

Mathematics Support: helping the neurodiverse student overcome their barriers.



### The Eureka Centre for Mathematical Confidence



Provision of 1-1 support:

- Students with neurodiverse needs
- Low in mathematical confidence



### This session

- Rationale
- Dyslexia
- Dyspraxia
- AD(H)D
- Asperger's Syndrome
- Dyscalculia
- Conclusion

### Rationale

- Increasingly diverse population in H.E.
- Legal requirements
  - to anticipate / resolve barriers
  - to make "reasonable adjustments" for access to goods and services
- So that:
- Disabled students are not unjustly disadvantaged

Dyslexia

"likely to be present at birth and to be lifelong in its effects. It is characterised by difficulties with phonological processing, rapid naming, working memory, processing speed and the automatic development of skills that may not match up to an individual's other cognitive abilities. It tends to be resistant to conventional teaching methods, but its effects can be mitigated by appropriately specific intervention..."

(BDA, 2007)

Dyslexic people are likely to think visually or laterally in some learning situations where neuro-typicals would be more likely to think verbally or logically.

### **Problem Solving**





Dyslexic	80%	20%
Non-Dyslexic	55%	45%

# Kate: Mathematics

### Strengths

- Basic number (96<sup>th</sup> percentile)
- Visual memory
- Reasoning skills
- Mathematics

### Weaknesses

- Word recognition
- Reading speed and accuracy (1st percentile)
- Poor working memory
- Frequently loses her place

### Reading



## Misreading: Similar words

Word	Read as:
Eigenvalue	Eigenvector
Diagram	Diameter
Integer	Integral
Fission	Fusion
Positive	Positron
3	5
В	E

Font Sans Serif: Arial Verdana Comic Sans Trebuchet

# Copying



- From Line to Line
- From Page to Page
- Calculator to Page to Screen
- ≤ may change to <</li>
- Cos t may change to Cot t
- Cos h may change to Cosh h

### Instructional terms

- Evaluate
- Generalise
- Prove

- Show
- Solve
- Simplify

 Unique terms with different expected output

### Notes



- Simultaneous notes/listen
- Keep pace in lectures



- Prefers to listen
- Relies on full notes beforehand
- Accessible format

# Words, Symbols, Procedure

Making and recalling associations

e.g. differentiation
$$\frac{dy}{dx}$$

$$y=3x^2$$
,  $\frac{dy}{dx}=6x$ 

# Nick: Economics

### Strengths

### Weaknesses

- Basic number
- Visual memory
- Vocabulary

- Slow processing speed
- Poor sequencing ability
- Working Memory
- Visual stress



### Notation

(a)  $\frac{a}{b} + \frac{c}{d}$  (b)  $\frac{a}{b} + \frac{c}{d}$  (c)  $\frac{a}{b} + \frac{c}{d}$ 

 $\begin{array}{ccc} a & b & J & f \\ \hline \mathbf{u}^{\mathbf{s}^{\mathbf{n}} \!n} \\} \\n} \\ \\n} n^{n$ 

### Assessment





- CAAs
  - Answer only
  - Transcription errors





- Recall in exam
  - theorems
  - definitions
  - formulae

Dyspraxia

"An impairment or immaturity of the organisation of movement. It is an immaturity in the way that the brain processes information, which results in messages not being properly or fully transmitted...Dyspraxia affects the planning of what you do and how you do it. It is associated with problems of perception, language and thought." (Dyspraxia Foundation, 2008)



# Andrew: Civil Engineering

### Strengths

### Weaknesses

- Non-verbal reasoning (95%)
- Basic number skills (95%)
- Reading comprehension (89%)
- Creative, determined

- Processing speed (9%)
- Working Memory (5%)
- Writing speed (1%)

# Presentation on page

#### starts 4 X 4 ends non-aligned 4 X 3



Stablo Pen

### Squared Paper



- Hand/eye coordination
- Work in the field
- Taking measurements

 Personal organisation







January 2014

AD(H)D



# **Anton: Mathematics**

### Strengths

#### Weaknesses

- Good mathematician
- Very sociable
- Good literacy skills
- Creative/intuitive
- High energy level

- Bored easily
- Lack organisation
- Easily distracted
- Shift between incomplete activities



### Keeping track



# Asperger's Syndrome



# David: Geography

### Strengths

### Weaknesses

- Determined
- Focused
- Attention to detail
- Hit deadlines
- Independent learners

- Isolated
- Working in groups
- Social behaviour rules
- Non-verbal cues
- Diagrams/visual learning
- Hypersensitive

### Transition Issues: hypersensitivity





#### Street survey



### Group work



### "I thought I'd make friends, but I didn't"

'David' (2009)

January 2014

### Dyscalculia

Dyscalculia is a condition that affects the ability to acquire arithmetical skills. Dyscalculic learners may have difficulty understanding simple number concepts, lack an intuitive grasp of numbers, and have problems learning number facts and procedures. Even if they produce a correct answer or use a correct method, they may do so mechanically and without confidence National Numeracy Strategy (2001)

# **Anna: Ceramics**

### Strengths

- Reading
- Phonological processing
- Writing skills
- Visual memory
- Perceptual organisation

### Weaknesses

- Numeracy (0.4 percentile)
- Seeing relationships between numbers
- Working Memory
- Non-verbal Reasoning
- Symbolic material

# Mixing a Glaze Powder 50g

Glaze A	%	Glaze B
Barium carbonate	35	Wood ash
Nepheline syenite	50	Nepheline syenite
China clay	15	Whiting



%

60

30

10

# In the Drop-In:

- Reading the notes
- Recall of formulae/notation
- Alignment of digits
- Very disorganised
- Slow processing

Partnership with Disability Services

Thank you