Understanding the needs of children with Down syndrome – speech, language and cognitive profiles

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Down Syndrome Education International

- DownsEd International exists to advance the education and development of individuals with Down syndrome worldwide through research, information and support.
- Since 1980, we have had an active programme of research and provided services to children, families and schools.
- This has enabled our team of psychologists 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 see www.downsed.org

Acknowledgements

- Leslie, D lys and Sarah Duffen for the inspiration for the reading research that got us started in 1980
- All the children, parents and professionals who take part in our studies
- Staff and students at DownsEd and University of Portsmouth since 1980: Liz Wood, Gillian Bird, John MacDonald, Irene Broadley, Rebecca Stores, Angela Byrne, Glynis Laws, Michele Appleton, Jo Nye, Ben Sacks, Tamsin Archer, Amanda Wood, Janet Myers, Kate Hillier, Clare Tatterson, Julie Hughes, Becky Baxter
- Team of design, IT and web experts including Linda Hall, Howard Hurd and Frank Buckley
- All have contributed to this work, to my understanding of the issues and to this presentation

Overview

- Effective interventions, education and therapies need to be based on knowledge of a child’s specific learning needs
- Effective intervention needs to acknowledge the social nature of development and learning
- Providing therapy and education programmes designed to address specific learning needs and delivered in an inclusive preschool system will be the most effective
- What evidence do we have to support this view?

The evidence for a specific phenotype or profile of strengths/weaknesses

- See Deborah J. Fidler (Colorado State University) for a recent review of the evidence – preschool age
- Down Syndrome Research and Practice 9 (3) special section on the specific profile online
Effects of Down syndrome on development?

- Not just a pattern of global delay
- a specific profile of learning strengths and difficulties – THE PHENOTYPE
- These specific learning strengths and difficulties are increasingly well understood
- The children’s difficulties can be addressed with effective interventions
- The children’s strengths can be used to support learning

Development is a dynamic process

- Development is NOT fixed at birth
- Brains are affected by input and activity
- Development is a social, interactive process – influenced by the quality of social relationships, social opportunities and learning environments
- Inclusion - in the family, in the community and in the school - is essential for optimal progress
- We can all make a difference
- INCLUSION PLUS FOCUSED INTERVENTIONS

The specific developmental profile associated with Down syndrome – overview 1

- A profile of moderate to severe learning difficulties – a wide range of individual differences
- Good social interactive skills, good empathy and positive personalities
- Good behaviour relative to mental ability and communication skills
- Sensitive to failure and to emotional cues
- Delayed motor development – affects learning
- Good practical self-help/daily living skills over time

The specific developmental profile associated with Down syndrome – overview 2

- Specific speech and language delays
- Speech and language delayed relative to non-verbal mental abilities
- Significant risk of vision and hearing difficulties
- Strengths in use of gesture and motor responses
- Memory strengths and weaknesses
- Significant delay in development of working memory – especially verbal component
- Strengths in visual processing and visual memory

Typical profile associated with Down syndrome (see Robin Chapman, Robert Hodapp, & Deborah Fidler)

<table>
<thead>
<tr>
<th>Weaknesses</th>
<th>Non-Verbal Mental Age</th>
<th>Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing and Vision</td>
<td>Motor Skills</td>
<td>Social understanding, empathy &amp; social skills</td>
</tr>
<tr>
<td>Speech and Language</td>
<td>Information processing</td>
<td>Self-help and daily living skills</td>
</tr>
<tr>
<td>Verbal short-term memory</td>
<td>Visual short-term memory</td>
<td>Visual learning a strength</td>
</tr>
<tr>
<td>Learning from listening difficult</td>
<td>Reading</td>
<td></td>
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</tbody>
</table>

Speech and language profile for children with Down syndrome

- Language is delayed but an uneven profile
- Communication skills are usually good
- Vocabulary is delayed but grows steadily - understanding is ahead of expression
- Grammar is more difficult – tend to be telegraphic talkers - understanding is ahead of expression
- Clear speech is more difficult
The importance of speech and language for all aspects of development

- 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

Improving speech and language

- Need to work on all aspects
- Speech clarity
- Vocabulary
- Grammar
- Communication
- Use our checklists plus observation diary for assessment and planning
- Progress with grammar is linked to total vocabulary size – see next slide
- (See Dsii Speech and Language Materials)

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

Working memory

- Working memory is the immediate memory system that supports all mental activity
- Working memory has two stores one for visual/spatial information and one for spoken information –
  - These stores hold information for about 2 seconds
- Short-term verbal memory span improves with age and can be estimated with digit tasks
- (See Dsii Working Memory book)

Working memory - development

- 4 year old 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 visual spans are better than their verbal spans
- In typical development, span is influenced by increases in speech perception and production rates and by reading ability
- Reading ability, speech and language knowledge and memory development are interactive, gains in one produce gains in another
Working memory is important for all children 1

- 'Working memory is the mental workplace in which information can be temporarily stored and manipulated during complex everyday activities such as understanding language and doing mental arithmetic'.
- 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

Working memory is important for all children 2

- ‘Any task where the child is required to process new information and to integrate it with stored knowledge – learned or just encountered’.
- Children in reception classes with poor working memory measures for age scored poorly later in the Standard Achievement Tests.
  - Children’s Working Memory Battery. Psychological Corporation.

Implications for education 1

Build on social/emotional strengths
- build on emotional responsiveness – encourage social communication, looking, smiling, gesture
- talk to and play naturally with children
- build on social understanding - encourage ‘good’ behaviour, starting with settled feeding and sleeping routines
- Always encourage AGE appropriate behaviour – do not ‘baby’ or ‘spoil’ child, have clear expectations and boundaries

Implications for education 2

Compensate for ‘weaknesses’
- hearing, vision – regular checks, good health care – speak clearly, use signs, limit background noise
- encourage and teach speech sound discrimination
  - SPEECH SOUND DISCRIMINATION IS IMPORTANT FOR TALKING AND FOR WORKING MEMORY
  - (Speech sound discrimination skills develop significantly in the first 12 months of life)
- Provide speech sound practice, word and sentence practice - talking needs to be worked on

Implications for education 3

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

Implications for education 3

- Address working memory difficulties with sound and word discrimination games from infancy, improving spoken language development and playing memory games
- Use visual supports for all learning and visual timetables in preschool
- Encourage age-appropriate social behaviour from early – with other children as good role models
- Ensure warm, supportive relationships and environment
### Implications for education

- Encourage motor development at all times
- Motor skills require active practice – keep child active – include in all physical education – balance takes longer to develop
- Encourage active movement through play
- Sporting skills are good for fitness and for social opportunities
- Handwriting will come with practice – ensure child is seated in right size furniture, feet on floor
- Teach computer skills – mouse and keyboard

### Using signs as a bridge to talking

- Signs help to compensate for hearing loss
- Children with Down syndrome are good at gesture
- Being able to sign reduces frustration, as spoken words are delayed relative to comprehension
- Signs support good communication and language teaching
- Signs aid comprehension of new words – speech alone is not sufficient

### The benefits of using signs

- Signs aid intelligibility when speech not clear
- Children supported by signing have larger vocabularies when they start school
- BUT REMEMBER
  - Speech sound work should be a priority from infancy, alongside signing
  - The focus should always be on using signing as a bridge to speaking and by school age signs should only be used as necessary for individual children
- Teaching talking is the priority in school

### The benefits of teaching reading

- Spelling and phonics support the development of articulation and phonology so improve speech intelligibility
- Research studies show that teaching reading improves speech, language and working memory skills
- Children do not need to be independent readers to gain these benefits – supported reading will produce at least some of the gains

### Teaching reading to teach talking

- Learning from listening is difficult and learning from looking is easier
- Printed words seem easier to remember than spoken words
- Reading activities can teach new vocabulary and new grammar
- Reading supports spoken practice of words and sentences
- ‘Teaching reading to teach talking’
- (See DSii series Reading Books for all age groups)

### Inclusion study (Buckley, Bird, Sacks, Archer, 2002)

- **Very significant gains in literacy** (mean gain 3.3yrs) and expressive language (mean gain 2.5yrs) 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**
Closing the speech-language/non-verbal ability gap — inclusion study (Buckley, Bird, Sacks & Archer, 2002)

- 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

Comparison across domains

Closing the language/non-verbal MA gap — changing the ‘phenotype’

- 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. Full inclusion in the mainstream world from infancy – preschool and school
2. Learning from and with age-appropriate peers
3. The children are role models for language, play and learning – classroom language and expectations are age-appropriate
4. Adapting the way we teach to the children’s specific speech, language and cognitive profile, allowing them to access the curriculum and to learn
   • BOTH ARE KEY TO THE POSITIVE OUTCOMES

Inclusion study – Portsmouth UK (Buckley, Bird, Sacks & Archer 2002)

- 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 from 1988, earlier than the rest of the county and adapted the teaching to address their needs
  - No difference in ability or social background at 5

The benefits of inclusion in school

- No progress 1988-2000 for special class outcomes
- Significant 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

Difficult behaviours – inclusion study

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

Education and intervention resources

Down Syndrome Issues and Information series on Development and Education - Range of small books on all aspects of development by age group (0-5, 5-11, 11-16) – an overview, speech and language, motor skills, social development, reading and writing, number and school issues
• Available as a pack or as individual books
• On-line versions coming soon as funding permits. Videos on 1. inclusion in school 2. development 0-18mths 3. speech and language 18mth – 4 yrs.
• see website at www.downsed.org for purchase details.

Further resources - preschool

• Early Support  www.earlysupport.org.uk
• Developmental journal for babies and children with Down syndrome – birth to 5 years
• - a record to celebrate achievement, to share with all professionals and to help to identify areas of need
• Further articles on profile issues by Debbie Fidler and others in Down Syndrome Research and Practice volumes 10 and 11 – shortly to be available online see www.downsed.org

References – Hampshire Inclusion studies

• Articles are available in full on http://www.down-syndrome.org/.
• All available in print from The Down Syndrome Educational Trust

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Information and advice provided by Down Syndrome Education International builds on 30 years of research examining how to meet the learning needs of people with Down syndrome.

Over 70% of this work is funded by voluntary donations.

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