations and instructions which may cause the learner to switch off. Give ample processing time and lots of opportunity for over learning.

Strategies:

- reassurance when any mathematical skills are needed
- use concrete apparatus to help e.g. number lines, unifix blocks
- support for a specific mathematical skill needed in the lesson – games are helpful!
- check the mathematical language is understood
- use ICT

When organising a practical session consider:

- use templates to help drawing tables and graphs
- asking them to talk through what graphs and tables are showing
- allow extra time to complete tasks 'with numbers'

4.8 Dyslexia

Dyslexia is a learning difficulty that is a significant and persistent difficulty primarily affecting the skills involved in accurate and fluent word reading and spelling. This is due to problems with: working memory; phonological processing; sequencing and organisation. Dyslexia occurs across the range of intellectual abilities. It is best thought of as a continuum, not a distinct category, and there are no clear cut-off points. Co-occurring difficulties may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organisation, but these are not by themselves markers of dyslexia.

A good indication of the severity and persistence of dyslexic difficulties can be gained by examining how the individual responds or has responded to well-founded intervention.

Many dyslexics have sequencing problems and cannot process information in the working memory. This affects their ability to use oral as well as written information. 'Teacher talk' needs to be differentiated to take into account the fact that a dyslexic is unlikely to keep oral information sequenced and with adequate detail due to working memory deficiencies. Do not expect a dyslexic student to do routine copying, especially from a board. He/she will not even be reading the work, they will be copying letter by letter so comprehension will be minimal.

It can no longer be assumed that a dyslexic student will be allowed additional time in external exams. It is necessary to demonstrate a reduced processing speed using appropriate test results.

Strategies:

- Use visual prompts to direct students
- Give only one or two instructions at a time
- Build a topic specific vocabulary guide
- Provide a transcript of text on the board for the student to highlight
- Encourage the use of mind maps/pictures/flow charts – this increases a spatial approach
- Use lots of short activities to reinforce concepts
- Offer extra time to complete work
- Create over-learning opportunities for automaticity
- When assessing writing – look for quality before quantity
- Find ways to compensate for working memory difficulties (e.g. joggers)
- Use a minimum of 12pt type, or ideally 14pt, in written text and sans serif fonts like Ariel, Helvetica or Tahoma, that are rounded and reflect a cursive script

When organising a practical session consider:

- Make it multi-sensory
- Set realistic challenges
- Provide tables and grids to record in
- Helping pupils to sequence the practical work using diagrams

4.9 Emotional, social and behavioural difficulties (ESBD)

This student may engage in low level disruptive behaviours such as not bringing equipment, losing work, asking unnecessary questions, wandering round the classroom etc to avoid failure – the pupil attempts to structure situations so that they do not have to test themselves in any way. Their behaviour may be more confrontational such as directly refusing to cooperate with adults' instructions.

The student with BESD may put self-actualisation and esteem in his or her peer group ahead of their safety needs, ie showing off in class in a practical lesson could endanger themselves or others. 40-60 % of children with behaviour disorders will also have SLCN.

Pupils with BESD are usually on the receiving end of a lot of negative comment from everyone around them. If they start to feel bad about themselves as a result, it is likely to make their behaviour worse. It can really help if adults in school make a special effort to stay positive. Keep language positive, for example: when the student misbehaves, saying what you want them to do, rather than what you don't want eg 'John, I want you to keep your hands on the table' instead of 'John, stop bothering Paul' and making sure that praise describes exactly what the pupil has done – eg 'Well done for...' rather than just 'Good girl'.

Strategies:

- Create firm expectations by displaying and repeating rules clearly and reminding students of a rule when he/she starts to misbehave rather than having a go at him/her.
- Give advance warning of any changes to regular events.
- Give very clear guidelines, for instance: 'I expect you to have produced at least four sentences by ten past ten. I will be asking you then to share them with your lab partner'.

- Use eye contact and non-verbal signals, wherever possible, to let the pupil know when their behaviour is inappropriate.
- Label the behaviour and not the pupil – eg ‘Sam, playing with fire can cause accidents’ instead of, ‘You idiot’
- Use language of choice to remind pupils when they start to misbehave that they have not made a good choice – ‘Not a great choice, Chloe – better think again’.
- All sanctions threatened must be applied.

When organising a practical session consider:

- Firmly establish laboratory routines.
- Use minimum and least concentrated amounts of chemicals
- Use plastic rather than glassware where appropriate
- Choose the best groupings
- Err on the side of caution with safety equipment
- The level of supervision needed

4.10 Hearing Impairment

There are different types of hearing loss:

- Conductive hearing loss – this means any cause or condition that affects the progress of sound into the ear canal or across the middle ear. Conductive problems can often be treated by medicine or by surgery; for example, glue ear, which occurs when fluid builds up in the middle ear, can be treated by an operation to insert a grommet
- Sensori-neural hearing loss – this means defects in the fine structure of the inner ear or sound pathways to the brain. Usually high-frequency sounds are most affected. This hearing loss is more likely to be permanent.
- Mixed loss – this means both types of hearing loss. It is not enough to know that a pupil has a hearing loss; you need to know which sounds are affected and by how much.

Poor hearing may be indicated by poor diction, poor spelling or problems with oral information. The issue may be slight, moderate or profound. A low frequency loss will affect the ability to hear vowel sounds whilst high frequency loss affects the consonants. One student in ten will have a degree of hearing loss at some time and one in four hundred will have a permanent loss. The problem may affect one or both ears.

Losses are measured in decibels (dB).

- Mild loss – is outside the normal range (greater than 20dB and less than 40dB). This would mean a pupil might have difficulty in hearing faint or distant speech, listening and concentrating in classroom or in other noisy environments, and possibly some delay in speech and language skills.
- Moderate loss – is 41 to 70dB. Most pupils with moderate hearing loss have significant difficulties with speech and language and they generally need to use hearing aids.
- Severe loss – a loss measured at between 71 and 95dB, means speech may not be understood without hearing aids or lip-reading. Speech and language are likely to be significantly affected.
- Profound loss – a profound loss (96dB and over) means no speech is heard without hearing aids. The pupil will find it difficult to know where sound is coming from and a

high level of background noise will make things worse

Problems arising may include poor understanding of the task, difficulty with communicating within the group and frustration because of this.

Strategies:

- Talk clearly
- Always face towards the student
- Be aware of lip readers, do not create a silhouette of your face by standing in front of a light source he/she will also need to be able to see other members of the class
- If using a radio microphone, switch it off when addressing other individuals, especially if raising your voice.
- Give time to process information
- Thinking about acoustics in an echoing lab

When organising a practical session consider:

- Check safety procedures are understood
- Cochlear implant pupils and static electricity issues
- Reducing class announcements during practical work
- Seat away from 'heavy traffic areas'
- Label new equipment and processes to help develop vocabulary

4.11 Moderate/global learning difficulties (MLD/GLD)

These students have a general or 'global' developmental delay and have difficulties in acquiring basic literacy and numeracy and with learning across all areas of the school curriculum. Learners with MLD may also have associated speech and language delay, low levels of concentration, co-ordination difficulties and under-developed social, emotional and personal skills. Issues may also exist with: auditory and visual memory and comprehension. They may have poor verbal and non-verbal reasoning skills and have difficulties with applying what they know to other situations. This can mean that they come to rely on a teaching assistant to direct them within the class situation; however, he/she does need a high level of support with investigation and problem-solving activities.

Strategies:

- Ensure that learning activities are broken down into small steps and are clearly focused
- Provide activities to develop motor skills
- Use visual and concrete materials to aid understanding
- Keep language simple and familiar in guided group work
- Make use of songs, rhymes and rhythm to aid learning sequences
- Keep instructions short and concise
- Ask children to repeat instructions in order to clarify understanding
- Provide alternative methods of recording eg. labeled pictures, diagrams, flow charts
- Ensure repetition and reinforcement within a variety of contexts
- Allow extra time to complete a task
- Organise activities to develop listening and attention skills eg. sound tapes
- Develop role play and drama activities including the use of finger and hand puppets to aid the understanding of new concepts
- Help children organise their written work by using writing frames

- Praise every effort and successful achievement of new skills.

When organising a practical session consider:

- A multisensory approach to learning
- Relevant practical work
- Provide simple planning and recording frames
- Flow charts to show steps in practical work
- Coloured tape attached at regular intervals to e.g. lever-arm balances, large rotary thermometers, metre rules to enable pupils with limited numeracy skills to measure 'small', 'medium and 'large' quantities
- Use non-standard measures

4.12 Pragmatic semantic disorder.

Usually associated with either autism or SLCN. Speech processing is extremely difficult. The young person may also have problems in understanding the meaning and significance of events. They may seem to live in a world of their own. (See autism)

4.13 Profound and multiple learning difficulties (PMLD)

Pupils with profound and multiple learning difficulties have severe and complex learning needs, in addition they have other significant difficulties, such as physical disabilities or a sensory impairment.

The IQ range for profound learning difficulties is below 20. Pupils require a high level of adult support, both for their learning needs and also for personal care. They are likely to need sensory stimulation and a curriculum broken down into very small steps. Some pupils communicate by gesture, eye pointing or symbols, others by very simple language. Their attainments are likely to remain in the early P scale range.

It is important to have high expectations, as many learners with PMLD continue to slowly learn throughout their lives. They need to be allowed to experience appropriate learning opportunities that take into account their very early stage of development. They need plenty of opportunities to repeat experiences that focus on developing their communication, sensory, physical development and take account of their complex physical and mental health needs.

It can be more challenging to identify learning within the PMLD setting. Breaking down activities into very specific areas allows student monitoring.

- What is it? (define/compare new information to existing schema, incorporate new information)
- What happens? (sequencing events)
- Why? (cause and effect).
- What is it? Will draw on prior learning eg recognising the feeling/noise of a fan blowing by responding to it.
- Compare/sequence i.e. what is happening? Will be demonstrated if the student responds to the fan changing to the other side of his/her face and responding by turning to the stimulus. When the student begins to anticipate this as a repeating pattern he/she is demonstrating sequence i.e. what will happen next? To demonstrate awareness of cause and effect e.g. why did it happen? the student could be introduced to a switch that they learn will operate the fan.

This type of analysis makes the student's learning more visible. It gives the information that the stimulus is recognised and remembered and that there has been information processing and sequencing. Later visual tools may help learners to gather information, compare and select the most relevant, organise/categorise information and sequence events.

At first the learner's response is likely to be a straightforward, motor response. Later, learners may consider what they did, what happened and why, make decisions and begin to use this knowledge in future learning and increasingly complex and independent responses.

Allow learners to take risks, make mistakes and be independent as far as possible. The classroom/other environments should be organised to encourage learner choice and responsibility with the potential for the students to make connections between earlier learning and use learning in wider situations/contexts.

Strategies:

- High level pupil support
- Stimulate and refine sensory perception
- Help pupils become intentional communicators
- Consistent routines to help develop anticipation

When organising a practical session consider:

- Sensory stimulation and multi sensory
- Fun filled physical contact at times and slow, peaceful contacts at other times

4.14 Scotopic sensitivity syndrome

The main problem this causes is words are not static on the page. They may appear to cascade down the page, vibrate on the page, move randomly, go in and out of focus or remain blurred in one area. Sometimes associated with dyslexia it can also be an issue for non-dyslexics. It also causes:

- Difficulty with strip lighting.
- Feeling nauseous when reading.
- Difficulty in focussing on an object that is backlit.
- Difficulty in walking on surfaces with a tessellated pattern.
- Clumsiness
- Disorientation in an unfamiliar place.

Where this has been formally diagnosed the young person may have been prescribed coloured lenses or advised to use a particular colour overlay or coloured paper. Computer screens can be pre-set to the appropriate colour. It may be necessary to request early opening of exam papers to allow photocopying onto the correct colour.

4.15 Severe Learning Difficulty (SLD)

Children with severe learning difficulties have acute global development delay, such that intellectual or cognitive impairment, coupled with possible sensory, physical, emotional and social difficulties, will make it difficult for the child to follow the curriculum without substantial help and support. These difficulties may be further compounded by poor co-ordination, and they may use symbols, or signing such as Makaton, to help with communication.

The IQ range for severe learning disability ranges between 20-35.

Young people with SLD are likely to find it difficult to understand, learn and remember new skills. As a result they will have problems with both learning skills and applying them to new

situations. There may be additional problems with social tasks, such as communication and awareness of health and safety. The SLD student's attainments are likely to remain below level 1 of the National Curriculum (in the upper P scale range, P4–P8) for much of their school careers. Some pupils may use

sign and symbols but most will be able to hold simple conversations and gain some literacy skills.

Strategies:

- Introduce a single idea at a time
- Use lots of repetition and reinforcement
- Use visual concrete materials
- Multisensory approaches

When organising a practical session consider:

- A multisensory approach to learning
- Relevant practical work
- provide simple planning and recording frames
- Flow charts to show steps in practical work
- Coloured tape attached at regular intervals to e.g. lever-arm balances, large rotary thermometers, metre rules to enable pupils with limited numeracy skills to measure 'small', 'medium and 'large' quantities
- Use non-standard measures

4.16 Speech, language and communication needs (SLCN)

Probably the most common SEND, especially in under-privileged areas where up to 50% of students can be affected. SLCN is often called a 'hidden difficulty'. Many children with SLCN look just like other children, and can be just as clever. This means that instead of communication difficulties people may see children struggling to learn to read, showing poor behaviour, having difficulties learning or socialising with others. Some children may become withdrawn or isolated. Their needs are often misinterpreted, misdiagnosed or missed altogether.

Speech is the production of sounds whilst language refers to joining words together into sentences, stories and conversations, knowing and choosing the right words to explain what you mean and making sense of what people say. Communication refers to how we interact with others ie using language or gestures in different ways, for example to have a conversation or to give someone directions; being able to consider other people's point of view; using and understanding body language and facial expressions, such as: knowing when someone is bored, being able to listen to and look at people when having a conversation, knowing how to take turns and to listen as well as talk, knowing how close to stand next to someone

Therefore SLCN can affect the sound production process; the receptive language of the student; their expressive language; and/or how they communicate with others. The student may have age appropriate reading skills but is unable to make sense of what they have read. They tend to have a very literal understanding and struggle with abstract concepts. Word finding can be an issue leading to high frustration. This means that the SLCN student will struggle to follow instructions. They will have a dislike of discussion work and their word finding problems limits oral and written work. They struggle in social situations because they

don't know how to express themselves appropriately. There is a strong relationship between SLCN and issues with inappropriate behaviour.

Strategies

- Gesture, drawings, photos, artefacts, prompt cards and where appropriate, symbols are used alongside words – oral and written
- Use task plans – see general strategies
- Pre-teach key vocabulary, then ensure multiple and regular exposure to these words
- Specifically teach the skills of cooperation and interaction for practical work
- Teach pupils to organise work
- Be direct about rules/instructions
- Explain the purpose of the activity
- Emphasise main points
- Slow everything down
- Chunk information
- Give pupils time to answer/initiate thought processes
- The SRA Science Laboratory series is an excellent resource focussing on the vocabulary of science

When organising a practical session consider:

- Use simple instructions
- Keep close to the teacher so easy to pick up any issues
- Give clear sequence of stages of the practical
- Repeat experiments to learn by doing
- Use voice recordings, photos, prepared grids etc as evidence of learning

4.17 Tourette's Syndrome

Involves both physical and vocal tics which can become more marked when the student is stressed and is seen more in males than females. The physical tics may involve blinking; foot stamping; lip biting etc and the vocal tics include throat clearing; sniffing; grunting; repetition and shouting as well as the more publicised swearing.

Students can suppress tics for a period of time but this will put them under great strain. Best for everyone to completely ignore any tics to allow pupil to relax which will tend to reduce occurrence.

4.18 Visual Impairment

This could be indicated in a student not diagnosed by: holding work too close or very distant, sensitivity to bright lights, shutting or covering one eye, squinting or blinking, rubbing eyes, confusion over similar shapes. There are a number of different terms that are used to describe visual impairment:

- Partial sight – partially sighted pupils have enough vision to manage school tasks but may need the help of special teaching methods and materials to compensate for their visual difficulties
- Low vision – pupils with low vision have severely restricted vision but can make some use of their sight. They may be able to see work or general mobility in close-up, with the aid of good lighting, careful positioning and low vision aids such as magnifiers. They may or may not use a tactile code such as Braille

- Educationally blind – pupils who are educationally blind are unable to learn through sight and have to be educated mainly by non-sighted methods, using touch and hearing only – for example, using Braille

Being ‘registered blind’ involves a medical definition and means that an individual is likely to function in their daily lives mainly through touch and hearing. It does not necessarily mean that they have no useful sight at all.

Because pupils with poor vision can’t learn by watching, they may need tasks to be reinforced for them on an individual basis by additional explanation or modelling. They may not be able to do schoolwork as quickly as other pupils, because it will often be harder for them to access the necessary information.

Because they are not able to learn the messages of body language or facial expression that other children learn without realising it, they may also find difficulties in relating socially with other pupils.

Strategies:

- Use hand-outs to supplement board work
- Make sure worksheets are of excellent quality e.g. good contrast
- Use auditory information to complement visual
- Avoid crowded writing or where it overlaps pictures
- Highlight relevant areas
- Be aware of glare on a white board
- Use font 14 as a minimum
- Present small amounts of writing at a time
- Use tape to raise lines eg on measuring cylinders to allow touch to ‘read’ the level.
- Suitable illumination

When organising a practical session consider:

- Additional equipment such as non-slip mats and a free-standing magnifying glass may also be useful.
- Measuring cylinders with large-scale readings, talking scales etc can also be considered.
- Explore shape and function of any equipment
- Use specialist equipment e.g. talking thermometers
- Record instructions
- Use equipment trays with polystyrene cut out shapes for equipment to fit in
- Use large print or Braille to label chemicals
- Colour water so it is easier to see
- Ensure everyone follows rules e.g. to keep floors free of obstructions

5 General Strategies

Many SEN pupils have a history of failure. This may have created other problems such as task avoidance or becoming the class clown to prevent this from continuing. Be aware of this fragile self-esteem and use praise and reward liberally to demonstrate success; don’t dwell on poor literacy achievements: definitely no writing out spellings! Wherever possible, students are consulted about the kind and level of support they require.

Teachers must start with learners’ developmental profiles, considering their skills and learning preferences to build in appropriate options and flexibility for learners to gather and

process information and respond in different ways. Knowing each learner's level of development particularly in communication and cognitive skills will ensure appropriate activities; language and teaching techniques are planned and used. It will highlight any particular learning strengths and preferences and particular barriers to learning which must be taken account of when planning appropriate learning opportunities. Barriers may be caused by difficulties in accessing or processing incoming information and/or in organising, retaining or expressing ideas and may include:

- problems in perception/processing – with vision, hearing
- language and communication difficulties – difficulties in processing and comprehension, lack of expressive language
- difficulties in planning, organising, controlling impulsive behaviour
- impact of physical difficulties
- poor spatial organisation, concept of time
- difficulties switching attention between stimuli/sources of information
- needing extra time to process input and organise response
- difficulty defining problems, selecting relevant information
- difficulty making comparisons, projecting, imagining
- poor memory.

Support is planned based on prior knowledge and experience, consistency of approach and building on what works best for individual pupils. This builds a holistic perspective on the pupil, easing frustration, anxiety and setbacks for the pupil.

Do not differentiate by outcome. This simply reinforces his/her feelings about being inadequate to complete tasks effectively. Create appropriate tasks with built in success. The most powerful tool for improving learning is convincing a young person that he/she **can** do it. Would you carry on doing something that you constantly fail at?

Set realistic homework that the pupil understands and make sure that it is completed appropriately. Use normal sanction if necessary.

Contact with home is the reward/sanction that has most impact with most students.

Common areas of successful teaching and learning are:

- Visual learning – often a strength for SEND learners.
- Kinaesthetic learning – another strength, use concrete apparatus to reinforce concepts
- Repetition – overlearning allows new information to be processed more effectively
- Organisation – using a standard lesson format removes the anxiety for the student of 'What's coming next? Will I be able to do it?'
- Multisensory teaching – ie use sight, hearing, touch and speaking in all learning experiences

Multisensory teaching

To provide the best possible opportunity for pupils to understand and retain information, you should use and incorporate a repertoire of multi-sensory approaches.

- Use a full range of media, for example, visual and hands-on materials such as artefacts, photos, symbol/vocabulary charts, written questions, concept maps, writing frames.
- Be aware of the different ways pupils like to learn.
- Use all forms of ICT (assistive technology and technology to enable learning).
- Offer a range of ways of recording responses to a task.

Games have many uses to support a multisensory approach. They can help with reading, spelling, number, memory, sequencing, developing spoken language and social behaviour. Manufactured activities such as the Stile Tiles tray can be used with home designed questions to suit level and subject. Try variations of pelmanism, families, matching pairs, snap, noughts and crosses and grab to develop games that meet the learning need in an enjoyable way.

Visual prompts

Use visual prompts to support the pupil's learning, for example:

- pictorial task cards
- writing frames give the student the starting point to build on. A sheet of blank paper can be very scary.
- word mats to keep relevant vocabulary close at hand.
- relevant classroom displays
- task plans - provide instructions for a task visually using the headings, What do I need? What do I need to do? What happens after that? This can be also be used as a scaffold to support homework tasks. The student progressively is given more responsibility for creating the plan.
- A visual framework can be used as a consistent guide for planning an investigation in science. Headings of what am I finding out? What I need? What will I do? What to look for? What happened? Why did it happen? Each with picture support will simplify the method, results and conclusion format for many students.
- a card listing ideas, eg for 'Five things to do if you are stuck with your work'

Working for pupil independence

All pupils should be able to participate in classroom activities. Plan for involvement by providing plenty of opportunity for pupil participation:

- carefully scaffold questions to build confidence
- ensure that you and other adults hold back and give pupils time to process and talk
- make explicit links to previous learning
- ensure that pupils are familiar with the range of resources they need to use
- Provide hand-outs
- Try a book rest for text books/hand-outs
- Ensure individual is facing the board
- Write instructions on the board – use different colours for each line, or to indicate instructions for different students
- Provide templates with headings to help individuals work through an activity
- identify with the pupil a source of assistance when they have a problem in the lesson, eg, a named peer, an appropriate adult.
- Teach mind-maps, spider diagrams, lists
- Give homework at the start of the lesson
- Write homework requirements on a slip of paper for individual to stick into their planner

- Keep groups of apparatus together, eg Bunsen burners, bench mats, tripods and gauzes, to save time and minimise movement.
- Consider setting up apparatus before pupils arrive.
- Pupils with significant motor difficulties may benefit from adapted apparatus, eg soldering a piece of metal on to the collar of a Bunsen burner to act as a lever.
- A digital camera is useful for recording investigations in progress and an individual's contribution to a paired/group activity.
- Concept keyboards, large format keyboards, tablet PC, touch screens and appropriate software (such as Clicker, Cloze-pro) can allow pupils to record their work more easily.
- Put an emphasis on relating any investigation to something in real life with which they are reasonably familiar – a 'hook' on which to hang new found knowledge and understanding.

Adult-pupil communication: listening, questioning and talking

Think carefully about how you communicate with pupils. Consider your input with regard to length and complexity of language and type of questions.

- Prepare appropriate questions for individuals/groups. Open questions are good but may offer too little direction for some pupils eg SLCN or ASC. Consider the range and level of questions that can be accessed by different pupils and adjust accordingly.
- Give pupils time to think about answering questions.
- Encourage discussion with peers in advance of feeding back to the group or answering questions.
- Teach pupils to ask for help, using supports for this, such as prompts.
- Check for understanding, perhaps involving other adults in the class.
- Accept all attempts from students to show their knowledge and understanding, both orally and when recording.
- What will happen during the lesson is written in language that pupils understand.
- Help students to plan effectively (eg provide instructions for them to sequence in the correct order).
- Support students in remembering and being able to read and write key words and names of apparatus, processes etc. (taking time to introduce and explain new words, providing word banks). Be aware of the confusion that may arise from words having more than one meaning (eg light, solution, resistance, concentration, etc).
- Use speaking frames to develop understanding of scientific concepts and language (listen, imitate, innovate). Allow time for checking understanding and repeating explanations/modelling when appropriate
- Plan is referred to during teacher introduction and updated as lesson progresses – 'this is where we are now'. Individual versions of this as appropriate, eg A4-sized whiteboards on pupils' desk with tasks erased as they are completed, etc.
- Help pupils to understand the context of the learning and access previous learning.
- Help pupils to understand the criteria for success – what they must complete to have done well.
- Consistency of approach reduces pupils' anxiety – it allows them to predict what will happen.

- Amount of teacher talk is reduced.
- Asking for clarification is encouraged.
- Pacing, using a slower pace in conversation to give pupils time to think and formulate a response.
- Pausing frequently and expectantly when talking to a pupil or group of pupils can encourage their participation.
- Confirming, by confirming their understanding of what a child has said, adults can maintain the conversation and reassure the child that they are being listened to and understood.
- Imitating, teaching staff can imitate and repeat what a pupil has said; for example, if a child says, 'Look at our bridge', the adult can respond by saying, 'Wow, look at your strong bridge'.
- Commenting, adults comment on what is happening or what a child is doing. Comments about the immediate situation can help the child to associate phrases and vocabulary with their actions or surroundings.
- Extending, by repeating what a child has said, but adding some syntactic or semantic information, adults can introduce new words or grammatical structures. This should be done in a way that is immediately accessible and understandable to the child.
- Labelling, you can build a child's vocabulary by providing the names of objects, actions or abstractions.
- Scripting, it is helpful for adults to provide a verbal routine for activities; for example, 'First you do this, then you do that...'. Encourage pupils to talk through known routines; for example, 'Now it's practical time, what do we do first?'.
- Modelling, using more effective question and answer strategies. Have pupils write down or discuss their answers with a partner, rather than answering the teacher directly.
- A 'no hands up' policy, in which the teacher chooses the pupil to answer a question, helps to avoid situations where only those with confidence to put their hands up are involved in classroom talk.
- Sequencing activities – writing up experiments, cycles, cut and paste. (it is perfectly acceptable for a TA to write sentences or draw diagrams for the pupil to cut and paste themselves. Do not feel it all has to be their own work
- Use child-friendly phraseology for sharing objectives.
- Any difficulties with the writing up of investigations, recording of results etc. can be minimised by providing writing frames/templates and/or support from peer tutors and TAs.
- Support developing numeracy skills as well with number lines, weights and measures charts, etc, displayed in the room.

Study skills will need to be taught explicitly.

All exam access arrangements should reflect the normal way of working therefore it is important that these needs are assessed and implemented in all classroom test situations.