down syndrome
education international
discovering potential • transforming lives

Down Syndrome Education International

- The charity exists to advance the education and development of individuals with Down syndrome worldwide through research, information and training.
- Since 1980, we have had an active programme of research and provided services to children, families and schools.
- This has enabled our team to work directly with children in early intervention and in classrooms, as well as collect research data.

Down Syndrome Education International

- This mix of focused research interests and direct involvement in education has given us a unique opportunity to set up interventions and then follow children in longitudinal studies, as well as ask more experimental research questions.
- We give high priority to sharing information directly with parents and practitioners through publishing, website and training activities.
- For more information on the work of the charity see http://www.dseinternational.org/ and note linked US site http://www.dseusa.org/en-us/

Keep in touch with our work

- We have a large information site at Down Syndrome Online at http://www.down-syndrome.org/
- This has much information for teachers in the Down Syndrome Issues and Information Education series (DSII)
- There is also a wealth of papers by world leading experts in the Down Syndrome Research and Practice section
- Teaching materials, books and videos can be found at our online store at http://store.dseusa.org/
- Sign up for regular news and blogs at link on bottom of home page or at http://www.dseusa.org/en-us/email/ and http://www.dseusa.org/en-us/news/feed/

down syndrome
education international
discovering potential • transforming lives

Evidence-based practice: what does research tell us about the specific language and learning needs of children with Down syndrome

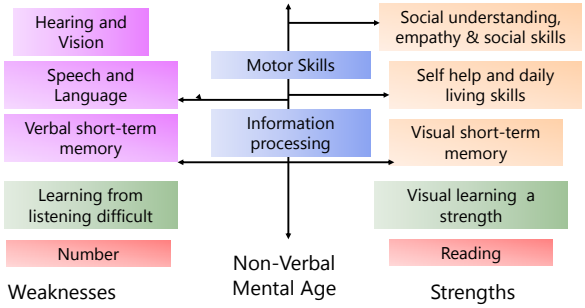
Setting the scene for effective education

- What do we know about the effects of Down syndrome on development?
- First – the big picture across all areas of development
- Second – a closer look at the areas of specific weakness
- Do we know any of the reasons for this profile?
- What are the implications of what we do know for intervention strategies?
- If we apply these strategies –can we improve the areas of weakness and change the profile?
- **Applies in special and mainstream classrooms – and to many other children**

Effects of Down syndrome on development

- Most children will have delayed development
- There is a very wide range of individual differences from mild delays to more severe levels of disability
- For most children, severity of disability cannot be predicted at birth or in early years
- Not all aspects of development are equally delayed
- Research in the past 15 years has highlighted a profile of strengths and weaknesses
- We can use this information to be more effective in helping children reach their full potential – development is not fixed at birth

Typical profile associated with Down syndrome (see, Hodapp, Fidler, Buckley in DSRP 9 (3) on website



The specific developmental profile associated with Down syndrome

- Good social interactive skills
- Good empathy and positive personalities
- Sensitive to failure and negative emotional cues
- May use social skills to distract/avoid difficult tasks
- Good behaviour relative to mental ability and communication skills
- Good practical self-help/daily living skills over time
- Delayed early motor development – affects early learning through play and handwriting progress

The specific developmental profile associated with Down syndrome

- Significant risk of vision and hearing impairments
- Specific speech and language delays relative to non-verbal mental abilities

Cognitive strengths and weaknesses

- Specific verbal short-term and working memory difficulties
- Strengths in visual short-term memory and processing

Academic learning

- Strengths in reading – can be at age level (10%+)
- Number more difficult – often 2 years or more behind reading

The importance of the weaker areas – speech, language and working memory

- Language underpins cognitive and social development for all children
- Words for knowledge – vocabulary size
- Language for remembering, thinking, reasoning
- Language for self-control and planning
- Language for dealing with emotions and worries
- Language for communicating with others
- Language for friendships

Any child with language delay will have cognitive (mental) delays (including executive function difficulties)

Working memory deficits will affect all learning

Learning to talk

- Talking is for **communicating** – getting the message across, engaging with others
- Starts with looking, smiling, pointing – non-verbal skills for commenting, requesting, answering
- Then words – **vocabulary** learning – working out meanings and saying the words
- Then sentences – **grammar** learning – stringing words together for more complex meanings
- Talking requires clear **speech** skills – takes time for all children

Speech and language development

For most children with Down syndrome spoken language is delayed for mental age but they show an uneven profile

- **Communication** skills are usually good
- **Vocabulary** is delayed but grows steadily
  - understanding is ahead of expression
- **Grammar** is a challenge and lags behind vocabulary
  - tend to be 'telegraphic' talkers, using key content words
  - understanding is ahead of expression
- Clear **speech** is a challenge and speech is often difficult to understand

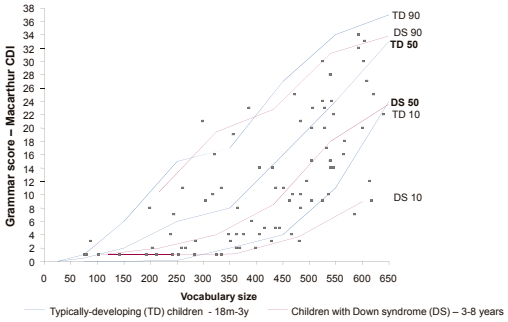
Vocabulary/grammar link

- Vocabulary size pushes along grammar development
- Children with Down syndrome have a vocabulary delay

- 200-250 words are needed before grammar starts
  - Understanding will be ahead of production
  - 200-250 words understood to begin to understand grammar
  - 200-250 spoken words to begin to use grammar

There will be many children with Down syndrome in kindergarten and elementary schools who do not yet have 250 words in spontaneous spoken language

Vocabulary/grammar link (Pennanen, Buckley & Archer 2000)



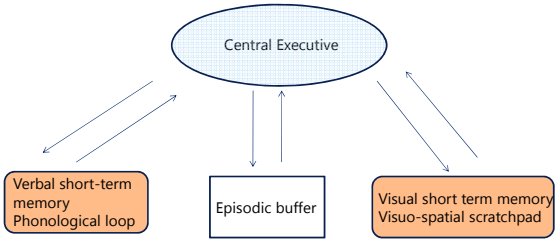
Why this learning profile?

- Hearing loss plays a part
- Auditory processing may play a part
- Slow vocabulary learning may delay grammar
- Difficulties with verbal short-term memory play a part
- We know nothing of early speech discrimination in children with Down syndrome
- Speech difficulties will delay language development
- We know very little about causes of speech-motor issues
  - Not just a motor issue
  - Planning component
  - Verbal short-term memory component

Looking in more detail at weaker areas – working memory

- Working memory is the immediate memory system that supports all mental activity
- The working memory system has several components
- The central executive which holds and processes information
- Supported by limited capacity stores
  - the visual spatial scratchpad - to hold visual information
  - the phonological loop - to hold verbal information
  - both hold information from senses for about 2 seconds
- the episodic buffer which links to long-term memory
- Capacity in working memory increases with age

Baddeley's 2006 Working Memory Model



Working memory is important for all children

- 'Working memory is the mental workplace in which information can be temporarily stored and manipulated during complex everyday activities.'
- listening to another speaker
- decoding an unfamiliar word whilst holding the meaning of the previously decoded text in mind
- writing while formulating the next part of the text
- engaging in mental arithmetic
- Predicts academic progress better than IQ (Alloway)
- See excellent book S. Gathercole & T. P. Alloway. Working memory and learning: practical guide for teachers. Sage 2008 and article for teachers at http://www.york.ac.uk/res/wml/PATOSS.pdf

Verbal short term memory & language

- The phonological component supports verbal short-term memory (VSTM)
- Verbal short term memory span improves with age and can be measured with digit and word span tasks
- Verbal memory span is influenced by increases in speech perception and production rates, and by reading ability
- The phonological loop influences the learning of vocabulary and syntax – and the storage and processing of sentences
- It seems to influence spoken language output – may play a role in holding the phonological structure of speech prior to output (Gathercole et al 2005)

Working memory in children with Down syndrome

- 4 year old typically developing children have a digit span of 3, 16 year olds a span of about 6/7, teenagers with Down syndrome only have spans of 2/4
- For children with Down syndrome their verbal working memory skills are delayed for mental age – a specific deficit
- Most of the research has measured verbal and visual short term memory
- Visual short-term memory skills are significantly better than verbal short-term memory skills in most studies
- However, recent Italian research has indicated visual STM impaired if material require simultaneous rather than sequential processing (dual tasks) and also central executive impairments (Lanfranchi et al.)

Why this profile?

- A number of research studies by Chris Jarrold and team at Bristol University, UK have shown that the deficits cannot be explained by hearing loss or speech difficulties
- They suggest a phonological loop deficit – which will affect word learning as well as memory.
- They have shown children with Down syndrome have specific difficulty learning the accurate phonological or sound pattern of words
- There is some evidence that training can improve working memory function including computer training – Cogmed (Bennett, Holmes, Buckley 2013)
- Early speech perception and production difficulties could be causal as system has to tune to native language

Effects of poor verbal short term memory function

In other children with poor verbal STM

- Speech characterised by short utterance length
- Immature syntax/grammar
- Limited range of vocabulary
- Speech clarity issues
- Storage and processing of sentences
- Poorer reading and poorer maths

See Gathercole et al (2005) Developmental consequences of poor phonological memory in childhood. *Journal of Child Psychology and Psychiatry* 46 (6) 598-611 and also in 47 (1) 4-15 on memory in developmental disorders

Executive functions now being studied

- **Working Memory** – Hold information in mind for purpose of completing/sticking with an activity. **Shift** – Move freely from one situation to another, solve problems flexibly. **Inhibition** – Control impulses and behaviour at correct time/context. **Emotional Control** – Modulates emotional responses appropriately to situation. **Plan/Organise** – Anticipates future events/consequences.
- Lanfranchi et al (2010) – adolescents with Down syndrome showed impairments relative to their MA on planning, inhibition, shift and working memory. Lee, Fidler et al. (2011) also report EF impairments and continue to study EF. Working memory and shift improved with WM training (Bennett et al 2013) – very preliminary finding.
- **Important role of language in executive functions**

Implications for intervention and education

Use social/emotional strengths

- build on emotional responsiveness – encourage social communication, looking, smiling, gesture
- early social communication underpins cognitive and language development
- talk to and play naturally with children
- build on social understanding – encourage 'good' behaviour

Always encourage AGE appropriate behaviour – do not 'baby' or 'spoil' child (or adult), have clear expectations and boundaries

Implications for intervention and education

- Target speech and language difficulties from infancy and through school years
- Remember that children are **visual learners**
- Use *reading to teach talking* from early (2 to 3 years) and through school years
- *Learning from listening* will be specially difficult but *learning from looking easier* so always use visual supports – signs, pictures, reading, the computer
- Enable understanding to be demonstrated without the need to say it – choosing, pointing, selecting

Implications for intervention and education

- Progress with grammar is linked to total vocabulary size for children with Down syndrome – therefore teaching vocabulary is an important goal from early
- Speech skills start in first year – therefore intervention should start then – games to develop discrimination and encourage production of speech sounds
- Non verbal communication skills predict talking (joint attention and pointing) therefore intervention should start in first year
- Gesture use can close the comprehension/production gap but we need more research on the proper use of signing

Implications for intervention and education

Compensate for 'weaknesses'

- Hearing, vision – regular checks, good health care – speak clearly, use signs, limit background noise. Involve sensory impairment team
- Address working memory difficulties with sound and word discrimination games from infancy, improving spoken language development and playing memory games
- Encourage motor development at all times
  - Active practice
  - Encourage active movement through play
  - Sporting skills are good for fitness as well as social skills

In summary

- Children with Down syndrome are visual learners
- They find learning from listening particularly difficult
- This effects learning to talk and it effects processing spoken language and instruction

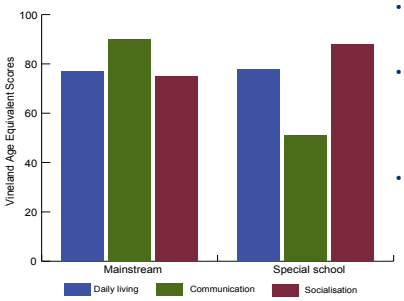
If we plan interventions to

- to focus on teaching spoken language
- support all learning visually – especially with print
- to improve and compensate for working memory

Can we make a difference?

Our data for teenagers taught in this way from preschool years suggests we can

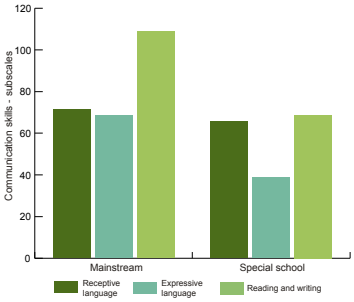
Closing the speech-language/non-verbal ability gap



Comparison across domains

- This is another version of the earlier coloured profile slide
- One group show the expected profile – social and practical strengths, language weakness
- The 'adapted input' mainstream group show language skills as good as their other skills – it is possible to change the profile

Language and literacy -inclusion study



Vineland Adaptive behaviour Scale – age scores

- Very significant gains in literacy (mean gain 3.3yrs) and expressive language (mean gain 2.5 yrs) in mainstream education
- Children fully included in mainstream classrooms
- Access the same curriculum with individual targets and in-class support
- Both groups had same range of abilities and social backgrounds at start of school

We can change the profile

- We can make a difference
- Outcome data from a study of teenagers shows significant gains in spoken language as a result of comprehensive interventions from early years
- Significantly better language and clearer speech
- Significantly better reading skills
- Linked to immersion in mainstream school/teaching to the profile of strengths and weaknesses
- Buckley, Bird, Sacks and Archer – see at

http://www.down-syndrome.org/reports/295/

The evidence for a specific phenotype or profile

- See Deborah J. Fidler (Colorado State University) and colleagues for a recent reviews of the evidence
- *The Emerging Down Syndrome Behavioural Phenotype in Early Childhood.* Infants and Young Children (2005) 18, 2, 86-103
- *Education and children with Down syndrome: neuroscience, development and education.* Mental Retardation and Developmental Disabilities Research Reviews (2007) 13, 262-271.
- *The Down syndrome behavioural phenotype: implications or practice and research in occupational therapy.* Occupational Therapy in Health Care (2011) 25, 7-25

And free access articles - preschool, primary and teenage profile papers

- Down Syndrome Research and Practice 9 (3) special section on the specific profile free at
- http://www.down-syndrome.org/research-practice/

Relevant research evidence is growing

- Whole journal issues devoted to Down syndrome – important review papers in 2007
- Mental Retardation and Developmental Disabilities Research Reviews 13 (3) 2007
- Journal of Intellectual Disability Research 51 (12) 2007
- Important recent review papers and chapters on cognition (Silverman), language (Fidler et al., Roberts et al, Abbeduto et al., education (Fidler & Nadel), reading (Groen et al., Buckley, Snowling et al.), social development (Iarocci et al, Cebula & Wishart)
- Gathercole & Alloway articles and books on working memory for teachers.
- **Clarke, B. & Faragher, R. (2013) Educating learners with Down syndrome. Routledge Education. (Includes good reviews of cognition and motivation literature and practical chapters on behaviour, reading and maths).**

References – speech, language and memory

- J.E. Roberts, R.S. Chapman, & S.F. Warren (Eds.), *Communication and language intervention series: Speech and language development and intervention in Down syndrome and fragile X syndrome* (pp. 233-254). Baltimore: Paul H. Brookes Publishing Co. Very good review and practical – for professionals
- Abbeduto, L, Warren, S.F. & Conners, F.A. (2007) Language development in Down syndrome: from the prelinguistic period to the acquisition of literacy. *Mental Retardation and Developmental Disabilities Research Reviews* 13: 247-261
- Gathercole et al (2005) Developmental consequences of poor phonological memory in childhood. *Journal of Child Psychology and Psychiatry* 46 (6) 598-611 – also same journal (2006) 47 (1) on memory in developmental disabilities
- LanFranchi S et al. Executive function in adolescents with Down syndrome. *J Intell Dis Research* 54, 308-319.

References – cognition and education

- Lee, NR, Fidler DJ et al. (2011) Caregiver report of executive functioning in a population based sample of young children with Down syndrome. *Am J Intell Dev Disabil.* 116, 290-304.
- Bennett S, Holmes J and Buckley S (2013). Computerized memory training leads to sustained improvement in visuospatial short term memory skills in children with Down syndrome. *American Journal on Intellectual and Developmental Disabilities*, 118(3), 179-192.

Importance of full inclusion in changing the profile

- Buckley SJ, Bird G, Sacks B, Archer T. A comparison of mainstream and special education for teenagers with Down syndrome: Implications for parents and teachers. *Down Syndrome Research and Practice.* 2006;9(3);54-67.
- De Graaf, G., van Hove, G & Haveman M (2013) More academics in regular schools? The effect of regular versus special school placement on academic skills in Dutch primary school students with Down syndrome. *J Intell Disab Research 57, 21-38*

down syndrome education International

Introducing RLI: effective reading and language instruction for children with Down syndrome

Professor Sue Buckley OBE
Director of Research
Down Syndrome Education International

Supported by The National Lottery through the Big Lottery Fund
THE UNIVERSITY of York

Further in depth information – and support

- Scientific report published in Journal of Child Psychology and Psychiatry: http://dsuri.net/OXRO0Z (free access)
- Further information on RLI web site: http://dsuri.net/YLCs1j

Effective reading instruction – the evidence

- Learning to read is dependent on phoneme awareness and letter-sound knowledge
- Teaching these skills (phonics) in the context of learning to read and spell is effective in supporting reading development
- Effective reading interventions combine training in letter knowledge, awareness of speech sounds (phonological awareness), links between letters and sounds, book reading (Hatcher et al., 2004, 2006)
- Evidence suggests this approach works for many children with Down syndrome (Goetz et al., 2008; Lemons & Fuchs, 2010)
- This approach does not improve reading for all children, with and without Down syndrome (Goetz et al., 2008; Lemons & Fuchs, 2010)

Reading intervention outcomes and language

- Importance of spoken language skills
- Non-responders tend to have additional weaknesses in vocabulary and grammar (Vadasy et al., 2008; Whiteley et al., 2007)
- For such children, interventions that combine training in reading and language may be more effective (Duff et al., 2008)
- Children with Down syndrome also have poor spoken language (Abbeduto et al., 2007)
- A combined intervention approach may be particularly effective for these children (Buckley et al., 1996; Burgoyne, 2010)

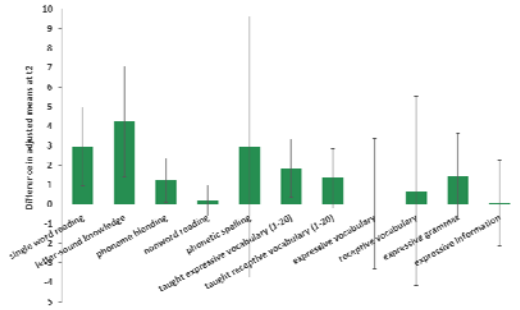
The content of language instruction

- Learning of new vocabulary (receptive skills)
- Use of new vocabulary (expressive skills)
- Grammar (understanding and using new vocabulary in sentences)
- Beck, McKeown & Kucan (2002):
  - Many opportunities to see, hear and say the word
  - Examples of the word in many different contexts (broad understanding)

Adapting teaching for children with Down syndrome

- Learn more slowly - Small steps, intensive daily instruction, frequent opportunities for revision and consolidation
- Short term memory - visual stronger than verbal - Visual supports for learning
- Comprehension an extra challenge - Emphasise and support reading for meaning from the outset
- Maintaining attention and managing behaviour - Short, varied activities and teaching approaches that ensure success
- More support for phonological awareness and phonics - Explicit instruction and frequent practise, alongside sight word instruction
- Recognising the wide range of ability - Scope to tailor program for individual abilities

Effect of Intervention: Week 20



Our findings

- On most measures intervention group progressed faster
- Some small gains, some larger – 4 were statistically significant (unlikely due to chance): letter knowledge, word reading, phoneme blending, expressive vocabulary
  - These reflect directly taught skills – and these gains did not yet transfer to gains in spelling, non word reading or standardized language measures. (Maybe not a surprise given the demands of the reading tasks and the extent of language difficulties for children with Down syndrome.)
  - The waiting control group progressed faster when they moved to the intervention – and showed similar gains to the intervention group

Individual differences in progress

- Wide variation in progress made on intervention – some children made rapid progress, other slower progress and some very little progress
- What influenced progress? - age, receptive language and no. of sessions
  - Younger children tended to make more progress – those starting at 5 and 6 years
  - Children with better receptive language tended to make more progress
  - BUT not all 5 and 6 year olds went fast and some older children did, some children with more delayed receptive language progressed with reading
  - Children receiving at least 80% of the intervention sessions made more progress
  - The only advice we can give is to try it – well planned and adapted to the individual child.
  - Other (unmeasured) factors may also contribute

Feedback from teaching assistants

- Teaching staff delivering intervention reported that:
  - Though the intervention was hard work they enjoyed it
  - Increased confidence and feelings of competence
  - Improved skills and expertise
  - Increased self-esteem and greater job satisfaction
  - Potential for application to other children in the classroom

I am absolutely adamant that this program (even though it is tailored for and suits children with Down syndrome extremely well) can be successfully used on many more children that struggle with a regular reading scheme

Teaching assistant and parent feedback

- Supported evidence from standardized tests

I think this [the intervention] has made the biggest difference to X out of everything we have done over the last 2.5 years

Many people have commented on how much X's speech has improved and that they can now understand him

The writing has suddenly taken off

His vocabulary has extended and his use of words in the correct tense has improved too

Guidance

- Suitable for children with Down syndrome aged from 5 to 11 years (max reading of 8 years)
- Guidance provided in handbook for children just getting started with reading and with poor language skills
- Can be delivered by teaching assistants and should preferably be delivered as part of school education
- Recommended where Resources and commitment to deliver RLI consistently for at least 20 weeks

Starting the program

- Identify 2+ key staff to deliver intervention
- Team approach: class teacher,special educator, reading specialist, teaching assistants, speech and language therapist
- Spend 3-4 weeks familiarising yourselves with program and organising how you will deliver it in your school

Starting the program

- Organizing delivery
  - Quiet place in school – consistency
  - Single session or two shorter sessions
  - Time of day
  - Time for planning, preparation and delivery
- Preparing to start
  - Assessments of existing skills
  - Find and grade books
  - Gather resources – visual supports, phonics resources, etc
  - Photocopy resources – planning and record forms etc
  - Share teaching targets and get help with preparing

Session structure

Strand	Component	Duration
Reading	Easy level book reading	2-3 min
	Instructional level book reading	5 min
	Sight word reading	2-3 min
	Letters, sounds and phonology	5 min
	New instructional level book reading	5 min
Language	Introducing new words	5 min
	Reinforcing the meaning of new words	5 min
	Using new words in connected speech	5 min
	Using new words in written language	5 min

Individualizing the program

- Wide range of abilities, interests and motivations
- Important that the program is pitched at the right level for the child
- Assessments taken before starting determine right starting level
- Ongoing assessment and records of progress
- Suggestions for ways to adapt/extend the program
- Be confident and use your knowledge of the child
- Examples of children with different skills and abilities on the DVD

Reading Strand

- Assessment for learning
- Strand begins with a series of assessments
  - Knowledge of letters and sounds (phonemes)
  - Word-level knowledge
  - Text-level knowledge
  - Reading test
- Essential for pitching the program at the right level for the individual child
- All assessment materials and instructions included

Running Record

- Also known as miscue analysis
- Essential component of instructional book reading
- Formative assessment
  - tracks reading and accuracy levels
  - helps determine teaching (when to move on to the next book/level)
  - identify child's reading strengths and weaknesses
- Taken before starting program and in every teaching session
- Instructions provided

Book reading (components 1, 2 and 5)

- Easy level book (1)
  - >94% accuracy
- Instructional level book (2)
  - 90-94% accuracy
  - Running record taken
- New book at instructional level (5)
  - Shared/guided reading
  - Becomes next book for assessment

Books

- Experience of a range of real reading books
  - Topics
  - Publishers
  - Motivating and interesting to child
- Levels from beginning readers to RA of 8 years
  - Starting point determined by assessment
  - Read 3-4 books at each level (consolidation)
  - Running Record determines when to move to next level (progression)
- Finely graded - Hatcher grading scheme (Hatcher, 2000)
  - Information provided for you to grade books that are available in school
  - Book list from research project (widely available books) is also provided

Sight word learning (component 3)

- Words child can read by sight
  - Strength in children with Down syndrome
  - Many high frequency words in English are not readily decodable
- Which words?
  - Beginning readers: personal words, characters, motivating words
  - High frequency words (Letters & Sounds, DCSF): first 100, next 200
  - Topic words from school
  - Tricky words from reading books

Sight word teaching

- Word walls, word hunts, flashcards, physical games……
- Including practice of 'known' words and new learning
- In isolation and in context
- Pace dependent on child

Using sight words in expressive language

Letters, sounds and phonology (component 4)

- May be difficult but essential for independent reading
- Starting point determined by assessments
- Follows a clear structure and progression (Letters & Sounds, DCSF)
- Levels of PA: syllables, rhymes, phonemes
- Listening to sounds and linking letters and sounds
- Different skills: learning letter sounds, alliteration, sound isolation, blending, segmenting

Letters, sounds and phonology (component 4)

- Each teaching session should include:
  - Learning letter-sounds
  - Phonological awareness (listening to sounds)
  - Linking letters and sounds
- Targets ideally related e.g.

a) Letter-sounds	Introduce letter-sounds 'j' and 'ea'. Revise previous letter sounds 'a', 'm', 'p' and 't'
b)Phonological awareness	e.g. blending (aural, could use picture support). TA: 'I went shopping and bought t-ea/p-ea-s/j-a-m/j-ui-ce' (Child listens to sounds and identifies the word)
c) Linkage activity	Can the child read the words on the shopping list (tea, peas, jam, juice)?

Language Strand

- Introducing and reinforcing meaning of new words
- Using the new word in expressive language (spoken and written)
- Increase children's breadth of vocabulary (understand and use more words)
- Increase children's depth of vocabulary (understand more about words they know)
- Highly interactive
  - Components can be tailored to individual abilities
- Visual

I-Spy with picture support (film clip)

Choosing vocabulary to teach

- Which words?
  - Related to themes
  - Useful
  - Motivating and meaningful to the child
  - Where possible imageable
  - Not necessarily completely new
- How to identify words?
  - Classwork/topic work
  - DSEI checklists
  - Consultation with parents/SLT
  - Reading books

Oral blending (film clip)

Language Strand

- Each theme should target a range of word types (nouns, verbs, adjectives, prepositions)
- Words mostly taught in isolation but sometimes in pairs (e.g. on & in, tall & short)

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	Soup	Cereal	Chew	Lick	Consolidation
2	Crunchy	Soft	On	In	Consolidation

- Work on base form but room to extend e.g. verb tenses

Language Strand

- (1) Introduce and discuss new word: Provides written, spoken, and pictorial forms of new vocabulary
  - TA introduces word
  - Child says word
  - Child and TA discuss word using related photos
  - Child is shown flashcard
  - TA and child create a word web
  - Emphasis on relating to child's experience, and building a rich, multi-contextual understanding

Vocabulary game

Introducing new vocabulary

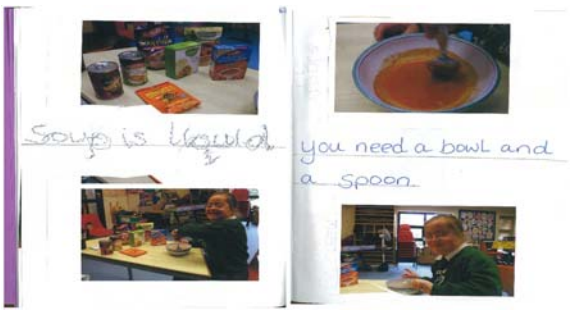
Language Strand

- (2) Reinforce word meaning: Increases the depth of the child's understanding of new vocabulary by discussing word meanings in different contexts
  - Activities are game-based e.g.:
    - Matching
    - Sorting
    - Demonstrating
  - Difficulty level can be adjusted according to the learning style and needs of the child
  - Emphasis on:
    - Multiple encounters
    - Using games as a springboard for more discussion about the meaning of the word
    - Having fun with the new word

Expressive language film clip

Language Strand

- Work on expressive language: Encourage the use of appropriate syntactic and pragmatic language skills
  - (3) Child generates utterance containing new word
  - (4) Child generates written sentence containing word
    - Guided by child's language level; aim to increase utterance length or complexity
    - Encourage/model/extend appropriate grammar
    - Scaffolded by TA
      - Independent writing; tracing; cut up sentences;
      - writing key word
    - Supported by pictures
    - Record kept in topic book



Topic book

- The topic book has a number of purposes:
  - Communication with parents
  - Record of child's achievements
  - Record of what has been taught so far
  - Reference book – can be referred to and revised from
  - A source of 'easy' reading material

Language Strand resources

- 4 weeks (2 themes) of scripted language work are provided
- Suggestions for teaching activities
- Guidance on choosing words to teach
- Ideas for finding visual supports for use in teaching
- Link with curriculum – use DSE vocabulary checklists, curriculum topics, speech and language therapy targets

The handbook

- Instructions for how to deliver each component, ideas for teaching activities and adaptations to suit individual abilities
- Practical information on delivering intervention, record keeping and collaboration
- Resources for assessments and teaching, planning and record keeping
- Video illustrating each component and activities for teaching, including examples of children with different starting levels, strengths and weaknesses

The handbook

- Available from our UK and US offices
- UK: http://dsuri.net/YRGrLp | US: http://dsuri.net/XpY1Cu

down syndrome
education international
discovering potential • transforming lives

Developing number and memory skills -school years

A range of skills

Research and implications
Number, counting and calculating

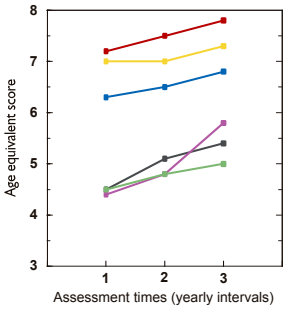
Money and time

Improving memory with supports & memory games

Understanding the number system

- Many children with Down syndrome enjoy numbers but most find them difficult
- There is very little research to draw on
- Early counting and cardinality at MA level (Nye
- Few adults achieve calculating to 100 at present
- Language, working memory and knowledge of number facts influence number development in all children
- Effect of cognitive profile?
  - language and verbal STM weak compared with non-verbal skills
  - working memory

Reading, language and number skills



Children with Down syndrome (aged 6-14 years at end of study) number skills 4 years behind CA and 2 years behind their reading skills (Byrne, 1997)

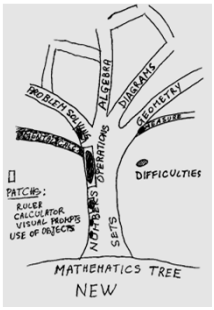
Range of skills 11-18 yrs, teenage study data

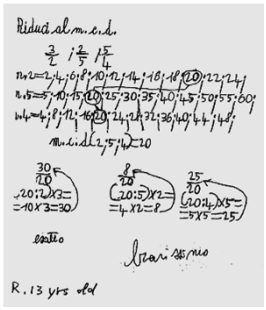
- More than ¾ of young people count to 20,
- About half to 50
- Around 1/3rd read, write, say numbers to 100
- Almost all add amounts up to 10
- More than ¾ of young people subtract numbers to 10
- Some add, subtract, multiply, divide for bigger numbers – helped by written sums, apparatus and calculator
- The majority of young people know:
  - days of the week,
  - months of year,
  - tell the time by the hour (half tell by quarter hour)

What can make a difference?

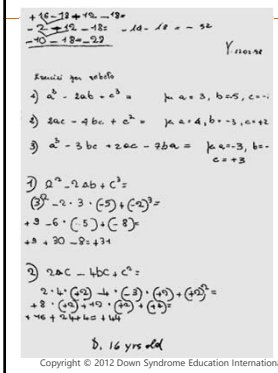
- All studies show that students respond well to good teaching
- Higher attainments by teenagers in mainstream education
- Quality and quantity of education affects learning in both mainstream and special schools
- Italian case studies show higher attainments in teenagers than in group studies
- Suggest our expectations should be higher (E. Monari- Martinez)

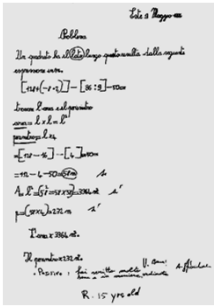
Maths tree
Italian teenager working with fractions





Italian teenagers learn algebra - Martinez





Range of examples growing

- Australian teenagers doing percentages with calculators
- (Rhonda Faragher Barbara Clarke – chapters on number and maths book on education for pupils with Down syndrome next year)
- Norway – simple statistics – counting numbers of cars of different colours then plotting a histogram
- Italy – algebra and problem solving with 15 teenagers with Down syndrome published
- Martinez & Pelligrini (2010) European Journal of Special Educational Needs 25 (1) 13-29

Teaching students with Down syndrome

- Make full use of visual, practical teaching methods
- Relate to interests, use skills meaningfully in daily life
- Teach language for number – vocabulary (in Dsii number books)
- Discriminate and say number words – this is a challenge for many children due to speech issues
- Learning the number word list (count sequence) is a challenge –use number line for visual support
- More practice at each stage of learning
- Language- research shows gains if the key word is last

'The ball is red', 'Look, balls, there are two' (Ramscar et al)

Teach vocabulary and basic concepts

Shape and colour words

Circle/square/triangle

Red, blue, yellow

Play matching and sorting games

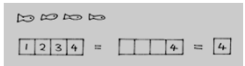
- Build with shape bricks, talk about shapes and features
- Size words, big, little
- Order words, first, last, next, before, after
- Comparison words – same, more, different, less
- Big, bigger, biggest – comparatives more difficult
- Pattern and order

Need to master counting principles

- 1:1 correspondence

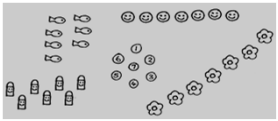
- Stable order

- Cardinality



- Order irrelevance

- Conservation of number



- Takes time (5-7 years TD child)

Number is difficult – basics essential

- Learn to say count words
- Learn to use them to count – 1to1 correspondence
- Learn last count word tells you 'How Many?'
- Link numbers with quantity – children can share items and know same or different before link with counting
- Understand ordinality or succession – each next number is one more
- Equinumerosity - learn same size sets must have same number of objects
- Understand cardinality – can give correct number from larger set – 'Give me x' task is the test
- Move from 'count all' to 'count on' in addition
- Understand subtraction is inverse of addition
- **Until a child has mastered these concepts for 1-9 cannot move on to place value, numbers above 10 – takes several years**

Activities to teach counting and number

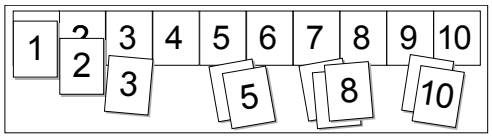
- Use visual support of number line to learn number words in stable order
- Start with learning to say 1-5 but to understand numbers 1-2 then 1,2,3, 1,2,3,4 and 1,2,3,4,5
- Numbers 1,2,3 subitisable (known without counting)
- As children begin to understand numbers = quantity they are '1-knowers', '2- knowers', '3-knowers' then 'counting principle knowers' in 'give x' task (Sarnecka)
- Play lots of games with objects making sets of 1 and 2, then 1,2,3 and so on – compare 'same', 'more'
- Play **linear** board games (no line 1-5, dice 1,2) (Ramani & Siegler 2009).

Activities to teach number basics

- Play correspondence games with toys/objects to practice one-to-one correspondence
- Play **linear** board games (no line 1-5, dice 1,2)
- Play 'give me' games and end counting games with 'How many?' to teach cardinality
- Play games adding a block, taking away a block to introduce the concepts of adding and subtracting and they they are inverse relationship
- Introduce Numicon – visual-spatial representation of number. Powerful for teaching 'each next number is one more', relative sizes of whole numbers, adding……
- Does not teach counting

Extra visual supports for learning number words

- Match, select and name
  - Numerals
  - Numicon shapes
  - Number words

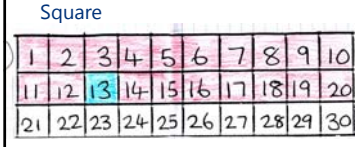


Visually support learning number sequences

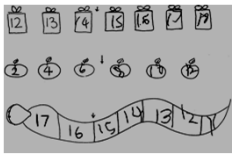
Line

1	2	3	4	5	6	7	8	9	10

Square

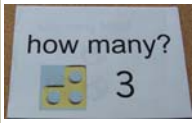


- Practice different parts of the count sequence
- Rote count from other numbers than 1



Visually support development of cardinality

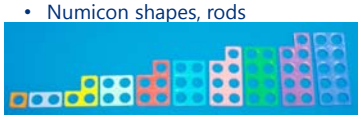
- With numerals, Numicon shapes, images, objects



Visually support learning about relative sizes 1

- Nesting dolls/pots/cups etc

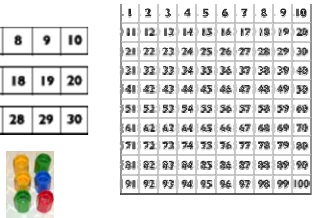
- Numicon shapes, rods



- With Stern structural arithmetic materials

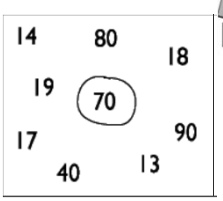
Numbers up to 100

- Counting up to 100 with 100 line, square, number cards
- Practice counting in 'tens' – understanding position in square, with equipment, tens cards, games to add 10



Similar sounding & similar looking numbers

- Lots of practice with 'teens', and 'ty's'
  Discriminating, matching, sorting, saying, reading,
  writing down, matching to images (shapes, rods, Cuisenaire)
  Lotto games
  e.g.17,70, seventeen, seventy



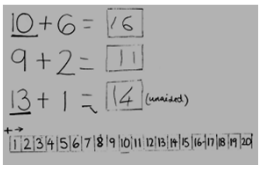
Support addition for a 'count-all' strategy

Joe is drawing circles
then counting them all

Teach addition with other strategies

- Visually support counting-on with a numeral

- Visually support counting-on with a number line

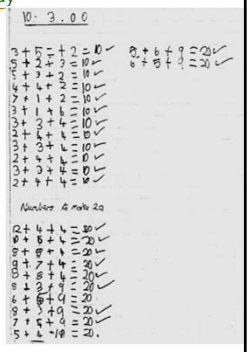


- With Numicon, spinner

- Make 'one more'

Number bonds – learn visual imagery to support Strategies for subtraction, taking away

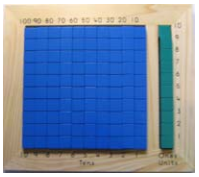
- 'Taking away', 'Counting-back, 'difference' (counting forward) using a number line
- 'Chopping –off' using Numicon
- Recall of number facts, doubles
- Number sentences/stories



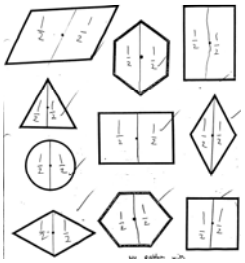
Place value – tens and units

(Wave 3 resources cards)

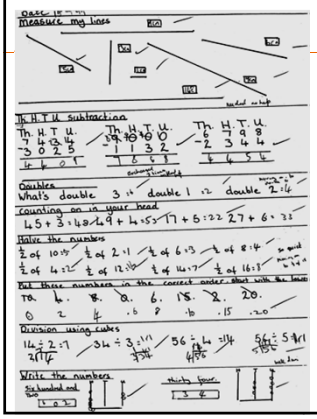
- Stern dual board
- For units and tens



Wider maths curriculum

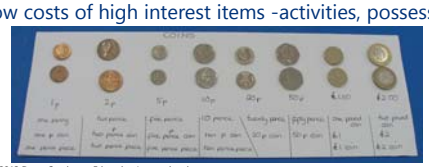


Revision, practice



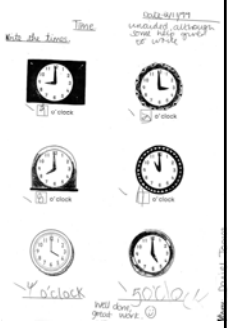
Money

- Match, select and name coins
- Play games with coin picture cards – snap, lotto,
- Play shops
- Practice adding coin values – with extra visual supports such as dots and Numicon shapes
- Use coins and notes – lots of practice
- Know costs of high interest items -activities, possessions



Time

- Relate times and clock reading to events in the day
- Learn to tell the time
- Wear a watch
- Count in 5's
- Know about a digital clock, analogue clock, 24 hour clock
- Calendar or flip chart days, weeks, months



Everyday activities

- Pages on books
- Finding out things from wall displays, practical displays
- In measurements
- And 'how many.....?' games
  - How many are there?
  - How many do we need?

Summary

- Number challenges most students with Down syndrome
- Students will need supports for measurement, arithmetic, mental calculations and problem solving
- Visual parts of the maths curriculum are more accessible
- For example, shape, geometry, fractions, algebra, diagrams, graphs
- Need for extra resources

Developing memory skills - research

Research findings suggest 3 types of interventions may help to develop working memory:

1. Activities to improve phonological loop function
2. Activities to improve attention and to increase processing capacity
3. Activities to improve remembering of lists of items and associations between items, including categorisation and rehearsal strategies

Activities to improve phonological loop function

- Listening games
- Sound discrimination
- Auditory bombardment
- Word discrimination
- Links with literacy, phonics, spelling

Activities to improve attention and increase processing abilities

- Sitting still
- Computer games
- Choosing games - objects, pictures, gestures/signs
- Following instructions, one to one, in a group, following teacher direction in whole class
- Waiting for turn
- Reading books with an adult
- Teaching new play/leisure skills

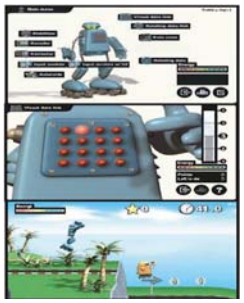
Activities to improve and support remembering

- Hiding games, Memory games
- Rehearsal training (apply e.g. spelling, numbers)
- Auditory rehearsal
- Grouping & organisation skills (sorting, oddity task, memory tasks in categories)
- Computer games – DSEI cog med trial
- Recalling activities, stories
- Delivering messages
- Lists (pictures, words) for self help and independence

Film clip – rehearsal strategy

Rehearsal training

Cogmed JM/RM – See www.cogmed.com



- JM = 75 games.
- RM = 200 games.
- Designed by psychologists and computer games designers.
- Adaptive training on a trial by trial basis constantly adapting to each individuals WM capacity.

Pilot

5 Children with Down syndrome
Trisomy 21. Mainstream Schooling.
Cogmed training completed at **home**.

1. PPVT (Peabody Picture Vocabulary Test)
2. 8 Subtests of the AWMA (Verbal & Visual STM/WM)
3. BRIEF parent version

Showed children could use the programme and supported a further study

Main Study

24 Children with Down syndrome
21 Mainstream, 3 SEN.
Cogmed training completed at **school.**

RCT random assignment (G1 N= 12, G2 N=12)

1. KBIT 2 (Kaufman Brief Intelligence Test)
2. 4 Subtests of the AWMA (Verbal and Visual STM/WM)
3. BRIEF P parent version (preschooler)

21 children completed training (Group 1 = 10, Group 2 N = 11). Improved on visual-spatial short-term memory tasks. The improvement was sustained 4 months later.

See Bennett, S., Holmes, J., Buckley, S. (2013) Am J on Intell and Dev Disabilities: 118, 179-192.

Summary

- Cogmed training was feasible and improved short term visual memory for children with Down syndrome in our study.
- Cogmed training may be suitable for younger children with appropriate support – also depending on their existing memory skills.
- Children who completed Cogmed training had less problems on WM & SHIFT (BRIEF-P).
- Gains are sustained – children likely need more frequent practise JM intervention programme less intensive than RM (75 activities v 200) – current case study of RM showing continuing gains.
- Planning a larger study in USA – to see if gains in verbal STM, language and academics

Resources and references

- Numicon teaching kits:
- 1st Steps with Numicon at Home is a starter kit for parents
- Numicon Firm Foundations Kits – One-to- one and Class Kits
- See whole Numicon range at our online store
- Nye, J. Buckley, S, Bird,G. (2005) Evaluating Numicon as a tool for teaching number skills Down Syndrome News and Update at http://www.down-syndrome.org/updates/352/
- Horstemeier, D. (Books 1 & 2) Teaching math to people with Down syndrome and other hands-on-learners. Woodbine House
- Clarke, B. & Faragher, R. (2013) Educating learners with Down syndrome. Routledge Education. (Includes four chapters on maths by math experts)
- Articles on number (Buckley et al.) and case studies - see http://www.down-syndrome.org/research-practice/12/1/

Additional resources

- Numbershark CD and other teaching materials - http://www.parentscanteach.co.uk/
- Range of software from Inclusive technology, http://www.inclusive.co.uk
- Time cracker Quality in Education Centre, Strathclyde University www.strath.ac.uk/qie
- See and Learn Number – developing See and Learn kits and apps to teach first maths concepts (size, shape, colour, pattern) and first counting (to adding and subtracting 1-9) - coming 2014
- Buckley, S., Bird, G. Memory Development for individuals with Down syndrome. Down Syndrome Issues and Information
- http://www.down-syndrome.org/information/memory/overview/
- Bird, G & Buckley, S. Number skills for children with Down syndrome 5-11, 11-16 years. Down Syndrome Issues and Information
- http://www.down-syndrome.org/information/number/childhood/

Reading and references

- Bird, G & Buckley, S. Number skills for children with Down syndrome 5-11, 11-16 years. Down Syndrome Issues and Information
- http://www.down-syndrome.org/information/number/childhood/
- Brigstocke, S., Hulme, C. & Nye,J. Number and arithmetic skills in children with Down syndrome.
- http://www.down-syndrome.org/reviews/2070/
- University of York website about memory – for parents and teachers
- http://www.york.ac.uk/res/wml/indexteachers.htm
- Sarnecka, B & Wright, C.E (2013) The idea of exact number: children's understanding of cardinality and equinumerosity. Cognitive Science 1-14.
- See also Sarnecka, B & Carey, S (2008) Cognition 108, 662-674.
- Ramscar, M. Dye, M et al. (2011) The enigma of number: Why children find the meanings of even small number words hard to learn and how we can help them do better. PLoS one 6 (7) e222501.

down syndrome education international

Supporting social and emotional development and managing behaviour



Supporting full social inclusion

- I want to draw attention to three aspects of social inclusion
- Building the child's self-esteem and confidence
- Supporting friendships
- Encouraging age-appropriate social behaviour and avoiding behaviour difficulties
- Full social inclusion is sometimes overlooked – and the child always seen as 'different'
- Some research shows that the more time a child is engaged in one to one activities outside the classroom the less they are socially included by the other children

Factors for developing self esteem and confidence

- Acceptance of one's identity
- Development of competence, success
- Understanding of one's own talents and gifts
- Feeling that one is loved and loveable
- Learning needs to be fun
- Being given responsibilities
- Being given choices

Supporting friendships

- Reciprocal – shared interest and activities
- Acceptance, loyalty, commitment, genuineness, common interests, intimacy
- Friends - share experiences
  - do things together
  - take care of each other
  - like one another

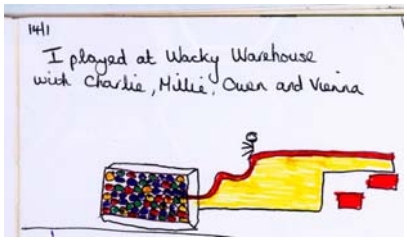
- Need for a range of friendships
- Need friends with a disability – for identity and adjustment in teenage years

Breaking down barriers to social inclusion

Limited spoken language for sharing lives and making friends

- Use communication supports
  make books – my family, weekend trip, holiday, news - using photos, pictures, postcards so that child can share his/her life with other students despite limited language
- Conversation diary – events and activities to be shared as well as help to improve spoken language

Conversation diary, 5 year old example, for sharing at school – suits any age and all types of schools



Breaking down barriers to social inclusion

Limited social and play skills for age

- Need to structure shared activities with mainstream peers at some play or break times –
- ensure that the activity is one the child with a disability can do competently and enjoys. Other children must play the game at that level to ensure the child is able to participate
- Modelling and scaffolding – by adults for the other children – adult role models matter
- Lunch time clubs

Friendships need active planning and support

- Parents need to take initiative out of school
- BUDDY SYSTEMS
- CIRCLES OF FRIENDS –need to extend beyond school
- Personal, Social and Emotional (PSE) curriculum – an opportunity to discuss
- DRAMA, SPORT, LEISURE SKILLS will help – encourage a wide range of social activities
- Social skills and confidence are learned in social situations
- PARTICIPATION is the key

Buddy system – 'my lining up friend'

Prevention of behaviour difficulties

- A key to promoting positive social behaviour is taking a proactive approach
- Important that parents establish sense of control from early and that home and school work together on any behavioural issues
- Actively teach positive social behaviours, self-regulation and ways to express emotions
- Use positive language
- Reward positive behaviours throughout the day

Prevention

- Set realistic and achievable targets
- Give warning and preparation time for transitions, changes and demands
- Give children small jobs and responsibilities
- Use visual time tables and reminders to promote co-operation and independence
- Provide ways of making choices and having some control

Preparation - going on holiday book

Prevention

- Provide positive peer role models and reward imitation of positive behaviours
- Keep child busy to avoid boredom
- Ensure appropriate communication systems are in place
- Many difficulties may be prevented by a change in routine and a change in adult behaviour at home or at school as the behaviours are predictable

Classroom preventative practices

- Adequate materials
- Balanced schedule – group size etc
- Defined play centres
- Structured transitions
  - Individualise instructions for children who need support
- Design activities that are engaging to children
- Provide clear directions
- Teach small number of rules

Social emotional teaching strategies

- Teach children to identify and express emotions

Teach and support:

- self regulation – learning to wait, supported by boundaries, by friends, by visual supports
- collaboration with peers
- friendship skills
- strategies for anger and disappointment
- social problem solving

Developing social skills

- Increase awareness of emotional responses and eye contact
- Teach sharing, turn taking, waiting, offering, receiving
- Teach communication skills – 'more', 'help', 'finish', 'yes', 'no', 'go away please', 'I'm busy'
- Encourage social interest in others – watch others and talk about what that they might be thinking and feeling – include reference to age appropriate behaviour

Developing social skills

- Teach vocabulary for emotions – from simple to complex
  - E.g. Happy, sad, tired, hungry, angry, proud, scared, use pictures, observing others, in role play
- Use a graded programme for teaching social skills – 'Talk about' or 'About me', SEAL resources
- 'Right to Know about Friendships, Sexuality, Personal safety' DSSA
- Full and explicit sex education a right

Changing difficult behaviours

- ADULT BEHAVIOUR MUST CHANGE IF YOU WANT CHILD BEHAVIOUR TO CHANGE.
- This may need a high level of support especially when problems have existed for a long time.
- Everyone concerned with the child must agree to act in a consistent manner or behaviour will not change.
- Time spent on planning how to change behaviour is essential and must involve everyone in contact with child reaching a consensus and working together.

Identifying behaviours to change

Behaviours that may …

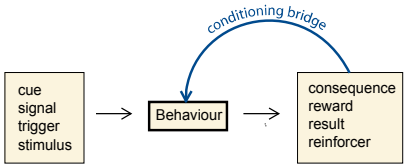
- Be harmful to the individual, others or property
- Impede the individual or others' enjoyment of an activity
- Interfere with learning or ability to carry out a task
- Draw negative attention to the child
- May be damaging to relationships with others, e.g. family members, friends

Developing a behaviour plan

PREPARATION

- Observation – identify ABCs
- Summarise results
- List possible functions
- Devise plans for decreasing unwanted behaviours and teaching new behaviours
- Data collection/recording methods
- Review of data
- RECOGNISE ADULT BEHAVIOUR MUST CHANGE

The ABC of behaviour



Objective, accurate observations essential

Date	Antecedent	Behaviour	Consequence

Class timetable version

Monday	Tuesday	Weds	Thursday	Friday
Literacy				
Break				
Music				
Lunch	Lunch	Lunch	Lunch	Lunch
Numeracy				
Break				
P.E.				

Understanding the observations

- Data analysis – compare and analyse information
- What patterns are there?
- What are the conditions when the behaviour is most likely to occur? (antecedents)
- What are the conditions when the behaviour is least likely to occur?
- What are the probable consequences that maintain the behaviour?
- What are the functions of the behaviour?
  Gain attention? Avoid activity? Seek excitement? Other?

Can we understand the functions?

- Throwing things – during play, at meal times?
- Hitting or pushing others
- Pulling hair
- Spitting
- Eating and drinking, difficult mealtimes?
- Difficult bed times
- Running off
- Refusal behaviours – avoidance, laying down on floor
- Grinding teeth – other noises
- Swearing?

- ?

Summarise results, devise a plan

- List possible functions – for avoidance?, attention?, control?, to reduce anxiety?
- Devise plans for:
  - decreasing unwanted behaviours
  - teach new replacement/alternative behaviours (skills)
  - what rewards can be used for positive behaviours and new skills?
  - what behaviours can be prevented?
  - decide how to respond to unwanted behaviours
- Decide how to monitor progress
- Identify training needs and resources

Strategies for responding to difficult behaviours

- Calm, consistent responses and consequences
- Always consider consequences from child's perspective
- Provide opportunities for positive attention and praise as soon as possible
- Personal reward systems – need to do motivator assessment
- Social stories
- Clear visual communication systems
- Calm, uncluttered, quiet environments

Example: social story

Example – to stop negative behaviour to parent at going home time

Photographs and sentences show the following story:

- I get my bag and coat
- I say goodbye to my friends
- I walk across the playground
- I see my Mum
- I say 'hello Mum'
- We smile
- We walk home together

The story is read several times just before leaving school.

Strategies for responding to difficult behaviours

- Attention should be withdrawn both verbally and non-verbally ('emotional ignoring')
- Social interaction should be resumed, without reference to the inappropriate behaviour after 30 seconds (or so)
- Discussion of bad behaviour should be avoided completely – discussion gives room for negotiation, social interaction, displays of emotion are rewarding

How to monitor progress

- Have frequencies of targeted behaviours changed?
- Have frequencies of new behaviours being taught increased?
- How do you share information between the team, especially parents?
- Review data every two weeks, for some behaviours every week, share and discuss experiences
- When to change the plan
- Review your rewards
- Check on consistency

Examples: coming in from play

Intervention for coming in after playtime

- 'Job' to do – hold door, give message, hold bell
- Come in before bell
- Hold hand before bell rings to prevent running
- Reward for coming in when bell goes – child choose
- Do not reinforce refusal – look away, do not show emotion, do not allow child to run off and do other things.
- Check out classroom situation re precipitating factors

Examples: laying down - when moving about building

- Stop reinforcing behaviour – pause, no eye contact, no discussion
- After a while (20 secs) ask child to come with you nicely – use gesture
- Repeat as above if the child responds negatively
- Praise warmly when child is on her feet and moving – wait till she is, before engaging
- Use prevention strategies – from the ABC record you will know when this behaviour is likely to occur

Examples: Magic pots and sparkles - for praising in class

- Useful for children who do not have assistants
- Child makes a magic pot for the teacher
- Teacher notices good behaviour in class and asks child to place an item in his/her magic pot
- At a suitable time for the teacher, the teacher and child empty the pot and talk about the items - what the teacher noticed, to praise the child again and reinforce positive behaviours
- Sparkles are reward cards that anyone can give to anyone to acknowledge positive behaviour – whole class/school system

Examples: 5 case studies and interventions

Strategies to address challenging behaviour in young children with Down syndrome Kathleen Feeley and Emily Jones

- Challenging behaviours linked with poor sleep
- Noncompliance – refusals
- Inappropriate hugging
- Avoidance
- Self-stimulatory behaviours

Paper http://www.down-syndrome.org/case-studies/2008/

Jones, Neil, Feeley (2013) Enhancing learning for children with Down syndrome in R. Faragher & B. Clarke. Educating learners with Down syndrome. Routledge – also Gilmore/Cuskelly on motivation in same book.

Recommended reading and resources

- Social development for individuals with Down syndrome – An overview Down Syndrome Issues and Information Series Sue Buckley, Gillian Bird, Ben Sacks. http://www.dseusa.org/en-us/resources/
- How do I feel? and I have feelings too – Books by Joan Green. http://www.dseusa.org/en-us/resources/
- The voice of the child. J Hooton and A Westaway http://www.down-syndrome.org/practice/2064/
- Right to Know CD 2004 – Down Syndrome Society of South Australia

Woodbine House – excellent series by Terri Couwenhoven

- **Teaching Children with Down Syndrome about Their Bodies, Boundaries, and Sexuality** A Guide for Parents and Professionals
- **The Girls' Guide to Growing Up**
- **The Boys' Guide to Growing Up**

down syndrome
education international
discovering potential • transforming lives

Evidence for the benefits of inclusion in education and the keys to success





Our research on the issues

- In 1987 we conducted a survey with 90 families of teenagers in Hampshire – almost the total group of those living at home.
- The aim was to find out what life was like for teenagers with Down syndrome and their families – all aspects, language, academic progress, practical skills, leisure activities, health, behaviour, family needs. Published as a book but a depressing read – reflects lack of education and opportunities rather than having Down syndrome
- In 1999 we decided to repeat the survey to see if next generation were benefiting from changes in social attitudes and educational expectations

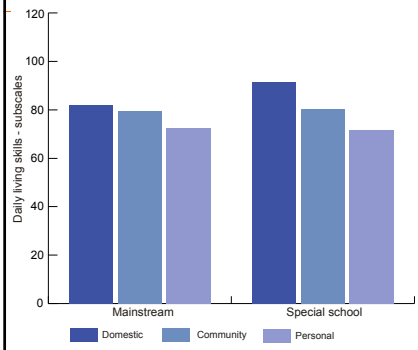
Evidence for the benefits of inclusion
Inclusion study – Portsmouth UK Buckley, Bird, Sacks & Archer

- Compared achievements of all teenagers with Down syndrome in 1987 and in 2000 in one county
- In 1987 – all in special education classrooms (SLD)
- In 1999 – about one-third full inclusion from 5 yrs
- Compared special class (SLD & MLD) and full inclusion outcomes with carefully matched groups
- One area of Hampshire county included children in mainstream schools from 1988, earlier than the rest of the county and adapted the teaching to address their needs
- No difference between the groups in ability or social background

Main findings of the study

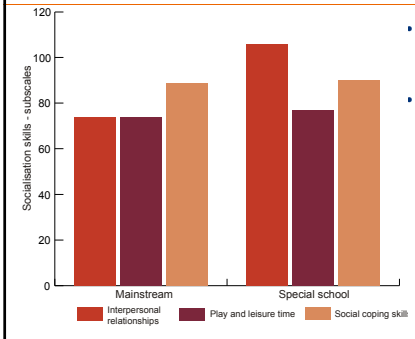
- No progress from 1988-2000 for special class outcomes – this was a surprise, we expected progress
- Significant and specific educational benefits for inclusion
- Teenagers fully included in mainstream classes
  - gains of more than 2 years in spoken language skills and 3 years in reading and writing
  - gains in maths, general knowledge and in social independence
  - no differences in personal independence or social contacts out of school
  - tend to have better behaviour

Daily living skills – inclusion study



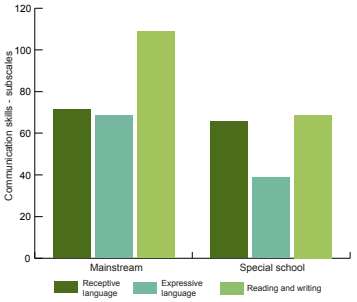
- No significant differences on daily living skills
- Even though special schools may say they make these a priority rather than academics
- Measure is Vineland Adaptive Behaviour Scale

Socialisation skills – inclusion study



- Special school group are 2 years older on average
- Interpersonal relationships, the over 17 age group only produce difference – more special friends, boyfriends, girlfriends reported by special school students

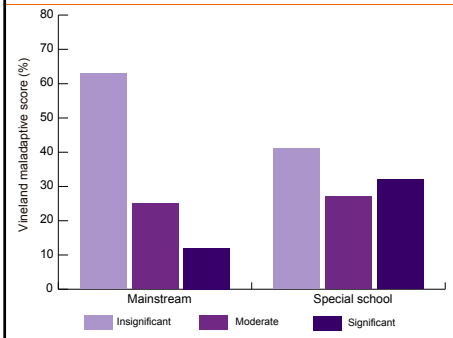
Language and literacy -inclusion study



Vineland Adaptive behaviour Scale – age scores

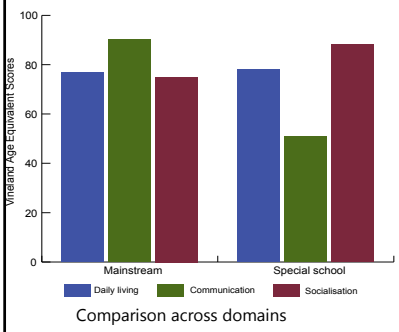
- Very significant gains in literacy (mean gain 3.3yrs) and expressive language (mean gain 2.5 yrs) in mainstream education
- Children fully included in mainstream classrooms
- Access the same curriculum with individual targets and in-class support
- Both groups had same range of abilities and social backgrounds at start of school

Difficult behaviours – inclusion study



- Behaviour better in mainstream settings
- 10% with significant levels of behaviour difficulties in mainstream versus 30% in special schools

Closing the speech-language/non-verbal ability gap



Comparison across domains

- The mainstreamed children are in a much richer spoken language world
- The mainstreamed children receive more literacy instruction
- The mainstreamed children have a much higher involvement in supported literacy as they are in all lessons

Closing the language/MA gap – changing the 'profile'

- The last slide demonstrates that it is possible to improve the speech, language and literacy skills of children with Down syndrome and bring them in line with their other skills.
- The immersion in mainstream classrooms and the resulting immersion in reading activities may explain this gain – even for non-readers
- These results support the view that speech and language is held back by hearing and auditory processing difficulties – print makes the language visual

What has produced these gains?

1. Adapting the way we teach to the children's specific speech, language and cognitive profile, allowing them to access the curriculum and to learn, with support
2. Full inclusion in the mainstream world from infancy – preschool and school

- Learning with and from age-appropriate peers
- The other children are role models for language, play and learning – classroom language and social expectations are age-appropriate
- BOTH ARE KEY TO THE POSITIVE OUTCOMES
- All other inclusion studies agree that inclusion done well gives an educational advantage (see references)

What is inclusion in education?

- Belonging to your school and community
- Being of equal value
- With recognition of the same needs, rights
- Removal of barriers - to enable participation and expression
- Learning and developing within this context
- Using the framework of the curriculum

What are the educational targets?

- To become socially competent – learn the social rules, manage emotions and make friends
- To develop language and literacy skills
- To develop math skills
- To learn about the world around – science, history, geography
- To develop physical abilities
- To engage in art, drama and music
- To find strengths and develop self-esteem and self-confidence
- The same as all children – so what needs to change?

Some key principles

Literacy and math – the targets are the same, progress requires learning the same building blocks - no short cuts

- Smaller steps – more explicit teaching and modelling
- More time to learn – more repetition and practice
- Generalisation needs to be taught

Science, geography, history – most topics can easily be simplified and often one topic not dependent on knowing another. Adds to general knowledge – link to the child's world, the world of the family – what siblings may be learning or doing and to the community and culture

Take care IEPs do not limit student

Range of skills and abilities

- Students with Down syndrome differ widely in their understanding, abilities and skills
- General principles are useful but teachers must plan for the individual
- Students with Down syndrome may not always be the most 'delayed' in the class
- It is not helpful to think of them as 'like younger children'
- They will be delayed in conceptual understanding but need access to age appropriate content
- The following principles will optimise learning for most students

Adaptations to teaching

- Teachers need to understand the learning profile
- Learn about the individual – through records and interaction/teaching
- Appreciate the need for supporting listening skills and how they can do this through visual supports
- Appreciate the need for language teaching – vocabulary, grammar, conversation, communication
- The need for activities and resources that engage the individual
- Understand the need for development of the individual across the curriculum and within the school community

Individualised learning

Too much individualised teaching in a 1:1 setting can:

- reduce exposure to age appropriate models of behaviour/language and opportunities for pupil to pupil interaction
- lead to social exclusion, feeling different
- make it difficult for staff - teacher and/or assistant roles
- may be too demanding for pupil and assistant

Our experience of inclusion

- In Portsmouth we began including children in their local mainstream schools in 1988 – with full support of the LA and parents. We still provide the inclusion support service to children and young people in local schools.
- 2 main drivers in 1988 – still the same
- Psychological: development is social, all children are profoundly influenced by learning opportunities and learning from other children – cognitive, language, academic and social learning
- Social: Identity is socially acquired – Who am I? How do others see me? Where do I belong? Changing attitudes, stopping the rejection and exclusion of our children

How are children included?

- Full inclusion in the local mainstream school
- Full inclusion in an age appropriate class
- In class support from teaching assistant (TA) – 15 to 30 hours per week according to need
- Accessing the same curriculum – differentiated for each learner
- Adapted teaching methods to the profile – visual learner, language delayed, sensory impairments, motor needs
- Move up each year with class

Inclusion support in Portsmouth

- Provided by 'specialists'
- At least one monitoring visit each term
- Support for access to curriculum, social development and behaviour, and for focused interventions
- Training for staff – teachers and assistants, parents, publications, information
- Regular liaison with parents and school team – equal access to service by parents and professionals
- A similar model is used in other successful Local Authorities

What have we learned since 1988?

- We have learned by working with schools locally and across the UK - provide a lot of training
- ATTITUDES are THE KEY TO SUCCESS – that is believing in inclusion and 'seeing child first', not the disability
- Commitment from the top, Head and Governors
- Planning at whole school, class and individual levels
- Good communication – a team approach
- Willingness to learn and to problem solve

Attitudes and rights

- We learned very early how very different schools and teachers can be
- We also learned about the need to address attitudes and beliefs about Down syndrome
- We had some of our most able students rejected even though their work was within the range in the class
- We had some of our most disabled students welcomed and fully included
- This is still happening despite disability discrimination law
- It is a professional duty for a teacher to meet a child's needs – with necessary support and training - not an option

Head and Governor's responsibilities

- Recognition that the evidence shows that inclusive schools are the best for all pupils and in an inclusive ethos academic results go up
- Inclusive ethos = respect for individuals, support for individual strengths, build self-esteem, self-respect and respect for others, build mutually supportive and caring environments in which everyone flourishes – pupils and staff
- "Everyone has had a good day and wants to come back tomorrow" – One Head's definition of a successful school

Joyce, junior school head teacher

Key points

- *'It has been a huge professional development for me – to understand these children can cope well in mainstream school*
- *That must be the same for all the staff who have worked with the children and will impact on all their teaching*
- *For recognising individual needs and how to deal with these*
- *Very positive'*

Bronwen and Joe (year 4, 8-9 years)

Whole school ethos = training

- Inclusion training for all – will lead to whole school change – this should be mandatory
- Attitudes – all staff need to believe in inclusion
- Disability awareness training for all
- Information on specific disabilities
- Whole school responsibility
- Special educational needs co-ordinator (SENCo) or inclusion manager should be part of senior management team – this shows school's priorities and commitment to SEN

Karen, junior school Special Educational Needs Co-ordinator (Senco) (ages 7-11) - from Downsed Primary Inclusion DVD

Key points

- *'At first teachers made comments that these were not the sort of children they expected to be teaching*
- *It has changed their outlook*
- *We get pleasure from them – a sense of achievement*
- *When one of the children, who is not very sociable, speaks with staff, we think 'we did that here'.*
- *It is good for the staff and puts development into perspective*
- *Sometimes we expect big leaps from children; the small steps are just as good'.*

Flexibility needed

- No – 'we always/only do it this way!'
- A range of teaching methods – team teaching, small groups, peer tutoring, working with teaching assistants
- Flexible and planned use of resources – people, space, materials, information
- Training – for staff at all levels
- Time management – for planning, meetings
- Remembering this is for ALL children

Parent involvement

- Partnership with parents based on mutual respect is essential to success and to maximising learning and social opportunities
- Parents are usually experts on their child's disability or needs and have played a major part in early education programmes as teacher if they have Down syndrome.
- They can continue to support teaching aims and help their child consolidate and generalise learning out of school

Supported by key recommendations from Fox, Farrell, Davis

Four key factors schools need to look at (2 year study, 18 English schools)

- The centrality of the teacher in the management of the inclusion of the child
- A complementary rather than compensatory relationship between the support and class teacher
- The capacity of the class curriculum to include and involve the pupil with Down syndrome
- The quality of communication between the teacher and pupil, teacher and teaching assistant, teacher and advisory teacher, teacher and parents/carers

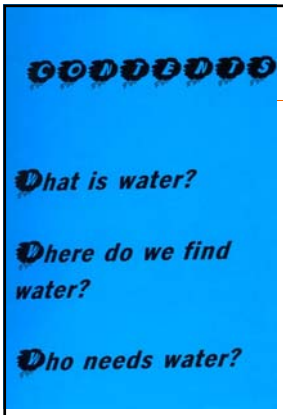
Differentiation, age 8

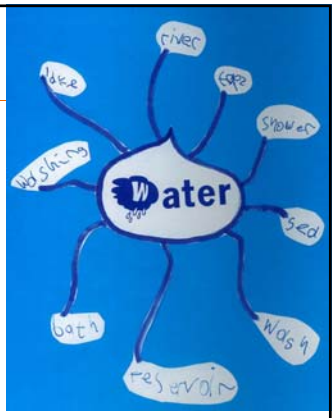
Class project about water.

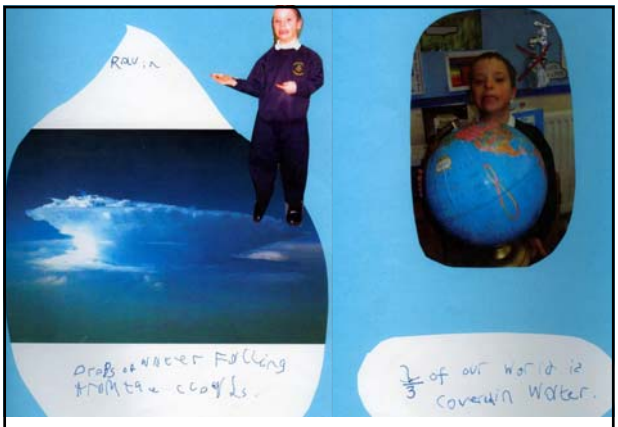
Key questions and answers; a word web.

Vocabulary and sentences explain:

rain, cloud, river, lake, pond, reservoir, people and water use, transport, contaminated water







Access the curriculum in the classroom! E.g. numeracy lesson, adding coin values

Challenges for parents

- Too many families find that getting their child included is still a battle – despite their child's right to a place in a mainstream school within their community
- Some face negative attitudes in schools
- Some face negative attitudes in Education Authorities
- Many feel that it is a constant struggle – each year they find themselves needing to advocate for their child, they see poor teaching practice and unwillingness to learn about their child's needs, to value their child
- Many are on the end of the 'bad news book' only hearing the negatives

The good news – it can benefit everyone

- While we hear about the bad news and bad practice, many families, children and schools have a great time
- Children with Down syndrome of all levels of ability and need flourish and make good academic progress, they have real friends in school and community
- Teachers tell us how much all the children in the class have benefited and how well they understand and support the child with Down syndrome
- Teachers tell us how much they have learned and how much their teaching skills for all children have benefited

Annette, SENCo, Secondary School

Key points

- *'Our experience has been phenomenal in terms of our level of understanding of learning – what learning is about*
- *We've had to rethink our preconceptions about what it is to be academic*
- *and what people need to have to achieve*
- *It has broadened our whole awareness of education'*

References – Hampshire Inclusion studies

- 1. Buckley, S., Bird, G., Sacks, B., & Archer, T. (2002). A comparison of mainstream and special education for teenagers with Down syndrome: Implications for parents and teachers. *Down Syndrome Research and Practice*. 9 (3) pp 54-67 (with full data tables).
- 2. Buckley, S., Bird, G. & Sacks. B. (2006) Evidence that we can change the profile from a study of inclusive education. *Down Syndrome Research and Practice*. 9 (3) pp. 51-53.
- 3. Buckley, S., Bird, G., Sacks, B., & Archer, T. (2002). The achievements of teenagers with Down syndrome. *Down Syndrome News and Update, 2(3),* 90-96.
- 4. Buckley, S. J. & Sacks, B. (1987). *The adolescent with Down syndrome: Life for the teenager and for the family.* Portsmouth, England: University of Portsmouth.
- Articles 1-3 are available in full on http://www.down-syndrome.org/

References - 'all other inclusion studies agree'

- All other studies of inclusion for children with Down syndrome – mainly rather smaller than ours – agree that the children show academic gains and language gains

- S. Turner, A. Alborz & V. Gayle (2007) Predictors of academic attainments of young people with Down's syndrome. Journal of Intellectual Disability Research 52(5):380-392,
- S Fox, P Farrell P Davis (2004) Factors associated with the effective inclusion of primary-aged pupils with Down's syndrome British Journal of Special Education 31 (4) 184-190
- De Graaf, G., van Hove, G & Haveman M (2013) More academics in regular schools? The effect of regular versus special school placement on academic skills in Dutch primary school students with Down syndrome. *J Intell Disab Research 57, 21-38*