

Unit 5

ICT resources

for pupils with multiple disabilities

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www.spacekraft.co.uk



Terminology

This Unit has been written for teachers and others working in all countries within the UK. There are differences in the legislation, terminology and structure of the educational systems in Scotland, Northern Ireland, and England and Wales and we have tried to reflect these in the document. In some specific Scenarios illustrating the use of ICT by individual pupils, we have given references to a scheme which is only applicable to one country – for example, the Literacy Hour in England and Wales – because it is necessary to make sense of the story.

For fuller information on terminology relating to each country, please see the section **Curriculum and Terminology in the UK**. This can be found at the back of your ICTS ring binder. You may well be corresponding with colleagues working in another part of the UK, and it will always be useful to have a common understanding of the language of education.

Throughout this Unit we have endeavoured to use the preferred spellings used by Oxford University Press and Cambridge University Press, as found in the current edition of the Oxford English Dictionary.

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Introduction

Labels or support needs?

This Unit addresses ICT concerns of teachers who work with pupils whose educational support needs have much in common but who may be given different labels / descriptors. In England, Wales or N. Ireland, and depending on the education authority, the following terms might be applied:

- PMLD (having profound and multiple learning difficulties)
- profoundly physically disabled
- MSI (multi-sensory impaired) or deaf-blind
- MDVI (multiply disabled with a visual impairment)
- MDHI (multiply disabled with a hearing impairment)

In Scotland a pupil with a similar profile might be described as:

- CLD (having complex learning difficulties)
- SCLD (having severe and complex learning difficulties)
- deafblind

In addition to these terms, you may come across diagnoses such as central neurological impairment, cortical visual impairment, cerebral visual disorders, and cerebral visual dysfunctions. Murdoch (1997), after Best (1994), points out that this 'grey zone with adjacent diagnoses on all sides' is more to do with a rapidly changing and developing field, as professionals learn from each other, than it is a reflection of disagreement and controversy.

It is not difficult to appreciate why different descriptors like these may be applied to the same pupil. Impairments that cause global learning and physical difficulties usually affect at least how the brain interprets visual images and often hearing systems as well.

It is important to understand that there may be as much, if not more, variation between pupils to whom the same 'label' is applied, as there is variation between pupils given one, or more, of the these 'labels'. For a discussion of how and why these terms may have evolved see Aitken (1997).

In this Unit we refer to the learning and support needs of individual pupils. In general we avoid the use of diagnostic or educational categories.

Key factors for ICT success

It can be difficult to introduce technology in a way that makes sense to pupils with complex learning difficulties which might include visual impairment, hearing impairment and / or dual sensory impairment. Often technology is introduced and, after an initial flush of success, is more or less abandoned, to statements like:

"He liked it at first but the novelty soon wore off."

"We tried him with switch operated toys and computer games but he wasn't interested."

"He liked the yapping dog but we didn't know what to do next."

"She was more interested in fiddling with the switch than in listening to the music playing."

Technology in and of itself is not helpful. For instance, it can be used to increase participation and social interaction, not to replace it! Greatest success is likely to come when ICT use is linked in a meaningful way to the curriculum through activities the pupil understands and / or finds pleasurable. In this way the effects are likely to last for longer. These principles help to integrate ICT into an existing framework of activities, adding a new dimension to those familiar activities:

- know in advance the pupil's preferences and motivations
- use technology to match these and to help the pupil be active and sociable
- introduce technology in the context of familiar play and social routines, within the curriculum

It is not appropriate to introduce technology 'simply to see if it helps'. Technology works best when:

- aims for using it are clearly defined
- it is introduced into a well defined place in the curriculum and in the pupil's individualized educational programme
- it is integrated closely with any planned programme of stimulation, play development, early learning and communication development, rather than as something separate

Expected outcomes

By the end of this Unit, participants will have...

- increased understanding of the range of technology available for pupils with complex learning difficulties caused by a combination of sensory, cognitive, physical and communication impairment
- increased understanding of how to make decisions as to which of the available technologies is appropriate, based on assessing a pupil's sensory, communication, physical and cognitive skills
- enhanced awareness of how technology might be integrated into IEPs
- become more familiar with some of the direct and indirect uses of ICT in multi-sensory environments and learnt how to apply these within individual pupils' curricula
- knowledge of the advantages and disadvantages of using computers in the context of visual stimulation activities, know how to explore visual stimulation activities using computers, and have experience in choosing software that matches pupils' developing sensory skills
- enhanced understanding of how ICT can be applied to improving the communicative competence of pupils with communication, sensory, physical and cognitive impairments

Key skills covered in this Unit

Each skill area listed below relates to one or more 'levels of ability' as discussed in the following section. This framework is used in order to implement activities suited to the age and abilities of individual pupils. For each scenario several examples are presented.

Select, set up and use multi-sensory equipment

Understand how multi-sensory equipment can be used to support learning through establishing and promoting trust and interaction. Establish an incremental approach to using multi-sensory equipment. Use a multi-sensory environment to augment assessment findings.

See Scenario 1, examples 1a, 1b, 1c, 1d, 1e, 1f, and 1g.

Introduce pupils to the control of multi-sensory and other equipment

Adapt multi-sensory equipment to allow operation by switch user. Adapt battery-powered equipment to allow remote activation by switch. Create simple loop tape with greeting message. Record digitized speech into simple voice output device. Adapt switch surfaces to enhance tactile and visual display, to suit individual pupils' visual impairments.

Adapt mains electrical equipment for operation by switch user using mains switcher

See Scenario 2, examples 2a, 2b, 2c, 2f, 2g, and 2h.

Be aware of advantages and potential risks of using a UV-A light source

Carry out risk assessment before introducing a UV-A light source; liaise with local professionals. Understand use of diffusers and fluorescent objects.

See Scenario 2, example 2d, and 2e.

Embedding switch activation into functional communication activities

Store recorded single-shot messages on voice output communication aid, activated remotely using PalPads or Taction Pads. Associate switch with objects of reference and the related effects.

See Scenario 3, examples 3a, and 3b.

Understand advantages and disadvantages of computers for visual impairment

Adjust settings in single switch software to enhance on-screen image (e.g. adjusting foreground and background colours or image complexity). Adapt settings for use by switch user.

See Scenario 3, examples 3a, and 3b.

Adapt user interface so that PC can be operated by switch user

Know that there are options to connect switches to operate some software on PCs. Know how to connect a switch interface for operation by a single-switch user. Adjust software settings for use in this way.

See Scenario 3, examples 3a, 3b, and 3c.

Write a script for others to use software

Record as a script how one pupil is introduced to, uses and ends a session with one software activity.

See Scenario 3, example 3c. This can be applied across this Unit and others.

Explore the World Wide Web

Use the Web to investigate areas of interest. Specific examples are given below although individual preferences can also be followed.

See Scenarios 3 and 6, examples 3d, and 6a. This is also applicable elsewhere.

Identify a selection of empowering messages and store on a single-message voice output communication aid

Identify messages that can be used across several situations rather than isolated to one (e.g. "Come over here") and store on voice output device such as BIGmack or One Step.

See Scenario 4, example 4a. This is also applicable elsewhere.

Store sequential messages to be reproduced in order

Use a Step-by-Step Communicator to store a series of short messages, which are produced in turn with each press of the communicator or by remote switch activation. This technique is useful across a number of settings e.g. counting, songs, lines in a play etc.

See Scenario 4, examples 4b, and 4c.

Import a photo using a digital camera or scanner, and store on a computer

Use a digital camera to take photos (if intending to purchase one see **Unit 1 - Literacy and recording - Using symbols, pictures and sounds** for more advice).

Use SwitchIt! Maker to allow image to be built up after three switch activations

See Scenario 4. example 4d. This also applies in several other examples.

Use a touch screen

Calibrate and adjust settings; load software to be operated by touch screen (Touch Monitor or add-on window).

See Scenario 4, example 4e.

Set up hot spots to be accessed by scanning

Use simple software such as *Chooselt! Maker* to produce hot spots of image e.g. photograph imported using *SwitchIt! Maker*

See Scenario 5, examples 5c, and 5d (as alternative to suggestion given).

Use talking books

A variety of talking books are available; although some are either visually complex, too difficult for some pupils to understand or a combination of both.

See Scenarios 5 and 6, examples 5e, 5f, and 6a.

Create and edit overlays

Know how to plug an overlay keyboard into the computer and use overlays. Use software to create overlays to use on the overlay keyboard. It is possible to use objects of reference, pictures, line drawings, symbols, and words, or a combination of these.

See Scenarios 5 and 6, examples 5f, and 6a / 6b (if required).

Create on-screen grids

Create, edit and use on-screen grids. On-screen grids are flexible tools for quickly and easily designing and combining presentations on screen; they can be used via touch screens, keyboards, switches or overlay keyboards.

Some grid-making software now allows switches to be used so that grid cells can be scanned and individual cells selected; sound prompts, either synthesized or digitized, can be given, and heard prior to selection.

See Scenarios 5 and 6, examples 5f, 6a, 6b, 6c, and 6d.

Scenarios

Levels of ability

Communication: functional versus linguistic

It is not possible for one short publication to cover the ICT educational support needs of all pupils and young people who might be described by these terms. This Unit therefore targets teachers of pupils whose **communication** is at a **functional** rather than **linguistic** level.

Taken in its broadest sense, it is by means of **communication** that we can judge whether a pupil is aware of their environment and changes that may take place in it. We hope to help pupils to move forward, so that they may move on from making a response to something, to beginning to initiate change themselves, and making choices about what happens.

The term '**functional communication**' itself spans a wide range of levels of communication. Teachers will be aware that ICT activities appropriate to pupils operating at one level of communication may not be appropriate to pupils who communicate at a different level. We have therefore grouped ICT activities around each of six levels of functional or early communication. The framework we use to group the ICT activities is one that will be familiar to many teachers, following the work of Coupe & Goldbart (1992).

In practice a teacher may well have in one class a group of pupils who cover these entire six levels of communicative competence (or beyond). And any one pupil may appear to function at more than one level at any one time.

The six levels are intended to help teachers choose ICT activities to suit the needs of pupils with whom they work.

Level 1. Pre-intentional: Reflexive

Description Adult assigns communicative intent and meaning to behaviours which consist of responses to internal and external stimuli from some or all senses.

Behaviours sucking, startle, crying, frowns, body movements, whines, burps

Meanings like, dislike, want, reject, known and not known

Aims to develop awareness and attention e.g. looking, stilling to sound

Level 2. Pre-intentional: Reactive

Description Adult assigns communicative intent and meaning to pupil's behaviours. These behaviours include reactions to events and people within their environment. Pupil receives, attends to and discriminates input from some or all senses.

Behaviours crying, body movements, mouthing, turning to sound (especially speech), holding, facial movements, smiling, mutual attention – e.g. mutual gaze if pupil makes eye contact

Meanings recognition of patterns, expectation / anticipation of predictable events

Aims to encourage consistent, distinct responses to specific stimuli (e.g. smile and vocalization for like)

Level 3. Pre-intentional: Proactive

Description	The pupil tries to act on environment. Adult uses actions as signals to assign communicative intent and meaning. Pupil is beginning to take meaning from adult's actions and displays of affection.
Behaviours	vocalizations with intonation, pitch, stress, joint attention to stimuli, 'listening' or stilling, taking part in shared interactions with adult(s)
Meanings	intention to carry out some action, or get something
Aims	to develop receptive skills, such as stopping actions in response to angry tone of voice, or acceptable behaviours, such as vocalizing when adult is near

Level 4. Intentional: Primitive

Description	Pupil begins to act intentionally on adults and objects in the environment. The meaning of actions may not yet be clear, although a limited range of functions is apparent. Pupil begins to understand non-verbal communication behaviours. For those with enough vision to make eye contact, it will alternate between object of attention and the adult. Pupil likely to persist until the goal is achieved, at which point behaviour stops. For those with less vision watch this one.
Behaviours	puts objects in people's hands, pushes people or things away
Meanings	conscious intention to act on the environment
Aims	to make eye contact and lead adult towards what is wanted; take item from adult offering it when instructed verbally to do so

Level 5. Intentional: Conventional

Description	Pupil intentionally communicates a range of meanings using more conventional signals such as gesture, vocalizations and protowords. Becoming easier for adults to understand meaning. Increasing number of communicative functions. Improved understanding of others' speech.
Behaviours	nodding, shaking head, waving, pointing, gestures, (use of objects of reference, signifiers)
Meanings	emergence of conventional functions such as drawing attention, responding, requesting, rejecting
Aims	to signal non-existence of an expected object (all gone)

Level 6. Intentional: Referential

Description	Intentional communication using combinations of words (speech, signs, symbols). Pupil's communication easier to interpret (less ambiguity and less dependence on context). Comprehension of language is increasing.
Behaviours	speech, signing, development of meaning
Meanings	wide range
Aims	the emergence of spoken, sign other formal language system

Note that the above is only a very rough guide to stages in the development of communication.

Scenario 1 – Pre-intentional: Reflexive

Some practitioners believe behaviours at this level should not be regarded as communicative. In their study of pupils based in a sample of special care units, Evans and Ware (1987) found that 80% of teachers reported that the pupils had no communication skills. Other studies (Ware, 1994) have reported that interactions by adults with pupils typically last less than one minute and occur infrequently; adults tend not to notice that the pupils are responding and, probably as a result, rarely respond to pupil initiated interactions. A priority is to enhance opportunities for interaction between pupil and adult.

Interacting in a multi-sensory environment

Multi-sensory environments offer one way of improving social interaction (Hepworth, Glenn et al; Bozic). Glenn et al (1996) describe one pupil, Susie, whose mother had commented “I didn’t think she would be any good for research [into using multi-sensory environments]; I thought she was too handicapped”. Despite these misgivings, Susie demonstrated changes in behaviour, especially in social situations. For her, a dark room environment was least preferred, while bubble tubes and a vibrating mat gained her attention. Multi-sensory environments can be used to:

- increase opportunities for interaction to take place
- introduce stimuli gradually – distraction-free – the chance to go into the room and shut the door
- increase opportunities for the pupil to make a choice, even at a very basic level
- reduce the number and frequency of interruptions from ordinary classroom activities – this can be vital to both adult and pupil



a multi-sensory room

Example 1a – Using the technology indirectly

If working with a pupil who shows few responses, or if the staff member is new to multi-sensory environments, aim simply to relax with the pupil in a multi-sensory environment, using the technology indirectly. The focus is on enhancing one’s relationship and interaction with the pupil. A basic set-up might consist of:

Designated area	Separate room or quiet area, or store room set aside
Cassette / CD	For playing relaxing music
Even illumination	Created by overhead lighting or uplighting – dimmer switch helpful. Note that fluorescent lighting can be dimmed using high frequency balancer dimming switches. (Prevents the frequency of some fluorescent lights interfering with hearing aids.)
Soft play mats	To lie on; see issues of seating and positioning discussed in Unit B – Organizing your resources .
Aromatherapy diffuser	On entry to the room, signals start of activity
Objective	build up trust between pupil and staff member. Observe pupil; do responses change e.g. stilling to cassette or CD? Is there a favourite type of music – if so, how do you know? Was it an increase or a reduction in head movements? Do similar behaviours occur when the lighting changed.

Example 1b - Focusing on touch

This activity continues with a similar set-up to that above, perhaps a few sessions later.

- Set-up** As above
- Tactile materials** Use a space blanket, rusty paper or lying on a resonance board
- Objective** Continuing to build up trust and interaction. Tactile materials can be draped over the pupil or, as with resonance board, pupil lies on it. Movement changes tactile experience. If adult is in close proximity, his or her movement can encourage the pupil to move. Be prepared to wait for the pupil's movement and respond to it.

Example 1c - Building on relaxation

So far technology has been low-tech and used indirectly, almost incidentally, to support learning objectives of participation and social interaction based on trusting another person. A mix of relaxation and movement can be helped by slightly more sophisticated technologies.

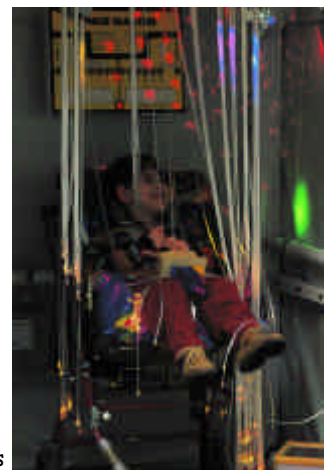
- Set-up** As above but without the cassette / CD. Signal change e.g. dim lighting and use a different oil in the aromatherapy diffuser.
- Fibre optic light** Drape fibre-optic light strands across the pupil or both pupil and adult, or a part of body that shows some movement. Movement and interaction is encouraged by the continuously changing colour combinations.
- Objective** Fibre optics help bridge the gap between relaxation and movement. The longer the strands the more of the body can be covered.
- Health and Safety note** Fibre-optic strands carry no electricity or heat – the actual light source is placed some distance away, so they are safe to handle. These should not be confused with Travelling Light Tubes etc, which, although of low voltage, are only for visual effect and should not be touched.

Example 1d - Moving along

Some fibre-optic combinations change the coloured light pattern when touched or moved rather than cycling through colour sequences independently.

- Set-up** As above, try with and without music. Dim lighting. Use the same diffuser oil.
- Fibre optic plume** Place strands of the plume on an area of the body that seems to have shown some movement. You may wish to change position so colour changes happen across more of the visual field.
- Objective** A subtle variation to help the pupil begin to control their world. Focus remains on interacting with **people**. Technology is a means to this end.
- Note** Colour perception does not depend on being able to see colour hues alone (if it did and pupil had no colour vision, he or she would see no change).

responding to fibre-optic strands



Example 1e - Encouraging inclusion

Multi-sensory environments offer exciting opportunities for including all pupils using themes: for example a water or jungle theme. One school began a jungle theme by inviting pupils (in ones and twos) from a mainstream class based in the adjacent school.

Set-up	Jungle theme in multi-sensory environment (or seasons, Christmas etc). Mainstream group visit, spend time with pupils
Design of theme	Mainstream group return having designed tapes, lighting arrangements, sensory boxes and different soft toys
Objective	Theme to facilitate interaction with other pupils rather than adults

Example 1f - Adding to the multi-sensory environment

Here we have illustrated only a few of the many activities that can be carried out using this sort of technology. Nor are multi-sensory environments to be solely used with pupils communicating at this level. The environments are flexible and offer learning opportunities for many more pupils. But before making huge investments in new technologies ask yourself what will be the purpose. Often very different pieces of equipment will be used to address very similar learning objectives. If these have been met, is it worth spending more money to address the same end?



enjoying the 'white room'

A more complete, but still relatively basic, multi-sensory environment would include – in addition to that all-important distraction-free area – equipment to stimulate:

Vision	For example, using variable lighting, such as fibre-optic lights, bubble tube, slide projector with effects wheel, mirror ball, travelling light tube, shimmering curtain
Sound	For example, cassette recorder, sound systems to produce music and sound effects, sound (and light) wall unit
Tactile	For example, soft play equipment, vibrating mat, massage tube
Olfactory	For example, aromatherapy diffuser box – in one school a lavender pad was attached to a switch which turned on and off the overhead light. On entering the room the teacher would bring the pupil to the light switch and at the same time press the switch. The combined cues – smell (lavender), sound (noise of light switch), vision (room lit up) – signalled the beginning of the activity.

Such environments provide sensory stimulation, opportunities to interact socially with people and physically with objects. Suppliers of this and a whole range of other equipment include TfH and SpaceKraft.

Training courses are also available, to be run in school so that several members of staff can attend. Led by independent consultants the school is then not 'locked in' to a particular supplier. Finally, courses can be run either before installation, helping to identify needs, or after installation (or both, if preferred).

Example 1g – Assessment explored in a multi-sensory environment

Hepworth (1992) investigated the use of multi-sensory environments in Condoval Hall – a school run by the Royal National Institute for the Blind. She stresses the need to incorporate the use of multi-sensory rooms into an existing programme of learning. In her work learning objectives included:

- enhancing relationships, communication and mobility
- a private area for staff to explore communication

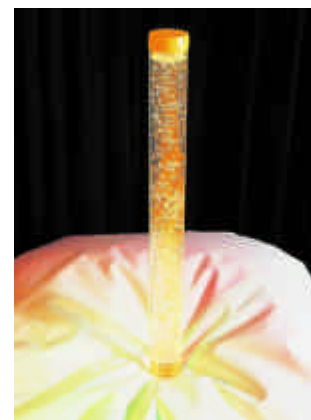
Often staff will report that their view of a pupil can be changed after spending time in the environment. How the pupil responds to changes in that environment provides valuable assessment information. A pupil who appears not to respond to people, objects or other events might, if given the opportunity, respond differently to some part of the multi-sensory environment. A head turn towards (or even away from) a coloured light source on one side might be a clue to investigate further visual responses in a pupil diagnosed as cortically visually impaired.

Tip: Even if a pupil is diagnosed or registered as blind, never assume that he or she sees nothing at all.

Set-up Very dim lighting, no music or other sounds, no diffuser.

Bubble tubes or columns These produce visually interesting changes in colour as oil bubbles ascend and descend the column of the light tube. Unlike fibre-optic lights, they produce a stable colour change, perhaps from blue to orange to green and so on.

Objective Observe visual preferences between dim light and bubble light on, vary position (not all in one session). Gradual change in lighting may allow pupil the necessary time to respond. Note too that the lights emit a low frequency 'hum' which can be heard but also produces vibration in the column of light. This can help in assessing vision, response to touch, visual field preferences to name but a few.



bubble tube

Key skills and equipment

The key skills for the above examples are the ability to:

- select, set up and use multi-sensory equipment – either already available in school or purchased following consultation with other staff
- use multi-sensory equipment and environment in order to encourage trust and interaction
- recognize and use equipment both indirectly and directly to support learning
- (where school setting allows) involve mainstream pupils in devising themes to reflect pupil IEPs
- undertake additional assessment using multi-sensory environment

The key equipment is:

- designated multi-sensory environment, e.g. room, area set aside, distraction-free
- controllable lighting, e.g. overhead lighting controlled by suitable dimmer switches
- soft play mat(s)

- tactile materials such as space blanket, rustly paper
- cassette recorder with relaxing music
- (optional)
 - aromatherapy diffuser and / or
 - fibre-optic light strands or plume
- additional equipment suggestions are given in Example 1f

Recording behaviours

Because it is often difficult to interpret observations made of a pupil whose behaviours are inconsistent, it is vital to introduce a robust recording system. For staff inexperienced in using this technology and perhaps in recording observations, it is best to begin with a simple recording system. Useful approaches include:

Video recording Not always possible given limited staff numbers

Time sampling Observer records what the pupil is doing every 15 seconds (a hands-free microphone attached to a voice-activated tape recorder can help if an extra person is not available to observe).

Note Compare responses in the multi-sensory environment to the pupil's responses outside that environment. Also observe when no one is with pupil. Use the same approach to recording in all three circumstances to compare results of observations.

Below is an example of how responses that have been recorded in time sampling can be assigned to different communication categories.

Observed response	Category applied
Look at person Stilling when person talks	Social interaction
Look at object Move within object related activity	Object interaction
Gurgling Smiling, laughing	Positive emotion
Crying Fretting – 'unhappy' sounds	Negative emotion

Examples of responses observed and related behaviour categories

On the next page is an example of a recording sheet for sampling of observed responses.

Sample behaviours	Time period (5 minute period measured in seconds, record behaviour frequency)																			
	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	270	285	300	
Look at person																				
Stills when person talks																				
Looks at object																				
Moves in object-related activity																				
Gurgles																				
Smiles, laughs																				
Cries																				
Fretting – unhappy sounds																				

Example of using time sampling to record frequency of different behaviour. This example uses a five minute period, split into 15 second intervals

Scenario 2 – Pre-intentional: Reactive

Increased opportunities to participate with other people and interact socially will encourage early understanding of the relationship between cause and effect, or contingency awareness. It is important to note that for most pupils, experiencing social contingency awareness will precede awareness of physical contingencies. In other words, to encourage the pupil's understanding of cause and effect, begin with people and not with objects.

A study by Phil Schweigert (1989) was one of many to show the power of using switches to interact with people. He showed that a pupil would use a switch to increase social contact, but would be less likely to press a switch if it resulted in non-social contact. A vibrotactile cushion was used. At first the pupil could activate a switch to operate the cushion. The pupil soon showed no interest. Then the cushion produced an auditory signal to a person to come and play with the pupil. Only when someone simultaneously came to play with the pupil did switch presses increase.

Earlier we noted Evans & Ware's (1987) study which showed that few interactions took place between staff and pupils with severe communication impairment. We also know that the consequences of a severe visual impairment include lack of mutual eye gaze, lack of facial expression and not recognizing facial expressions in other people; we know too that cerebral palsy will result in reduced facial expression; all of which leads to fewer attempts by the pupil to initiate social interactions. What if the pupil could attract staff's attention?

The various technologies brought together within multi-sensory environments can be adapted so they can be controlled by the pupil. This is an example to show that one type or class of technology can be appropriately used with pupils whose cognitive, sensory, physical and communication abilities are very different.

It is time to focus more on how pupils themselves might activate multi-sensory environment rather than it being operated for them. A balance must be struck. It will be helpful for the pupil to understand that the world of objects can be controlled. But if too much opportunity for control is introduced at one time or no thought is given to why control is being offered to the pupil, technology will offer little advantage and may undo previous hard-won successes. Three useful principles to consider are:

start low

build up slow

make it social!

Because attempts will be made to encourage the pupil to use switches to control events, it is vital to have read and become familiar with the **Unit B – Organizing your resources** which covers issues of:

seating and positioning

Observations, perhaps made in multi-sensory environments, will have given clues about appropriate seating and positioning. Consult with physio and occupational therapists as well as with parents.

Other preparatory steps addressed in **Unit 8 – The development of switching skills** include:

locating switch

Observations (e.g. in multi-sensory environment, feeding situations, physiotherapy etc) will provide hunches about the best site on the body to place a switch. Finger, hand, and arm are optimum but may physically not be possible. Lateral head movement may interfere with eye contact.

type of switch

Many factors come into play here. For instance, a contact or target switch requires the pupil to make physical contact, which may be difficult physically to achieve. But because most give feedback on activation, it is often easier to associate contact with effect. Non-contact switches (e.g. mercury tilt switch) may physically be easier to operate but more difficult to understand.

mounting switch Velcro, straps, mounting arms, and clamps for wheelchair trays are just a few of the options to consider to ensure the switch stays in position. Equally important – especially when using mountings near the head and eyes – is to be able to detach them quickly.

Time spent in preparation will be repaid many times over in successful use by the pupil. (But don't spend so long preparing that you never get started)

Example 2a - Saying "Hey"?

set-up Insert a battery adaptor into a standard battery-powered bell or buzzer, so that an external switch can operate it. (Detailed instructions for fitting battery adaptors are given in **Unit 8**.)

preparation Refer to the introductory section on 'Pre-intentional: Reactive'. Begin by showing the pupil how to activate the buzzer; cue a second member of staff to come over when the buzzer sounds. Model the switch activation with the pupil. Staff need to be prepared at first for one of them to drop everything in response to the buzzer.

objective To provide a means of signalling independently to get attention – the response of the staff member is to engage in social interaction

Example 2b - Using loop tapes

Buzzers and bells can attract attention and encourage interaction, but loop tapes can be used to communicate a single thought or idea. A verbal message is a powerful tool for expression. The pupil may not be at a 'stage' of using an augmentative communication system in a functional way, but interaction and communication skills can be developed.

set-up Make a loop tape using the tapes for a telephone answering machine. Short tapes are best (10 seconds or so). Record the message, repeating it until the end of tape; press Stop. Next, decide on an appropriate switch to use (see above). Attach the switch to the remote jack of a cassette recorder, or insert a battery adaptor. Press 'Play'; and with the switch activated the message will be played.

objective Many communication skills can be learned and used with this approach e.g. calling attention, initiating interaction, turn-taking etc. Not all of these skills are appropriate to the 'Pre-intentional: Reactive' level of communication. This illustrates that the technology is not important, but the curriculum and preparation are. Sample messages include: "Come over here", "More please".

Key skills and equipment

The key skills for the above examples are the ability to:

- introduce multi-sensory equipment that can be activated by the pupil rather than be operated for them
- use technology to develop pupils' interaction with people rather than objects

The key equipment is:

- battery adaptor(s)
- battery-powered bell or buzzer
- switch that pupil can operate
- additional member of staff to respond to buzzer or loop tape activation in initial stages
- cassette recorder suitable for loop tape
- loop tape(s) for telephone answering machine (10-second)

Example 2c - From loop tapes and buzzers to talking switches

A BIGmack is one example of a 'talking switch', a simple yet effective device that brings together physical and social contingencies. By pressing the large top of the switch (giving a satisfyingly loud 'click') a pre-recorded message is spoken, such as "Can I have some juice?" or "Jump up and down!". The teacher decides on the message recorded.



BIGmack single message devices

- preparation** Choose a message. Agree that whatever is to happen must take place immediately after the message. Agree who will respond, how to respond and how to end the interaction.
- record message** If possible, do this within pupil's sight (or hearing). Press record button; speak message into microphone (you might want to ask a pupil to record the message rather than an adult); release button. Press top of device to check the recording and volume.
- position
BIGmack** It should be made as easy as possible for the pupil to reach and press. Decide if it should be to the right, left or midline and whether it is best to mount it at an angle (using a Maxess mount). Decide if it should be visible – helping pupil understand the effect of actions.
- objective** Perhaps the message is to attract attention or initiate a conversation: "Come here please", "Hey, look at me!"; or requesting something: "More crisps please", "Do it again". The last message may be too advanced for this level of communication as it is an example of using a person as an agent for something else rather than for attention and interaction.
- other options** A remote switch can be attached to the base of the device so the pupil does not need to press the top of the device to activate it. Also a cable can be attached to it so that it operates a battery-powered toy at the same time as a message is played (or without a message). However, this can be confusing – so you might choose not to play a message in this case.

If a switch is to be used as well, to operate mains operated devices or toys, it is helpful to buy these in a different colour. Thus they can be easily distinguished. If the pupil has visual impairment try attaching different materials to the surface of the device.

More examples of using talking switches like the BIGmack are given in the **Unit 8 - Developing switching skills**. At this level of communication the emphasis is on increasing social interaction.

Key skills and equipment

The key skills for the above example are the ability to:

- record a short single message on a BIGmack (or equivalent)
- attach switch to BIGmack for remote activation
- liaise with other staff member (or parent, or other pupil) to co-ordinate response to message produced by BIGmack
- adapt BIGmack or switch surfaces to enhance tactile or visual display

The key equipment is:

- BIGmack or equivalent single message device
- switch for attaching to BIGmack, if required

Example 2d – Focused attention: ultraviolet light / black light

UV-A (or 'black') light offers an alternative to multi-sensory rooms, which generally consist of bright colours or are entirely white. A UV-A light area might be cordoned off within a multi-sensory room or housed in a separate room. Black lighting and dark rooms are not just at opposite ends of the lighting spectrum from multi-sensory environments. They also tend to afford different learning opportunities (see Longhorn, 1997 for examples).

The UV-A light source itself is not of interest: rather the fluorescent effect it has on objects such as fluorescent bean bags, hoops and balls and many other items. Again it is essential to start with the curriculum rather than with the UV-A light. First identify which aspects of the pupil's individualized educational programme might be assisted using UV-A light.

set-up Dark room, with UV-A light on. Teacher and pupil each hold (or touch) an end of ordinary transparent plastic bottle containing three fluorescent balls. As each pulls their end of the bottle the balls roll back and forth.

objective Above example to encourage turn-taking and eye-hand co-ordination: especially useful if little residual vision.

Health and Safety note It is vital to obtain the agreement of everyone who might have an interest before using UV-light. If considering using UV-light sources ensure that advice is obtained from local authority health and safety officers, who may wish to seek advice from Medical Physics departments of hospitals. This is to ensure that the correct source of lighting is obtained, that diffusers or shades are fitted correctly and that there is no possibility of the light source causing damage. Although the form of UV-light that should be used is Type A it is best to check before purchase. Also ensure that a diffuser is fitted. Having made all these checks, check with health and safety once it is purchased, diffuser fitted and sited where it will be used.

Note too that although any one pupil may receive little exposure, over the years staff may be working in that environment for much longer, accumulating greater exposure.

Example 2e – Improving eye-hand co-ordination

set-up As above but using fluorescent plastic skittles in different areas of visual field.

objective To improve eye-hand co-ordination, check out effect of movement can be worked on using fluorescent skittles.

Key skills and equipment

The key skills for the above examples are the ability to:

- consult and comply with relevant Health and Safety legislation and local representatives regarding UV light sources
- monitor and maintain use of equipment to comply with legislation

The key equipment is:

- UV-A light source
- fitted diffusers
- fluorescent toys

Example 2f - Toys and early learning

Many battery-powered toys can be adapted for switch operation, by fitting inexpensive battery adaptors (see **Unit 8 - The development of switching skills** for detailed instructions). With the battery adaptor in place, specialized switches can be attached. Then, even pupils with severe physical disabilities can have active control over their environment, and play with many of the same toys as other pupils.

Unit 8 also includes many examples of battery toys being used in functional communication settings. In this approach the communication and learning is the focus, not the toy itself. The toy is only a means to an end.

Example 2g - Operating electrical devices and appliances

Often it is even more motivating than controlling battery toys to be able to switch on 'grown-up' appliances. These are usually powered by mains electricity rather than batteries. So a device called a mains switcher or controller is needed. The most effective situations are functional, fitting in with family or group day-to-day activities: switching on a lamp or hairdryer, cassette player, TV, fan, food mixer, microwave oven, Hoover etc, that will then be used. Group activities include switching-on music for a game or song.

set-up Choose an activity that will fit in with the pupil's IEP. For example, a foot spa might be activated to receive a massage. Disco lights, bubble column, travelling light tube, sound making activity or other might be switched on in a multi-sensory room.

mains switch unit A device that connects between mains operated appliance (disco lights, cassette player, fan etc.) and pupil's specialized switch. Rather than the pupil having to fiddle with an ordinary switch their preferred switch can then be used.



controlling a cassette player with a switch

objective To involve the pupil in controlling the ordinary events that take place and in which he or she is involved.

other considerations Some mains switchers, such as the PowerLink 2, can be operated in momentary (appliance on so long as input switch activated), or timed (appliance stays on for chosen length of time after switch release), or latched modes (appliance toggled on or off on each switch press – like an ordinary light switch).

Key skills and equipment

The key skills for the above example are the ability to:

- convert battery-powered toy(s) for use by pupils who cannot access the ordinary switch
- use mains switching device to allow pupils with physical difficulties to operate equipment in multi-sensory room or standard electrical appliances (e.g. fan, anglepoise lamp, radio)

The key equipment is:

- equipment in multi-sensory room and / or
- battery-powered toy(s)
- battery adaptor(s)
- plus: Mains switcher (e.g. PowerLink 2) and mains-powered equipment
- selected switch(es)



switches in a multi-sensory room

Example 2h - Exploring through sound

For teachers working with learners who find it difficult to make sense of sound a sensory room can bring stories to life. For example a water theme can be created using lighting in shades of green with dolphin and whale sounds created.

set-up	SoundBeam used in multi-sensory room with its range control adjusted so that its sonar beam (it works like a bat sending out sound to bounce off things in its path) picks up particular movements the pupil makes, e.g. lifting an arm or whole body movement. When movement is detected SoundBeam produces music using an electronic keyboard.
objective	To encourage the pupil to explore and to move parts of the body. The necessary movement may be as great as dancing or movement of only a few centimetres, even that of a twitching finger.
other objectives	SoundBeam has much potential e.g. to transform stereotypical behaviours often displayed by blind pupils into productive movement (Ockelford, 1993).
note	Because the device is so sensitive and because no physical contact is necessary, no feedback is given aside from the music. It is therefore not always clear to the pupil that his or her own movement produced the sound. It would be as if you walked into a room, snapped your fingers and for some mysterious reason the overhead light came on.

Key skills and equipment

The key skills for the above example are the ability to:

- encourage movement using SoundBeam, adjusting range and other controls
- establish baseline movements and distinguish these from voluntary control

The key equipment is:

- SoundBeam
- electronic keyboard

Example 2i - Exploring through touch

Visually impaired pupils may prefer using touch and feel to explore and discover. Activities that use technology to support vibration, bells, or noises may prove useful additions to the usual range of sensory and tactile experiences.

A difficulty with some 'all-in-one' commercially available systems like Pethna, Phydo and Electrical Activity Centres (and even Snoezelen or multi-sensory rooms) is that it may be hard for the pupil to generalize outwards from play experiences, associated with this 'magic box', to a realization of their own power to use technology to control a range of different things. Therefore the pupil should be presented with the opportunity to explore a variety of different experiences, using technology, instead of always using the same 'set piece'.

Scenario 3 – Pre-intentional: Proactive

On finding an activity the pupil can do – such as pressing a switch to operate a battery toy, it is tempting to extend that skill and buy more toys to operate in the same way. So, if she can activate a switch to make a toy racing car go why not attach the switch to a snorting pig? Then to a yapping puppy? Great fun but where is it going in terms of the curriculum? The likelihood is that the pupil will soon lose interest in using a switch to operate most or all forms of toys. If the pupil begins to appear intrinsically motivated (i.e. motivated to try the switches to explore independent control as much as to obtain an ‘extrinsic reward’) it is time to move on. Otherwise, repetition could impair rather than help learning. Introduce tasks to do with a switch or switches which are more varied and more demanding.

One possibility is to invest in a range of different toys and other devices that can be operated by switch(es). In practice these need to be presented in as varied and interesting ways as possible. At this stage a range of toys might help to chart preferences, helping to assess:

- Is sight being used at all, or is hearing or touch used most?
- Does most stimulation occur with toys that (a) make a noise; (b) move; (c) feel interesting; (d) look bright and colourful?

The emphasis should move towards generalizing any success gained with switches, toys, and cause and effect towards independent control over the environment. To avoid boredom, sessions need to be short, varied and rewarding. A return to talking switches might be in order with voice output messages for communicative play. Instead of being used once only to ask for the activity, they could be used repeatedly within an activity to ask for a little bit of the reward (e.g. “more” is used for each sip of drink) or a few seconds of puppet play or tickling.

Example 3a – Linking touch, feel and control

At this level of communication technology should continue to be as ‘contingent’ as possible. That is, it should be as closely linked as possible to the object or activity it represents. Switches that themselves do something (*internal reward switches*), such as musical switches, vibrating switches, switches that light up, stacking cone switch, or shape matching switch, are a useful starting point.

preparation	Switches that do not have their own internal ‘reward’ can be made easier to associate with an effect if they are distinguished one from another, using ‘touchy / feely’ materials. For example, attach a furry surface to a switch that will operate music. Attach a knobbly-surfaced switch that operates a vibration device. (If you know the pupil likes the effect and know a covering material is disliked, do not attach that material).
objective	Avoid confusing the pupil with the same switch doing very different things. For a visually impaired pupil, often only the switch itself is ‘real’ – a teacher unplugging one device and plugging in another is not seen. If the different tactile surfaces are kept consistent, the pupil may associate what is essentially an arbitrary connection between switch (or furry surface) and the effect it produces.

Example 3b – Functional touch

The difficulty with associating an arbitrary surface – furry equals music – is in relating this understanding to the real world, or to interaction with people. Some other association is needed; an association that once learned, will help the pupil make new associations. Most educators interested in this ICT Unit will be aware of objects of reference (often known as signifiers or by one of a number of other titles). The nearest thing to ‘technology-supported signifiers / objects of reference’ may be to use PalPads or Taction Pads.

preparation	Record a spoken message familiar to the pupil into a BIGmack (if using PalPads) or onto one of the squares used to store messages on a VoicePal or VoicePal Pro (if using Taction Pads). The message should have a clear link to an object with which the pupil is familiar and in which he or she is interested. Next attach a PalPad or a Taction Pad to the object e.g. the empty crisp packet . Connect its lead to the socket in the BIGmack or VoicePal.
objective	To make switches themselves into meaningful objects, with an effect made meaningful in a clearly related way. Whenever the pupil touches the crisp packet with its taction pad, the message is spoken; pupils with even limited reach / touch / grasp may use PalPads or ‘Taction Pads’ to make familiar objects ‘talk’.
related activities	attach to cup: message – “let’s have a drink” on crisp packet: message – “time for a snack” on square of towelling: message – “I go swimming”

Note: Technology is using input from touch and giving output in sound. The system is helping concept development and interactive communication. Programmed messages should be functional and matched to the pupil’s immediate interests and motivations. To be functional and interactive, messages will usually be short social phrases, not single words.

Key skills and equipment

The key skills for the above examples are the ability to:

- use switches which offer direct reinforcement
- adapt switch characteristics (visual, tactile, auditory)
- store spoken messages using e.g. VoicePal Pro or BIGmack (with Flexible PalPads)

The key equipment is:

- any of: musical switch, vibrating switch, stacking cone switch etc
- flexible PalPads with such as BIGmack or Taction pads + VoicePal Pro
- objects of reference

Using computers

Some computer software may be used to enhance the use of vision, often having certain advantages over more traditional materials. Bozic et al (1993) suggest two main reasons for this superiority. First, computers maximize the visual environment for the learner (albeit a rather narrow environment); second, with suitable software, opportunities are provided for developing and practising visual and perceptual skills, with immediate feedback given on the learner’s actions in the same place (the screen).

Like a TV screen a computer monitor is backlit. This means the image does not require ambient light for it to be seen, and the light source cannot be blocked by the pupil coming too near to the screen. Brightness, colour and contrast can all be varied to suit individual pupils. In addition to these **hardware controls** specialized software can make use of these features. Tasks for pupils to carry out can be presented with increasing complexity.

So, if computers bring all these advantages why not start using them with pupils functioning

at earlier levels of communication? Although computers do bring advantages they also have disadvantages. Throughout this Unit we have emphasized the need to use technology to enhance the pupil's individualized curriculum. Computers are not easily portable. Different activities within the same application may require very different skills, and it is not always apparent what these skills are until they are tried.

Example 3c - Improving visual skills

set-up	PC and pupil positioned to see screen single switch (preferably one already used in other situations) switch interface to PC
software	Sensory – <i>Build It!</i> Each switch press builds a step in a simple picture.
objective	To improve visual attention to shape, size and colour, visual tracking, scanning in each direction, and directed attention – can also be used to extend turn-taking, joint activities such as <i>Attending Together</i> , <i>Look at This!</i> and <i>Make it Change!</i> (see Bozic & Sherlock, 1996).
other options	Sensory – <i>Build It!</i> is one of many applications that can be used by a single switch user. Others include <i>Build It! – Patterns</i> and <i>Build It! – Scenes</i> , <i>Sensory – Look Here!</i> , <i>SwitchIt! Pictures</i> .

Key skills and equipment

The key skills for the above example are the ability to:

- connect switch interface to PC; attach a single switch to interface
- install and set up visual stimulation software operated by a single switch and place short cut on desktop
- adjust level of difficulty of visual stimulation software (number of presentations, number of switch presses, visual display to suit different pupils)

The key equipment is:

- PC
- switch interface e.g. DJ Switch Interface, SwitchBoard, SwitchBox
- visual stimulation software
- appropriate switch

Extending switch use

There exists a range of software that offers single switch access. These include the *SwitchIt!* series and *SwitchOn* series. Another example is *LäraMera* software. When deciding on which software to buy and to try, note that although the software will work with a single switch, different programs may work in different ways and therefore make different cognitive and perceptual demands on the pupil. Choosing isolated programs from different designers may then become problematical (scenarios in level 4 below discuss two programs that help to resolve this difficulty and achieve greater consistency).

Because different staff may well be working with the same pupil, it is helpful to have some way of recording exactly what steps to take with the pupil. Below we describe an example followed in one school with one pupil:

- going to the computer (picture of pupil at computer)
- show me my signifier (object of reference), so I know what is going to happen
- tell me we are going to the computer – I go in my buggy
- make sure what you want me to use is ready – computer on, program selected, space for buggy so I can reach the screen
- programs I like: *Just Look*, *SwitchIt! Patterns*; *SwitchIt! Pictures*

- I like a dark background, I like to have the light off so the screen is really bright
- keep reminding me to 'Wait', 'Look', 'Touch' (use my name)
- single words help me to concentrate
- I need a bit of help from you to keep me focused – my session lasts about 15 minutes max.
- if I don't settle into good concentration, please don't keep me there
- record how I got on, with the day sheet in my classroom
- please write down if I watched the screen, how long for and if I was noticing that when I pressed the switch something happened. Also note length of session and how I was

The above description illustrates an important point. Preparing the pupil to use a computer involves much more than seating, positioning, selecting a switch and suitable software. You will have noticed that the instructions are written in the first person, as if the pupil had written them (she cannot). This format follows the framework of a Personal Passport – readers interested in this approach may wish to refer to Millar & McEwen (1993).

Key skills and equipment

The key skill for the above example is the ability to:

- write a script for others to follow that describes how to use a program with a pupil

The key equipment is:

- paper and pencil!

Example 3d – Integrating mobility, communication and learning

The Smart Wheelchair has been designed so that pupils with severe impairments, who may be unable to use or have difficulty with controlling conventional electric wheelchairs, can achieve more effective control of powered wheelchairs.

Using its sophisticated tools and simple interfaces the teacher can increase the pupil's access to the curriculum, gain independent mobility and improve quality of life. Not only does the pupil have power to move unaided, the chair also facilitates communication and learning. The Smart Chair is an example of independent control giving immediate access to functional communication and movement, using a single switch or a range of other access devices.

Note too that the Smart Chair is an example of technology that can be applied at the previous level i.e. Pre-Intentional: Reactive, as well as throughout the age and ability range. Some schools use the chair as a resource shared amongst several pupils.



Pupil operating Smart Wheelchair using switch(es) instead of joystick.

Key skills and equipment

The key skills for the above example are the ability to:

- obtain further information about the Smart Wheelchair by browsing the CALL Centre Web site – callcentre.education.ed.ac.uk
- identify pupils who might benefit from using the Smart Wheelchair

The key equipment is:

- PC with Web browser and connection to the Internet

Scenario 4 – Intentional: Primitive

For those who have reached this level of communication and who have enough vision, it may be possible to introduce using pictures. Alternatively, or even in parallel, more work may be needed on developing use of objects of reference before gradually moving towards the use of pictures. Learning to recognize pictures may come naturally through developing maturity but the following activities may assist. First, one needs to build up receptive knowledge of pictures, before expecting expressive use of pictures. Games of 'hide and seek' with pictures and 'Snap' are helpful introductions, with a facilitator pointing out pictures and symbols while talking to the pupils.

Transition to pictures

Later stages of developing picture recognition can be incorporated into curriculum games:

- matching familiar objects with pictures
- matching pictures (snap, lotto)
- indicating pictures when asked by the name of the picture (using the name of a picture in another communicative context e.g. asking someone else for it, as in 'happy families' card game)
- indicating pictures when asked by function of the object (which one can cut toast?)
- indicating pictures that are associated with each other (e.g. toothbrush and toothpaste pictures)
- using pictures to talk about things e.g. sequencing, like toast, butter, jam, and indicating which is done first, next, etc, in the context of a conversation, e.g. with Mum, in the kitchen.
- asking for things by indicating a picture. Giving the wrong thing and waiting to see if pupil notices and asks for the right thing

Example 4a – Single message, many settings

BIGmacks and equivalent single message devices can be used in many different communication situations. Good situations for single message voice output device use include story reading, song participation, socially functional messages and messages attached to games or specific activities.

story reading and songs	Choose a story book with a repetitive line, such as Spot's Easter story with the line "no, no eggs there". Record the line into a BIGmack.
variations	Vary the stories and songs used, to build up a repertoire. Also return frequently to the same ones again and again. For those with enough vision 'clue pictures' can be attached to the top of a BIGmack or other communicator such as Step-by-Step (see below). These help to reinforce picture recognition, rather than leaving the surface blank, pictures can be quickly drawn and stuck on with Sellotape.
social messages	record messages such as "more" to be used at snack or drink time, after each sip or mouthful. The old favourite "XXXX, come here please" can give confidence in recalling someone while 'practising' being left a little more alone at times.
message for games	"turn the page" is a useful message to record to accompany story reading, or try recording "my turn" for use in games.

Note: empowering messages *must* result in immediate response each time the device is hit!

Key skills and equipment

The key skills for the above example are the ability to:

- use a single message voice output device to record repetitive lines in story books and social messages
- identify and record empowering messages such as “turn the page”

The key equipment is:

- BIGmack or equivalent e.g. One Step
- story book with repetitive story line

Example 4b - Switching on to stories (see Parks, 1999)

It is not always easy for a pupil with severe communication impairment, especially one who is visually impaired, to take an active part in story situations. Parks (1999) acknowledges that stories can be appreciated at many different levels. He has used successfully a ‘call and response’ technique with a Step-by-Step Communicator to emphasize rhythm and musicality while reading the well-known ‘Christmas Carol’ story by Dickens.

preparation A voice output device which stores messages separately, each activated by a switch press, is used to record a version of a well-known Christmas story. The first section is shown below. For the complete story line refer to the original article.

equipment Step-by-Step Communicator to record story lines in turn. The first time it is activated the first recorded message is played, the second time the second message and so on. Because it is wedge shaped it can be easier to activate. Each of the lines shown below is recorded on the Step-by-Step.

Call:	Response:
Scrooge is my name	Scrooge is your name!
Loads of money!	Loads of money!
You want presents?	We want presents!
Very funny!	Very funny (said sarcastically)
Christmas?	HUMBUG!

Everyone shouts out the final line “Humbug”. Alternatively, someone can activate a BIGmack switch with the word “Humbug” recorded on it.

There are many variations on this theme. For instance, instead of recording all of each line, the second part could be recorded, or only the first part of the line. Both promote turn-taking in conversations and initiating conversations.

Example 4c - Consolidating messages

preparation Use a BIGmack to teach and practise each new message and associated object symbol or object of reference (signifier). This is also a useful technique if introducing a voice output device on which more than one message square can be activated.

Key skills and equipment

The key skill for the above example is the ability to:

- co-ordinate group story session using call and response technique with Step-by-Step communicator, scripting messages and storing on device.

The key equipment is:

- Step-by-Step communicator

Example 4d - Consistency in switch access

In the discussion of scenarios in level 3 (see above) we indicated that it is possible to achieve a greater degree of consistency in using switches. *SwitchIt! Maker* gives the teacher more complete control over what is presented on screen, how it is presented and how it is accessed by switch.

preparation Use pictures from clip art, or use a scanner to scan images into the computer, or a digital camera to take pictures on a walk or in an activity. Ensure that the pictures show as little visual clutter as possible. Create a sequence of pages in *SwitchIt! Maker*. Use the software to decide how the images will be sequenced on screen, via a succession of switch presses.

software *SwitchIt! Maker* software

other options This is another example of a framework program. The software is made up of a **toolkit**, you configure it to meet your requirements, to suit the needs of the pupil and curriculum area being addressed. It is appropriate at this level of communication and also at levels 5 and 6 (possibly for level 3).



creating a switch activity in SwitchIt! Maker

Key skills and equipment

The key skills for the above example are the ability to:

- import images into *SwitchIt! Maker*, via clip art, digital camera or scanner
- assign the images to pages accessed in sequence by switch presses, using *SwitchIt! Maker*

The key equipment is:

- *SwitchIt! Maker* software
- clip art, digital camera or scanner

Example 4e - Using a touch screen

Pupils who are able to move one or both hands into midline with ease may be assisted to select items using a touch screen. Especially if the pupil has a visual impairment but whose vision is still sufficient to see images on screen, touch screens may be of some help. They offer a direct link between visual presentation and the effect of touching. However, as the note below shows, they can present problems of their own.



using a Touch Monitor

preparation PC with either a Touch Monitor or a Touch Screen add-on attached (and calibrated in the settings panel), and software already launched. Talk your pupil through activity.

equipment touch screen (see **Unit B - Organizing your resources**).

objective helping pupil to wait for your verbal prompt to touch screen initially, then remove prompts for more independence; to isolate pointing finger and to encourage pupil to 'watch', 'listen', 'point' and 'touch'.

Note: Although touch screens seem an admirable idea, allowing a more direct association between what the pupil does and the effect on screen, in reality it is not always that simple. Try any software yourself before trying with the pupil. Note that any particular piece of software, even different activities within the same piece of software, may appear to respond differently. If so, the software may be increasing not decreasing the cognitive demands on the pupil. To help plan work and achieve consistency, devise a recording system to evaluate the use of the software. Two examples are given overleaf.

Key skills and equipment

The key skills for the above example are the ability to:

- use a touch screen (and set calibration if required)
- adjust features such as area activated by touch, whether single or double click by touch
- identify single switch software to use with touch screen; use with one pupil

The key equipment is:

- touch screen – i.e. Touch Monitor (built-in), or an add-on window
- single switch software or other if preferred

Software to use

It is important to evaluate the software you have, so that everyone is clear about the purpose of using the program. It is also extremely useful to have a record of equipment use for individual pupils. Then everyone working with that pupil can use the equipment in the desired manner and record progress consistently.

The two following pages show samples of software record sheets.

Scenario 5 – Intentional: Conventional

By this stage and possibly earlier, switches begin to offer not only cause-and-effect opportunities but also the chance to improve the pupil's timing of switch activation. This in turn opens up a range of opportunities, but it does mean that the software needed to address this more complex skill needs to be chosen with timing in mind, rather than simply extending cause-and-effect understanding.

Using a computer with a touch screen (Touch Monitor or add-on window clipped to a normal monitor) is an option that becomes more consistent and viable to a pupil whose functional communication is at this level, although some success may be obtained when using it with pupils within level 3.

Example 5a – From cause-and-effect to switch timing

For switch users, focus moves away from cause-and-effect using computers more towards improving timing. This stage requires motor skills to operate the switch as well as cognitive skills to understand the task, as the pupil has to wait until the right time before pressing the switch.

preparation	PC with appropriate switch and switch interface. The pupil should have already carried out functional activities relating to the objects depicted on screen with this software.
software	<i>SwitchIt! At Home</i>
objective	Relating functional activities carried out with real objects in and around the home to their two-dimensional presentation on screen. It is important to have some understanding of whether a pupil's vision will be sufficient to (a) see what is on screen, and (b) associate what is on screen with the real object it refers to. There are many visual perceptual disorders which can make this apparently simple task perceptually challenging. Nevertheless, this and related programs can help to identify the effect of some visual perceptual disorders.
other options	Introduce timing of response in addition to cause-and-effect. It may be helpful to stick with one suite of software to reduce the chance of the pupil being confused by different styles of presentation e.g. the LäraMera suite uses a consistent presentation style throughout – <i>Step by Step, On the Farm, Learn More through Games</i> etc.

Note: because different software, and even different activities within the same software, may operate in different ways, care needs to be taken so as not to make the task of accessing the computer cognitively more complex than the pupil can cope with. It can be helpful to introduce a recording system that all staff can use. This way any advantages of particular software can be noted and communicated to other staff.

Key skills and equipment

The key skills for the above example are the ability to:

- relate functional activities to two-dimensional representations on screen
- focus on switch timing as opposed to just cause-and-effect
- choose software with consistency of interface to reduce confusion

The key equipment is:

- PC, switch, switch interface
- *SwitchIt! Series* of software with emphasis on timing use of switch
- functional activities represented in software images

Example 5b - Introducing 'hot spots'

As we have seen, pupils who cannot access a keyboard, mouse, touch screen or joystick may be able to use a single switch or more than one switch. A number of strategies are then available to allow the pupil to choose what the switch will activate on screen. The simplest is for the teacher to move the mouse pointer between items on screen. Then, when the pupil presses the switch the computer accepts the switch press as a mouse click. Lots of interesting turn-taking opportunities are afforded by this partnership between pupil and helper. Through this means the pupil's timing can be improved. However, choice remains with the teacher / helper.

Hot spots introduce a greater degree of independence. Items are pre-selected and the mouse pointer automatically moves, or scans, between hot spots. An item 'under' the hot spot is then selected by activating the switch.

preparation	Obtain software with ready made hot spots. Begin using it in turn-taking mode, i.e. the helper moves the mouse pointer but the pupil activates switch to choose.
equipment	see below
objective	Consolidating 'cause and effect', timing and choice in partnership with pupil. Many factors will affect how easily a pupil effects the transition to some form of independent choice making. For instance, sensory impairment will dictate the size, contrast, number, complexity and arrangement of images on the screen. Physical impairment will indicate size and position of switch, and the delay necessary between mouse pointer movements. Cognitive impairment will affect whether two-dimensional images are understood, time needed to process images, the need for auditory or visual presentation, or both.
other suggestions	See also Unit 7 - Accessing technology and Unit 8 - The development of switching skills .

Key skills and equipment

The key skills for the above example are the ability to:

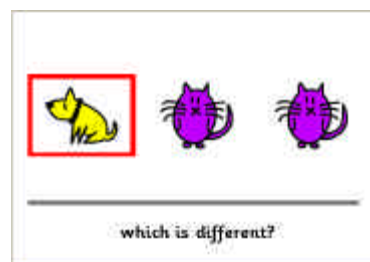
- introduce turn-taking with the mouse pointer under your control and a switch controlled by the pupil
- focus on switch timing as well as choice making
- choose well contrasted images against an uncluttered background

The key equipment is:

- PC, switch, switch interface
- Edmark Thinking Things 1 or equivalent 'point and click' software

Example 5c - Making your own scanning activities

A few programs allow you to design your own hot spots. This can be a demanding process, so one option is to begin by using a simple program with relatively few features. *ChooseIt! Maker* is a simple editing program for building choice-making activities for switch users. You can add personalized pictures, symbols, and sounds including speech, and present them on-screen for switch users to scan through before selecting.



ChooseIt! Maker software

preparation	Check that the symbols and images to be used on screen are familiar to the pupil, that they are clear, uncluttered and few in number.
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equipment	see below
objective	To pave the way for independent selection of items on screen.
other suggestions	Begin by using a multi-sensory approach, for example in the diagram above, attach a 'bark' to the dog. Ensure the method used to highlight each image can be seen by the pupil.

Key skills and equipment

The key skills for the above example are the ability to:

- produce images (pictures, symbol, line drawing etc.) using *Chooselt! Maker*
- set up two hot spots

The key equipment is:

- PC, switch, switch interface
- *Chooselt! Maker* software

Example 5d - Sales presentations in the classroom

Another effective method for creating images, sounds, special effects and setting up hot spots is to use *PowerPoint*. This application is better known as a business tool used for presenting reports, lectures and sales pitches. A number of schools have used *PowerPoint* to produce talking book templates (see Scenario 6).

preparation	First become familiar with the basics of <i>PowerPoint</i> by following the tutorials supplied with it.
equipment	PC, switch, switch interface or touch screen
objective	Create hot spots on <i>PowerPoint</i> display, each one producing a different effect. Operate by switch, touch screen or mouse click.
other suggestions	Explore setting up template slides with foreground and backgrounds tailored to the needs of different pupils.

Key skills and equipment

The key skills for the above example are the ability to:

- follow tutorial for *PowerPoint*.
- produce a *PowerPoint* presentation with two hot spots activated by switch, mouse click or touch screen.

The key equipment is:

- PC, switch, interface, or touch screen
- *PowerPoint* software

Example 5e - Talking books

A number of talking books are available on CD-ROM. They allow pupils to explore images on screen, clicking on hot spots for various actions (using a mouse or switch with switch interface). Although the story lines and images used in many of the commercially available talking books may be too complex, less complex books or pages from books may be suitable e.g. Sherston Software's Oxford Reading Tree series.

preparation	Load and explore one of the ORT series, or equivalent, on CD-ROM.
equipment	PC, switch with interface, software
objective	In discussion with pupil, move mouse pointer to different images with pupil having to click to activate the image.

Key skills and equipment

The key skills for the above example are the ability to:

- load Talking Book CD-ROM
- set up switch and interface; take turns with the pupil

The key equipment is:

- ORT Talking Book or equivalent
- switch with interface, PC

Example 5f - IntelliTools - IntelliKeys or equivalent overlay keyboard

IntelliTools have a family of products for use with their IntelliKeys overlay keyboard (which includes two switch sockets). Access to such a keyboard may be provided to pupils with impaired vision, using tactile images, possibly incorporating real objects or parts of objects, such as objects of reference, Thermoform representations, Moon characters, pictures etc. Overlay activities may be designed using a combination of *IntelliPics*, *Overlay Maker* or *ClickIt!*

preparation	Use <i>IntelliPics</i> to create a two-picture (or real object etc) activity and record sounds to go with each of the representations. Use <i>Overlay Maker</i> to create the overlay so that it is 'recognized' by IntelliKeys.
equipment	<i>IntelliPics</i> , <i>Overlay Maker</i> , or equivalent software, and IntelliKeys or equivalent hardware
objective	Become familiar with manipulating images, importing, creating images and attaching effects such as sounds.
other suggestions	Explore additional IntelliKeys overlays such as those designed for Living Books series.

Key skills and equipment

The key skills for the above example are the ability to:

- create and edit overlay grids
- manufacture keyboard overlays incorporating tactile images

The key equipment is:

- IntelliKeys or equivalent such as Discover: Board
- *IntelliPics*, *Overlay Maker*, *ClickIt!* or equivalent overlay-making software

Scenario 6 – Intentional: Referential

One of the many considerations when working with a pupil who has sensory, physical, cognitive and communication difficulties is that these disabilities all interact with each other. Consider, for example a pupil with severe visual impairment, seeking improved literacy but showing difficulty in developing Braille or keyboard skills. It is tempting to assume that difficulties in typing and writing are a result of physical or sensory impairments, or both; e.g. the inability to see, lack of sensitivity in the fingertips, lack of interest. However, mitigating the effects of physical and sensory impairments may offer only a partial solution. Attention also needs to be paid to underlying literacy difficulties which may be complex (as this text is not intended as a tutorial on early literacy, we do not pursue what these issues might be). How might these be addressed? You need to resolve three main problem areas; identifying how the pupil will:

- see (and / or hear) what is on screen: issues of cursor size and speed of movement, foreground and background colour, auditory prompts
- select the items on screen
- know what to write and then write it

Problem solving is much more complex when multiple impairments are involved. At this level of communication pupils are on the cusp of moving towards developing a formal language system. But the very complexity of impairments may lead you to embark too quickly on a programme of literacy.

Example 6a – Using an on-screen grid

Clicker and *Writing with Symbols 2000* are two examples of framework programs, which both offer useful routes to introduce reading and writing to early learners. Instead of having to become familiar with a keyboard, words and phrases can be clicked on and pictures, symbols, photographs, and illustrations used to support reading and writing. For pupils with low vision, clear, well-contrasted images can be introduced, and foreground and background colours adjusted to suit.

preparation	Explore sample grids in grid-making software.
equipment	Grid-making software
objective	Become familiar with setting up grids.
other suggestions	Many examples of grids can be downloaded from Web sites. You might wish to investigate: www.cricksoft.com www.clickergrids.com www.widgit.com and www.inclusive.co.uk

Key skills and equipment

The key skills for the above example are the ability to:

- complete tutorial for *Clicker* or equivalent
- explore sample grids
- create a grid with two to four images
- set up foreground / background colours to suit one pupil with visual impairment

The key equipment is:

- *Clicker 4* or *Writing with Symbols 2000*
- user interface suitable for pupil (e.g. touch screen).

Example 6b – Recording sound and adding to grid cells

For pupils with low vision or visual-perceptual difficulties it can be helpful to add auditory prompts to cells. This can be done either using sounds supplied with the software or by recording your own sounds.

preparation	grid-making software as above
equipment	grid-making software and microphone (for access see below)
objective	to record sounds and attach to grid cells

Key skills and equipment

The key skills for the above example are the ability to:

- use a microphone to record sounds, adding to cells in grid-making software (examples of digitized sounds are included in grid-making software e.g. sounds of animals – additional digitized sounds can be obtained or recorded by yourself)
- use the right mouse click to activate sounds
- replace right mouse click with switch

The key equipment is:

- *Clicker 4* or *Writing with Symbols 2000*
- microphone, PC equipped with a reasonable sound card, e.g. SoundBlaster
- switch, with interface that allows right click of mouse to be emulated

Example 6c – Recording speech and adding to cells in grid

If not already tried in Example 6b, record your own speech or the speech of another pupil and add it to appropriate cells in your grid. With pupils who are early communicators it is important to use digitized speech as opposed to the computer's synthesized speech. Using a co-operative peer provides an additional 'me too' factor.

preparation	grid-making software, as above
equipment	grid-making software, microphone (for access see below)
objective	to record speech and attach to grid cells

Key skills and equipment

The key skills for the above example are the ability to:

- record speech appropriate to individual cells in grid
- use the right mouse click to activate recorded speech
- replace right mouse click with switch

The key equipment is:

- *Clicker 4*, *Writing with Symbols 2000* or *Inclusive Writer*.
- microphone, PC equipped with a reasonable sound card, e.g. SoundBlaster
- switch, with interface that allows right click of mouse to be emulated

Example 6d – Auditory scanning

For pupils with some vision, enhancements to contrast and size, reduction in image complexity and the number of items on screen can prove helpful, as can the addition of sound cues. There remain some pupils who, because of severe visual impairment or poor visual processing skills, cannot see or interpret visual presentations on screen. If they also have physical access difficulties they may not be able to use a switch to scan an array of items and select from that array.

Note: Using technology to scan and select items is described in detail in

Unit 8 – The development of switching skills. Scanning requires the pupil to have a number of skills, e.g. understanding the relation between what is on the array (for example a set of symbols) and the associated spoken message activated by hitting the switch, and activating the switch at just the right time.

For a few pupils with severe visual impairment and physical access difficulties, auditory scanning is sometimes a better choice than visual scanning, even though the temptation is to make best use of a pupil's residual visual function. Clues in favour of trying out auditory scanning include:

- visual skills: pupil good at seeing static, well-contrasted objects; has difficulty switching visual attention between tasks
- auditory skills: good hearing; good auditory processing; able to attend to and follow several conversations in different settings; able to deduce from auditory clues alone what is happening.

preparation	Use the grid designed in Example 6c or create a new two-cell grid. Alternatively, if available, use a voice output communication aid with auditory scanning facilities (e.g. AlphaTalker). Set up auditory scanning with digitized (recorded) speech sound prompts for each cell.
equipment	Grid-making software, microphone (for access see below)
objective	To record speech and attach to cell grids; to apply auditory scanning.

Key skills and equipment

The key skills for the above example are the ability to:

- set up and investigate auditory scanning
- set scanning rate and type to suit
- understand basic issues involved in auditory scanning

The key equipment is:

- grid-making software offering auditory scanning, or voice output communication aid
- switch, with interface
- microphone and sound card

Practical teaching activities

Please choose and complete one or more of the following activities:

1. Using a multi-sensory environment to promote interaction

Identify key factors in a successful multi-sensory environment. You might consider factors to do with the pupil, the curriculum, with the technologies and how they are arranged, in the way observations are recorded and how you will communicate your results to other staff.

If the pupil can operate a switch, set up one item of equipment in a multi-sensory environment to be operated by a mains switching device connected to the pupil's switch.

2. Advantages and disadvantages of using a dark room with UV-A lighting

Discuss the issues you would take into account before using a dark room with UV-A ('black') lighting. Note what steps you would take to follow up these issues. Assuming that you went ahead with using this lighting and dark room, discuss areas of the curriculum you would address and how you would go about this.

3. Broadening out versus moving up a step

Describe five activities that make use of switches to control battery-powered toys and electrical appliances (at least two for each of toys and appliances). Discuss how you would compensate for visual and hearing impairment in each activity. You may wish to consider specific effects of each sensory impairment on each activity.

4. Using a BIGmack or other talking switch device

BIGmacks and most other talking switch devices come with a shiny plastic surface. How might this appear to a pupil with severe visual impairment and cognitive difficulties. Describe how you might adapt the BIGmack so that its message can be associated more effectively in the pupil's mind with what it refers to (e.g. consider low-tech strategies such as objects of reference / signifiers).

5. Visual stimulation using computers

Discuss the pros and cons of using computers to improve functional visual skills, as opposed to more traditional low-tech methods. Compare how well two programs designed for visual stimulation address each of these functional vision skills. Set up one activity for different access options (e.g. single switch). Describe how you would incorporate the results of computer visual skills sessions into at least one area of the pupil's curriculum.

6. Touch screens to access software

Calibrate a touch screen (i.e. Touch monitor or Touch Screen add-on window). Choose one program (which may include one or more activities) to be operated by the touch screen. Open up the 'Settings' panel (possibly in the Control Panel) and describe the settings that can be changed. Discuss the advantages and disadvantages of using touch screens with pupils who have multiple impairments.

7. SwitchIt! Maker

With pictures from a digital camera or clip art, design a simple cause-and-effect activity using SwitchIt! Maker. Discuss what factors you would take into account so that the image could be accessed by a number of your pupils. Describe other activities you might introduce using this approach.

8. Voice output devices in the curriculum

Choose two areas of the curriculum and devise classroom activities using a simple voice output device (e.g. turn-taking in group activities using a One Step Communicator).

9. Scanning and visual impairment

Describe how you would investigate whether visual scanning is an appropriate access method for a pupil who is able to use a switch.

10. On-screen grids

Use grid-making software to produce an on-screen grid which incorporates sound and images.

Appendix 1 - Key resources

Level 1. Pre-intentional: Reflexive

Item name	Comments	Supplier
Multi-sensory low-tech	Alongside item names the letter 'V', 'A', 'T' and 'S' correspond to the main modes of sensory stimulation Visual Auditory Taste Smell	Note that items included in this list are representative examples only. A comprehensive listing would include many hundreds of products.
Activity Mat, Activity Quilt, Feely Mat V, A, T		Spacecraft, TfH
Diffraction tape and other low tech diffraction products V	For example sheets that are made of metallic plastic film with prism patterns	Spacecraft, TfH
Glitter wigs V, T		Joke shops
Glitter make-up V		Art shops, some joke shops
Multi-sensory environments		
Amplifier A	Amplifies small electrical signals e.g. from microphone or tape recorder	Music and electrical shops
Aroma box S	Small unit in which can place smell-producing fluids, used for aromatherapy	Spacecraft, TfH
Bubble tube / column V	Clear plastic tube filled with water. Sits on base with light and some way of producing bubbles, passing upwards through liquid. Filters change colour of light in sequence	Spacecraft, TfH
Diffuser S	For diffusing smells by heat	Boots, Spacecraft, TfH
Digital sampler A	To capture sounds e.g. from microphone. Sound can then be modified e.g. changing pitch, reversing sound	TfH
Effects wheel V	Used in effects projector (e.g. Solar 250) to produce colour moving images. Can have pictures, coloured oil bubbles and produces abstract patterns	Spacecraft, TfH
Fibre optics V	Filaments of glass fibre in narrow plastic tubes. Bundles are attached to a light source, transmitting light along the strands. Small torches with fibre optic strands available in toy shops at around £10	Spacecraft, TfH

Mirror ball V	Large ball covered in small squares of mirror, suspended from ceiling, turns by small motor. Beam of light shone onto it reflected onto walls and ceiling	Spacekraft, TfH
Plasma ball V	Transparent luminous ball of charged particles. Hand or body movement near the surface produces interesting patterns	TfH
Solar 250 effects projector V, A	Uses colour wheels and cassettes to produce moving images. Accessories include such as Crystal Pulse, Crystal Pulse Microphone, Cassette	see under 'Effects wheel'
Shimmering curtain V	Shimmers when light strikes, used for hanging across doorways and walls. Also fibre optic versions, but more expensive	Spacekraft, TfH
Travelling light tube V	Plastic tube with many different covered bulbs – not for handling	Spacekraft, TfH

Level 2. Pre-Intentional: Reactive

Multi-sensory equipment	See above	
Battery-operated toys and equipment	More details in Unit 8 – The development of switching skills	Various
Battery adaptors	Allow battery-powered devices to be operated by external switches (see Unit 8)	Inclusive Technology, Liberator
BIGmack	Talking switch devices, easy to record	Inclusive Technology, Liberator, others
Fluorescent toys, equipment	Many items can be adapted	SpaceKraft, TfH
Karaoke A	Used to sing songs while automatically playing pre-recorded accompanying tunes	Various music and toy shops where cheaper versions available
Loop tapes	Used in telephone answering machines. Record short message, repeat	Electrical suppliers, phone shops
Mains Switcher	Switch interface box which operates between switch and mains-operated devices such as radio, TV, cassette, hairdryer	QED 2000, Various
MIDI Creator A	When connected to MIDI keyboard or sound module, notes can be played by hitting switches, pressure pads etc.	Dawsons Music
MIDI Gesture A	Peripheral device for MIDI Creator. Emits invisible ray which, when interrupted, by movement, creates sounds	Dawsons Music
PowerLink 2 and other mains controllers	Mains switcher type device, also infra-red version available	Inclusive Technology, Liberator, others

Soundbeam A	Small box can be connected to midi-keyboard. Emits ultrasonic beam, when broken, delivers music. Any movement inside the beam triggers keyboard	Spacekraft
Sound Light Wall unit V, A	Links moving colours to changes in sound and frequency input	Spacekraft, TfH
Switching System	Control systems for operating single or multiple effects	Spacekraft, TfH
UV-A light (Ultra-violet light) V	Light beyond normal range of vision – some objects fluoresce when illuminated e.g. fluorescent clothes. Range of products available. Ensure compliance with local authority regulations (check first with Health and Safety department)	Spacekraft, TfH

Level 3. Pre-Intentional: Proactive

DJ Switch Interface	Sits between computer keyboard and user's switch, allowing software to be operated by single switch. Other switch interfaces include Serial Switch Box, Keyboard Switch Box and SwitchBoard	Inclusive Technology, Don Johnston, others
PalPads Flexible PalPads	Flexible option usually chosen as can be moulded to fit around / inside objects. Can then be connected to devices that will accept switch input e.g. BIGmack	QED
Smart Wheelchair	'Intelligent' electric wheelchair can be configured to match individual needs. Not just mobility aid but aids learning and communication	Contact CALL Centre
SwitchBoard	Alternative keyboard with 16 switch sockets built in. Also offers limited mouse emulation	Inclusive Technology
Switch Box	Connects via the keyboard and gives up to 8 switch connections at one time. Software allows different key strokes to be selected for emulation	Inclusive Technology
Taction pads	(Relatively) unobtrusive sensors that can be fitted around actual objects. Activated when area covered by pad is touched / gripped. Connect to Voice Pal	QED
VoicePal	Voice output communication aid to which Taction Pads can be connected	QED
Software to improve visual skills	This is a small selection only	
<i>SwitchIt! Patterns</i> PC Windows, Macintosh V	Software to encourage use of vision, understand cause and effect. Switch presses build patterns on screen which then animate. Default of clear black and white but also different colour combinations	Inclusive Technology

<p><i>SwitchIt! Pictures</i> PC Windows V</p>	<p>Similar to <i>SwitchIt! Patterns</i> but using images of familiar things (e.g. face, person). Complexity of images is variable as is number of switch presses needed to build each image</p>	<p>Inclusive Technology</p>
<p>LäraMera software suite PC Windows</p>	<p>Wide range of options for visual impairment, cause-and-effect, switch timing. The suite is well integrated for consistency of physical access. However, some of the images are complex</p>	<p>Inclusive Technology</p>
<p><i>Maze-On</i> PC Windows V</p>	<p>Framework software package which also has support packs.</p>	<p>Inclusive Technology, Semerc</p>
<p><i>Moves 1</i> PC Windows V</p>	<p>Support resource to go with <i>Maze-On</i>. Designed to help develop visual scanning, tracking of images moving on screen and, with a touch screen, for developing eye-hand co-ordination</p>	<p>Semerc</p>
<p><i>Make it Happen 1, 2 and 3</i> PC Windows V</p>	<p>Combines cause and effect practice using switches with improving visual attention skills</p>	<p>Widgit</p>
<p>Sensory Software Series</p>	<p>Series of software for pupils with complex learning difficulties. Specific programs in suite are listed under names (e.g. <i>Build It!</i>)</p>	<p>Inclusive Technology, Semerc</p>
<p>Sensory – <i>Build It!</i> PC Windows V</p>	<p>Picture building using switches or other inputs</p>	<p>Inclusive Technology, Semerc</p>
<p>Sensory – <i>Build It! - Patterns</i> PC Windows V</p>	<p>Support files for <i>Build It!</i></p>	<p>Inclusive Technology, Semerc</p>
<p>Sensory – <i>Build It! - Scenes</i> PC Windows V</p>	<p>Support files for <i>Build It!</i></p>	<p>Inclusive Technology</p>
<p>Sensory – <i>Listen Hear!</i> PC Windows A</p>	<p>Auditory stimulation program with 90+ recorded sounds. Add effects such as movement. Can be used to produce own sound effects using a microphone and PC's sound recording tools.</p>	<p>Inclusive Technology, Semerc</p>
<p>Sensory – <i>Picture This Knockout & Reveal</i> PC Windows V</p>	<p><i>Knockout</i> lets users change image areas. <i>Reveal</i> can be used to gradually uncover an image encouraging selective visual attention.</p>	<p>Inclusive Technology</p>
<p>Sensory – <i>Splatter</i> PC Windows V</p>	<p>Various inputs such as switches to support colour recognition using patterns and sounds.</p>	<p>Inclusive Technology</p>
<p><i>Touch Here</i> PC Windows V</p>	<p>Pupil moves mouse or uses touch screen to produce effect. Effects with different colour preferences can be produced.</p>	<p>Semerc</p>
<p><i>Look Here!</i> PC Windows V</p>	<p>Inbuilt images e.g. snake, confetti, chessboard, can be moved and modified by changing such as speed, size, colour</p>	<p>Inclusive Technology, Semerc</p>

<i>Builder</i> PC Windows	Encourages use of vision, helps eye-hand co-ordination. Consists of two programs: <i>Builder</i> and <i>Interactive Builder</i>	RCEVH
<i>Just Look</i> PC Windows V	Software providing visual stimulation; user watches as screen shapes build up to a pattern filling the screen, or move across screen randomly	RCEVH
<i>Kinder Suite</i> V	Suite of several disks containing hundreds of programs. Two main aims of improving visual attention and of encouraging visual-motor skills (the latter using a switch)	TGW Software
<i>Screenplay</i> V	Design and replay animated sequences, including those for visual stimulation, finding targets and understanding of prepositions	Widgit Software

Level 4 Pre-Intentional: Primitive

BIGmack	Talking switch devices, easy to record	Inclusive Technology, Liberator, Others
Digital camera	Take pictures of other pupils, events outside, family members, projects etc. Then download them to the PC and add text, hot spots etc.	Various e.g. Jessops
One Step and Step-by-Step Communicator	Record digitized messages as in BIGmack but allowing sequences of messages to be strung together, each activated by switch activation	Inclusive Technology, Liberator, Others
Scanner	Allows photographs, drawings etc, to be 'scanned' into a computer.	Most computer suppliers
<i>SwitchIt! Maker</i>	Framework program to create switch activities	Inclusive Technology
Touch Monitor	Pointing and touching directly on screen activates as if using button on a mouse.	Inclusive Technology

Level 5 Pre-Intentional: Conventional

<i>Chooselt! Maker</i>	Editing program for producing choice-making activities, for use by switch users.	Inclusive Technology
Discover Board		Don Johnston Special Needs
Hands on Concepts	A range of IntelliKeys overlays for the UK market, including for several talking books.	Inclusive Technology
IntelliTools	IntelliKeys overlay keyboard and associated software	Inclusive Technology
Oxford Reading Tree Talking Stories	Talking book CD-ROM versions of popular reading series.	Sherston Software Ltd.
<i>SwitchIt! At Home</i>	From 3-D to 2-D, relating functional activities. With no visual impairment this program can be introduced at earlier level. Visual perceptual disorders can make interpretation of apparently simple pictures very difficult.	Inclusive Technology
<i>Thinking Things 1</i>	Simple problem-solving program, with built-in scanning options for switch users. One of the Edmark series of CD-ROMs, revised by Iona Software for use in UK.	Inclusive Technology

Level 6 Intentional: Relational

AlphaTalker	Communication aid	Liberator
Alternative communication aids are available (e.g. AMD1, TechTalk, MessageMate)	Not all will have auditory scanning features but may be useful in other activities.	Inclusive Technology, Other suppliers
<i>Clicker 4</i>	Framework program suitable across the curriculum, but conceptually difficult for pupils operating at earlier levels of communication. Incorporates switch access.	Crick Software, Inclusive Technology, others
VoicePal Pro	Voice output communication device to which remote switches can also be connected.	QED
<i>Writing with Symbols 2000</i>		Widgit Software Ltd

Appendix 2 - Suppliers' addresses

Dawsons Music Ltd

65 Sankey Street
Warrington
Cheshire WA1 1SU
Tel. 01925 632591
Web: www.dawsons.co.uk

Inclusive Technology Ltd

Gatehead Business Park
Delph New Road, Delph
Oldham OL3 5BX
Tel. 01457 819790
Web: www.inclusive.co.uk

Kirton

23 Rookwood Way
Haverhill
Suffolk CB9 8PB
Tel. 0800 212709
Web: www.kirton-healthcare.co.uk

Liberator Ltd

Whitegates
Swinstead
Lincolnshire NG33 4PA
Tel. 01476 550391
Web: www.liberator.co.uk

QED 2000 Ltd

1 Prince Alfred Street
Gosport
Hampshire PO12 1QH
Tel 0870 787 8850
Web: www.qedltd.com

RCEVH (Research Centre for the Education of the Visually Handicapped)

School of Education
The University of Birmingham
Edgbaston
Birmingham B15 2TT
Tel. 0121 414 6733
Web: www.bham.ac.uk/RCEVH/

Rompa International

Goyt Side Road
Chesterfield
Derbyshire S40 2PH
Tel.: 01246 211777
Web: www.rompa.co.uk

Semerc

Granada Learning Ltd
Granada Television, Quay St
Manchester M60 9EA
Tel. 0161 827 2966
Web: www.semmerc.com

Spacekraft Ltd

Crowgill House
Rosse Street
ShIPLEY
West Yorkshire BD18 3SW
Tel. 01274 581007
Web: www.spacekraft.co.uk

The Soundbeam Project

Unit 3, Highbury Villas
Kingsdown
Bristol BS2 8BY
Tel. 0117 9744142
www.soundbeam.co.uk

TFH

76 Barracks Road
Sandy Lane Industrial Estate
Stourport-on-Severn
Worcestershire DY13 9QB
Tel. 01299 827820
Web: www.tfhuk.co.uk

Widgit Software

26 Queen Street
Cubbington
Leamington Spa CV32 7NA
Tel. 01926 885303
Web: www.widgit.com

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Appendix 4 - Some useful Web sites

ACE Centre – www.ace-centre.org.uk

Information and software. Publishers of SAW.

ACE Centre-North – www.ace-north.org.uk

Advisory Unit – www.advisory-unit.org.uk

Information and resources about Windows Switch, Point for Windows, and other software.

Call Centre – callcentre.education.ed.ac.uk

Information, software, assessment, research and development.

Cambridge Adaptive Communication (Possum Controls Ltd) – www.cameleon-web.com

Communication aid company.

Crick Software Ltd – www.cricksoft.com and www.clickergrids.com

Information about Clicker etc, and grid resources.

Don Johnston – www.donjohnston.com

Information and resources for Discover, Ke:nx and other Don Johnston software and products.

Inclusive Technology Ltd – www.inclusive.co.uk

Extensive information on a range of issues around special needs and ICT.

Liberator Ltd – www.liberator.co.uk

Communication aid company, also sells range of cause-and-effect switches, controllers and associated devices.

MAPE – www.mape.org.uk

Micros and Primary Education Web site. Information and software deals.

Meldreth Manor School – atschool.eduweb.co.uk/meldreth/

Ideas and information for symbol users.

NCIP – www2.edc.org/NCIP/

Association with lots of useful information, advice on classroom applications, and reviews of software.

Semerc - www.semern.com

Software and hardware for special educational needs.

SpaceKraft Ltd – www.spacekraft.co.uk

Toys, wide range of multi-sensory equipment for pupils with special needs. Consultancy services.

techcess Ltd – email: techcess@pipemedia.co.uk

Extensive range of special access equipment.

Widgit Software – www.widgit.com

Excellent site with lots of information about symbols, switch software and techniques for introducing switches and scanning.

Words+ – www.words-plus.com

Information on EZ Keys and other Words+ communication and computer access products.

