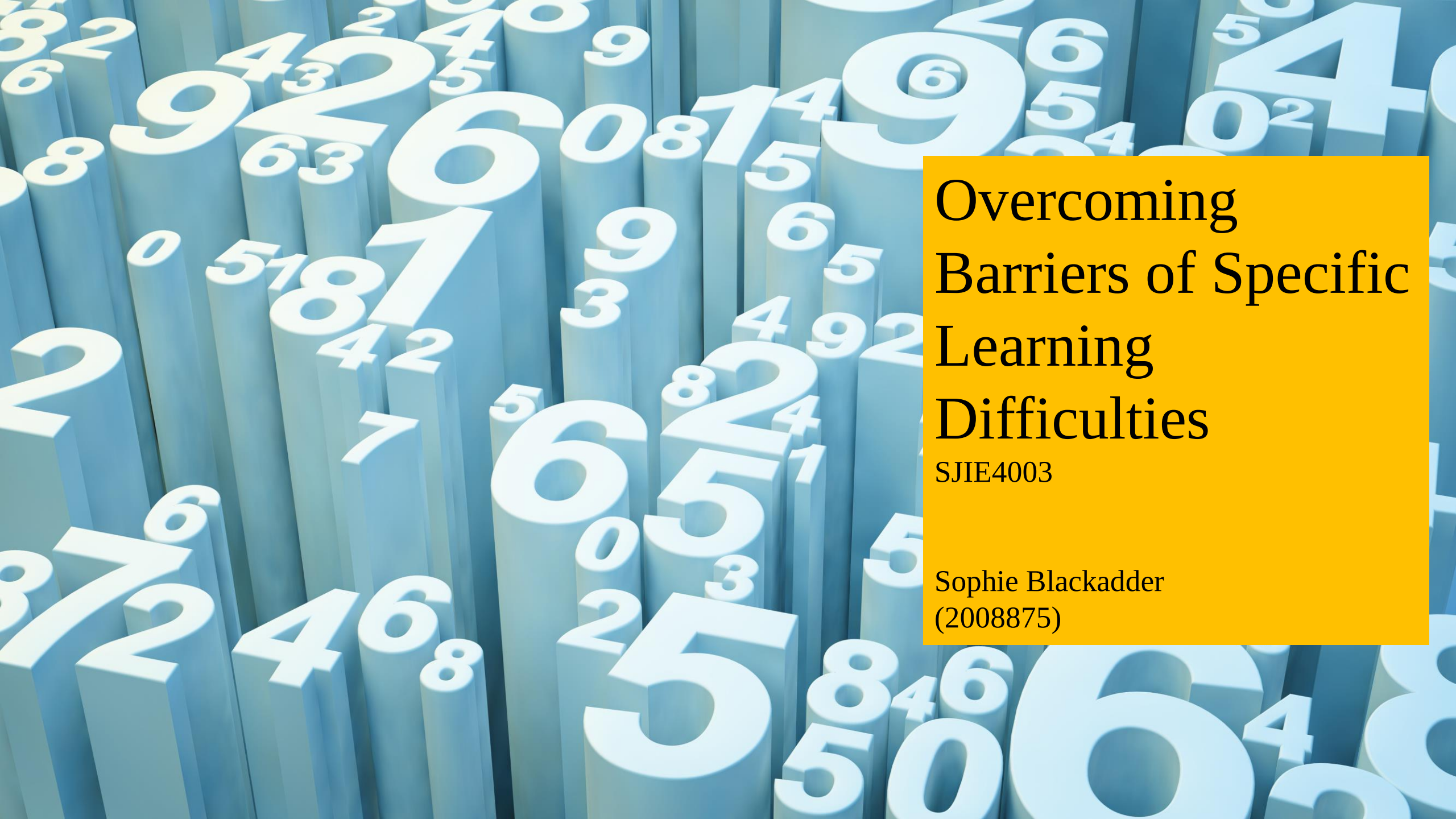


The background of the slide is a dense, 3D-rendered field of numbers. The numbers are in various shades of light blue and white, creating a sense of depth and movement. They are scattered across the entire frame, with some numbers appearing larger and more prominent than others. The overall effect is a complex, abstract pattern of digits.

Overcoming Barriers of Specific Learning Difficulties

SJIE4003

Sophie Blackadder
(2008875)

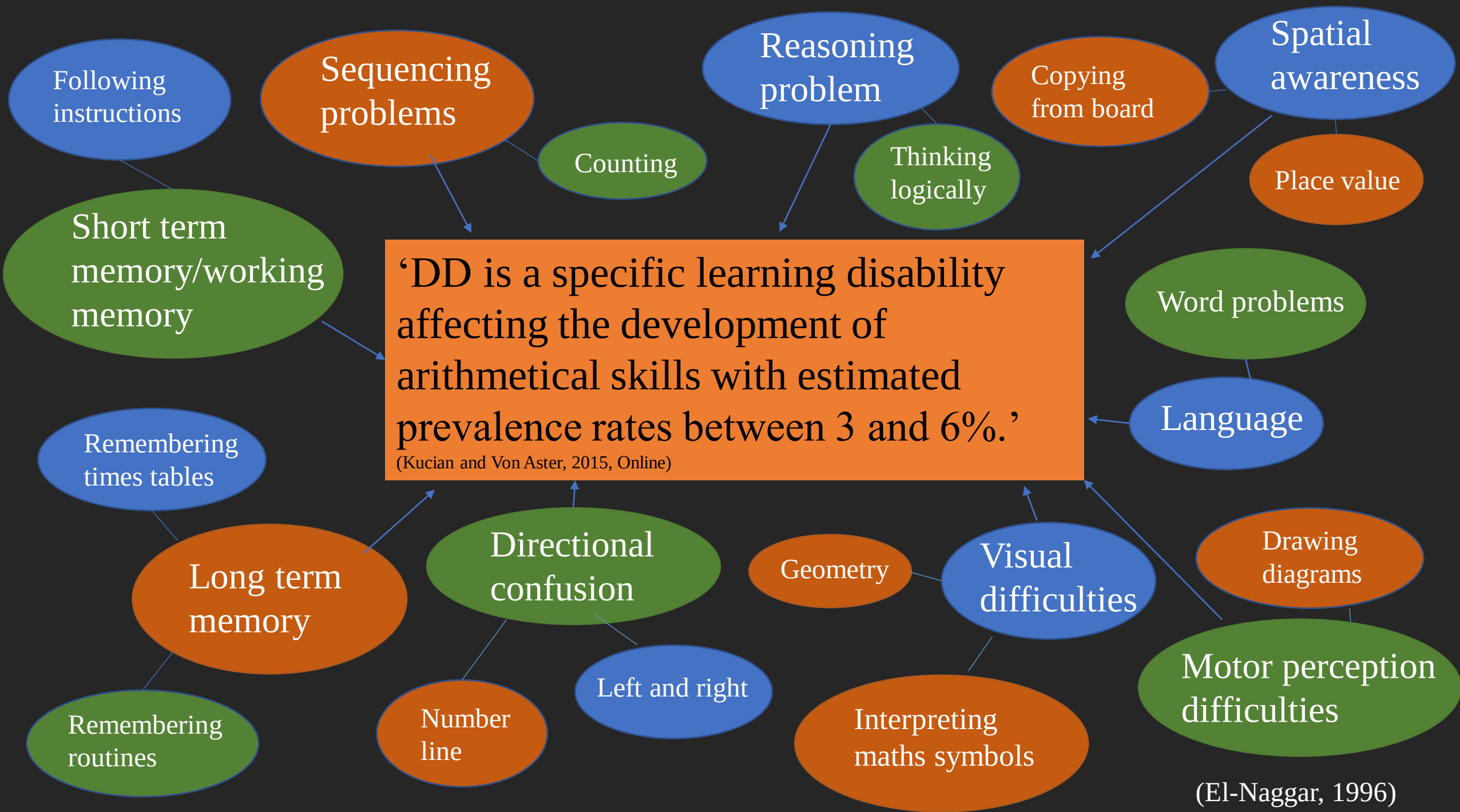
A multi sensory resource to support an individual with a specific learning difficulty

According to Mencap (2021) a learning difficulty generally presents itself in childhood. These difficulties can range from mild to severe, with intelligence levels unaffected. There are several types of learning difficulties, such as: attention deficit-hyperactive disorder (ADHD), dyslexia, dyspraxia and developmental dyscalculia (DD). Wilson *et al.* (2013) suggests that the comorbidity can be common among the learning difficulties, but the reasons for this is inadequately understood. Mencap (2021) continue to suggest that different approaches need to be acquired, instead of using traditional classroom teaching, for children with learning difficulties to access their full potential.

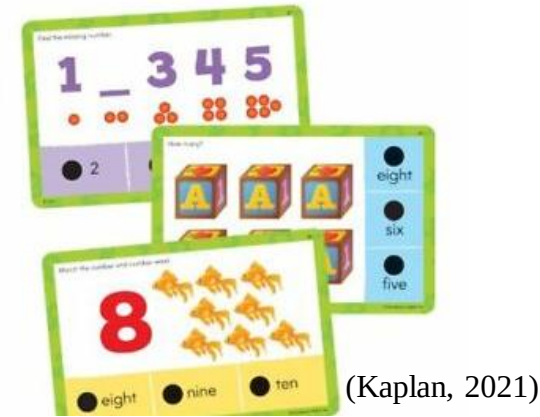
Obaid (2013) suggests that a multi-sensory approach to learning gives children a richer and a more motivating experience. Developing on all the senses, using techniques that include visual, auditory and kinesthetic.

Action Points

1. Use a wider range of sources of literature such as more books and journals.



Skills spot



❑ Numicon
Each shape represents a number from one to 10 (Oxford Owl, 2021).

❑ Hot dots
Self checking system. With multiple choice and instant feedback (Learning Resources, 2020).

❑ Number pebbles
Tactile pebbles each engraved with a number (Early Excellent, 2021).

❑ Link cubes
Connectable cubes that make geometric shapes and patterns (Bright Minds, 2021).





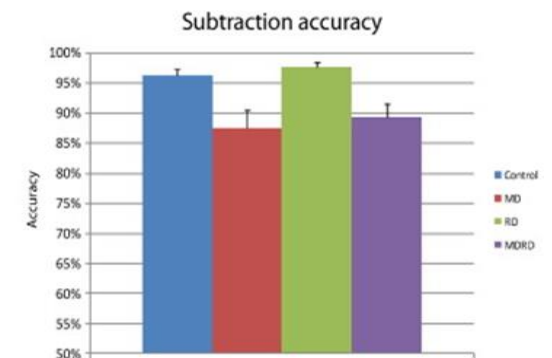
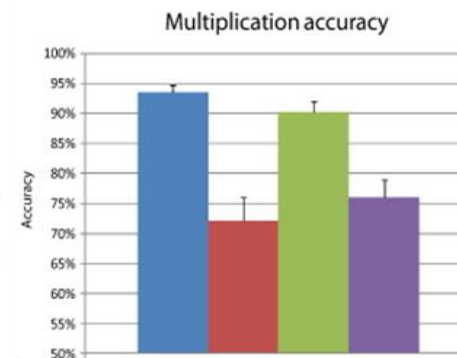
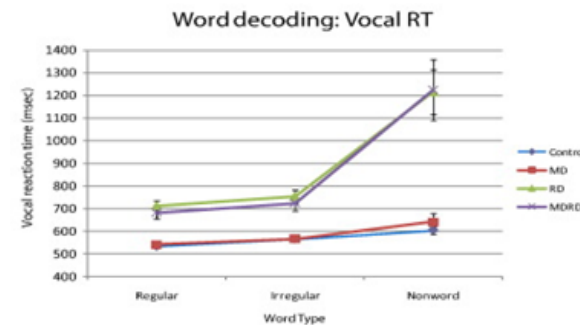
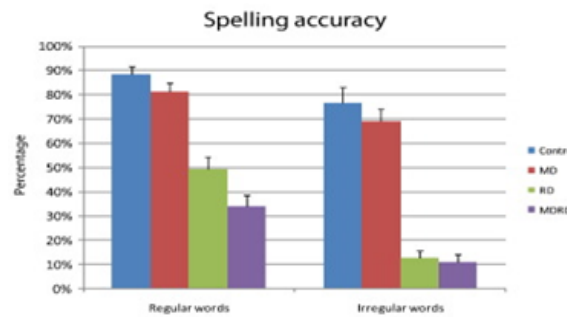
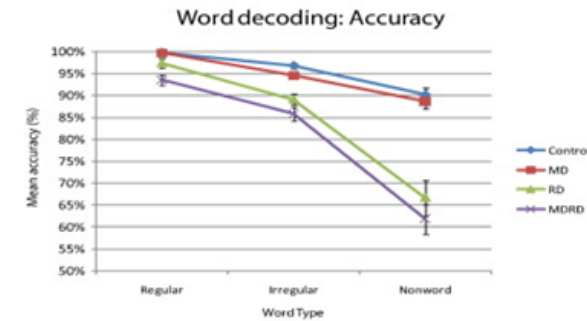
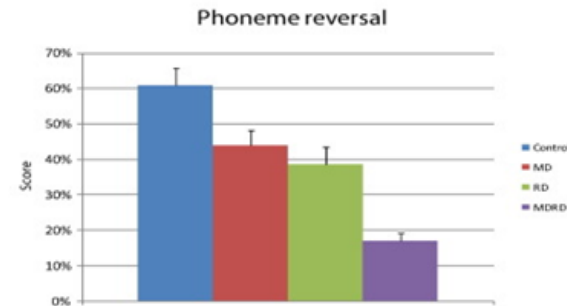
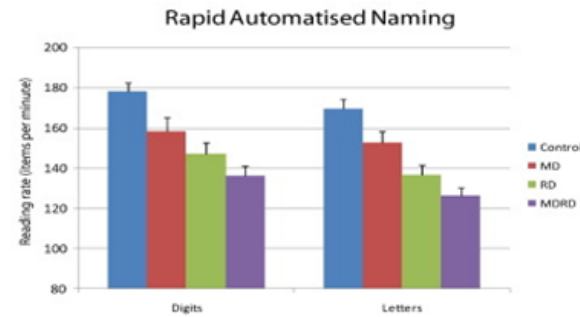
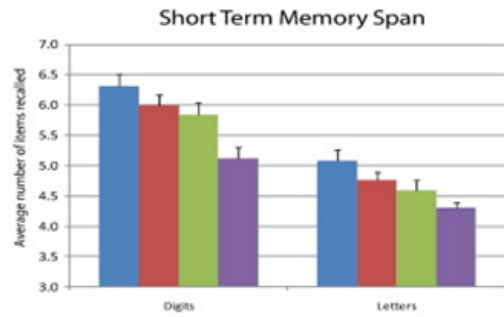
Background on Dyscalculia

- Kosc (1974) first coined the term 'dyscalculia' and defined it as a 'structural disorder of mathematical abilities.'
- An earlier term used in 1968 was referred to as a 'learning disturbance'.
- Research into DD is still in the early stages.
- In America, the National Institute of Health spent \$2 million on studying DD compared \$207 million spent on dyslexia.
- The online community has designated March 3rd as World Dyscalculia Day in a way to improve awareness (Soares and Patel, 2015).
- DD is a brain-based disorder presented from birth and not caused by injury or illness.
- Children with DD are of average or above average intelligence and have had an adequate learning environment.
- Dyscalculia studies have reported associated with other learning difficulties such as: dyslexia, ADHD, additional psychiatric disorders like anxiety, depression or aggression (Kucian and Von Aster, 2015).

Wilson *et al* (2014) study showed how difficulties with numerical tasks continued into adulthood.

- Less accurate and slower answering multiplication and subtraction problems.
- Showed deficits in phonological processing and rapid naming.
- Trend towards a deficit in verbal short-term memory.

They continue to suggest there is a comorbidity rate of 40% with dyslexics. These individuals showed greater deficit on all tasks other than those with the sole learning difference.



(Wilson *et al*, 2014)

Numeracy manipulatives can be accessed through free play, group work and interventions. It presents curriculum material in many different modalities allowing all children access to learning (Obaid, 2013).

- Uses visual, tactile and audio approaches
- Encourages understandings of number relationships
- Concepts less abstract and more concrete
- Helps with counting (addition and subtraction)
- Number recognition
- Patterns and colour
- Physically fits together, combining numbers
- Explore and investigate
- Sort and collect
- Sequence
- Interactive pen with instant feedback

Wing and Tacon (2007) states we now have different approaches to learning that of the 19th century, where traditional pen and paper were used from the beginning. The modern way is by learning mental arithmetic first, followed by written calculations.



(Author's own, 2021)

Howard Gardner's Multi Intelligence (1983)

Skills Spot

- ❖ Linguistics - Reading numbers
- ❖ Musical - Listening to sounds
- ❖ Bodily-kinaesthetic - Able to move around
- ❖ Visual-Spatial - Visual representations
- ❖ Interpersonal - Group work
- ❖ Intrapersonal - Working alone
- ❖ Naturalistic - Natural materials



Visual-Spatial

Linguistic-Verbal

Interpersonal

Intrapersonal

Mathematical

Musical

Bodily-Kinaesthetic

(JR Bee, 2019)

'The Multiple Intelligence Theory proposes that all children learn in different ways and it assists in understanding their strengths and weaknesses' (Heming, 2008, p11).

Identify a child's potential, with this theory you can customise lesson plans, classroom layouts and assignments (Heming, 2008).

The Emotional and Social Impact of Living with Dyscalculia

It is extremely important to get an early diagnosis of DD to help support with future challenges, low numerical skills can have a negative impact upon:

- ❑ Academic achievement
- ❑ Employment prospects
- ❑ Activities in daily life
- ❑ Mental and physical health
- ❑ Economic status of the country

(Kucian and Von Aster, 2015).

With the ever-increasing role that technology plays within our society, young children would benefit from building their confidence in their maths abilities. Poor numeracy skills can have strong links to maths anxiety:

- ❑ Feeling of tension
- ❑ Helplessness
- ❑ Dread

Caused by:

- ❑ Personal – Low self-esteem, lack of confidence
- ❑ Environmental – Negative experience in a maths class
- ❑ Cognitive – Low intelligence, learning difficulty DD

(Rubinsten and Tannock, 2010).

Positive aspects and strengths of children with dyscalculia can be:

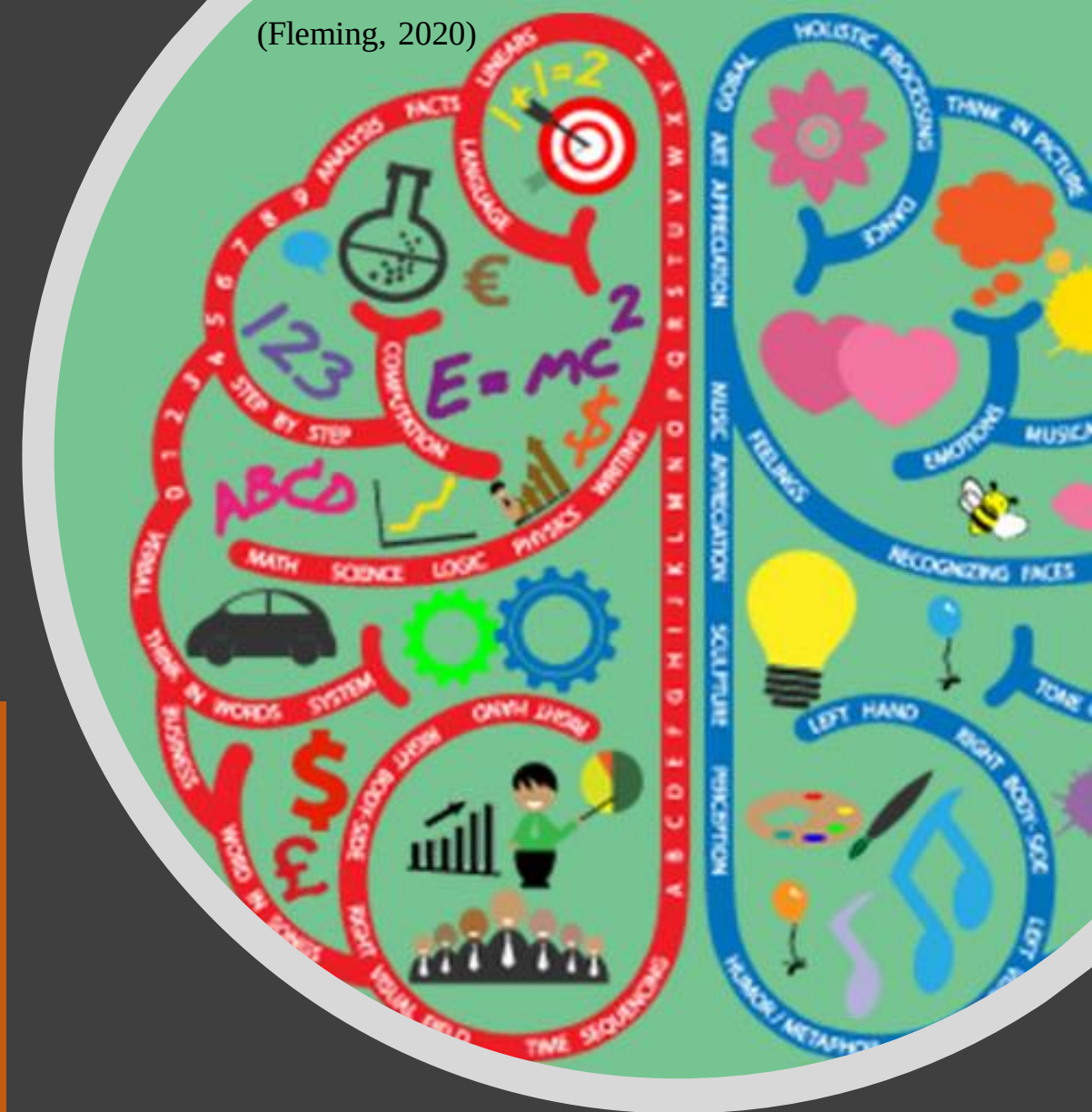
- Creative
- Practical ability
- Problem solving
- Love of words
- Intuitive thinking

(De Montfort University, 2013).

The National Literacy and Numeracy Programmes (2012) allows for:

- Quality math's teachers
- Cross curriculum subjects
- Allowing for differentiation
- More time given to develop oral and mental math's
- Pori Drwy Stori developing numeracy skills in a reception class
- Pupil deprivation grant

(Fleming, 2020)



Numeracy can be a very abstract concept for most people. Children suffering from dyscalculia can struggle even more. Orff described the importance of children learning through doing. 'Tell me, I forget; show me, I remember; involve me, I understand' (n.d, cited in Long, 2013, p.22). This demonstrates the importance that solid objects can create relationships with numbers. Frederickson and Cline (2015) suggests that no two individuals with DD are the same, to support children you must find their intelligent strength. With the help of multi-sensory resources, praise and time, children can develop confidence and the motivation to achieve.

The Cone of Learning

sparkinsight.com

*I see and I forget.
I hear and I remember.
I do and I understand.
— Confucius*



Source: Edgar Dale (1969)

(Dale, 1969)

References

Bright Minds (2021) *Learning Resources Mathlink Cubes set of 100*. Available at: <https://www.brightminds.co.uk/products/learning-resources-mathlink-cubes-set-of-100-ler4285> (Accessed: 31st March 2021).

Dale, E. (1969) *The Cone of Learning* [illustration]. Available at: <https://northcoasted.com/what-is-multi-sensory-learning/> (Assessed: 7th April 2021).

De Montfort University Leicester (2013) *What is Dyscalculia?* Available at: <https://www.dmu.ac.uk/documents/dmu-students/the-student-gateway/disability-advice-and-suppor/what-is-dyscalculia.pdf> (Assessed: 7th April 2021).

DSPL7 (2019) *Specific Learning Difficulties* [illustration]. Available at: <http://dspl7.org.uk/specific-learning-difficulties/> (Assessed: 8th April 2021).

Early Excellence (2021) *Set of Number Pebbles 1-10* [photo]. Available at: <https://earlyexcellence.com/go-shopping/set-of-number-pebbles/> (Accessed: 17th March 2021).

Early years resources (2021) *Numicon Shapes 1-10* [photo]. Available at: <https://www.earlyyearsresources.co.uk/eyfs-maths-c1931/numicon-c1938/numicon-shapes-1-10-p83256> (Accessed: 17th March 2021).

Education and skills (2012) *The national literacy and numeracy programmes*. Available at: <https://gov.wales/sites/default/files/publications/2018-11/national-literacy-and-numeracy-programme-a-strategic-action-plan.pdf> (Assessed: 8th April 2021).

El-Naggar, O. (1996) *Specific learning difficulties in maths a classroom approach*. Tamworth: NASEN Enterprises Ltd.

Fleming, G. (2020) *Right brain dominant students should put their creative talents to work!* [illustration]. Available at: <https://www.thoughtco.com/right-brain-dominant-students-1857175> (Assessed: 18th March 2021).

Frederickson, N. and Cline, T. (2015) *Special Educational Needs, Inclusion and Diversity*. 3RD Ed. Berkshire: Open University Press.

General Medical Council (2021) *Who is a disabled person*. Available at: <https://www.gmuk.org/education/standards-guidance-and-curricula/guidance/welcomed-and-valued/health-and-disability-in-medicine/who-is-a-disabled-person> (Assessed: 1st April 2021).

Heming, A. L. (2008) *Multiple Intelligences in the Classroom*. Unpublished PhD thesis. Available at: http://digitalcommons.wku.edu/stu_hon_theses/138 (Accessed: 1st April 2021).

James, C. (2019) *Maths towers* [photo]. Available at: <https://nurturestore.co.uk/math-towers-unit-block-addition-activity-printables> (Accessed: 17th March 2021).

JR Bee. (2019) ‘Gardner’s *Theory of Multi Intelligence*’ [illustration]. Available at <https://www.verywellmind.com/gardners-theory-of-multiple-intelligences-2795161> (Accessed: 1st April 2021).

Kaplan (2021) *Hot Dots Jr. Numbers and counting cards* [photo]. Available at: <https://www.kaplanco.com/product/91114/hot-dots-jr-numbers-and-counting-cards?c=8%7CNU1005> (Accessed: 17th March 2021).

Kucian, K. and Von Aster, M. (2015). ‘Developmental dyscalculia’, *European journal of pediatrics*, 174(1), pp. 1-13. DOI:10.1007/s00431-014-2455-7 (Accessed 30th March 2021).

Learning Resources (2020) *Original Talking Hot Dots Pen*. Available at: <https://www.learningresources.co.uk/hot-dots-pen-uk> (Accessed: 31st March 2021).

Long, A. (2013) *Involve Me: Using the Orff Approach within the Elementary Classroom*. Unpublished PhD thesis. Available at: <http://thekeep.eiu.edu/honors/6> (Assessed: 8th April 2021).

Mencap (2021) *Learning difficulties*. Available at: <https://www.mencap.org.uk/learning-disability-explained/learning-difficulties> (Accessed: 18th March 2021).

Obaid, M.A.S. (2013) 'The Impact Of Using Multi-Sensory Approach For Teaching Students With Learning Disabilities', *Journal of International Education Research*, 9(1), pp. First Quarter. Available at: <http://www.cluteinstitute.com/75> (Assessed: 1st April 2021).

Oxford Owl (2021) *Numicon guide for parents*. Available at: <https://home.oxfordowl.co.uk/maths/numicon-guide-for-parents/> (Accessed: 31st March 2021).

Rubinsten, O. and Tannock, R. (2010) 'Mathematics anxiety in children with developmental dyscalculia', *Behavioral and Brain Functions*, 6(1), pp. 46–46. Available at: <https://doi.org/10.1186/1744-9081-6-46> (Assessed: 6th April 2021).

Shutterstock (2021) *How having dyscalculia can feel* [illustration]. Available at: <https://theconversation.com/dyscalculia-maths-dyslexia-or-why-so-many-children-struggle-with-numbers-104655> (Assessed: 17th March 2021).

Soares, N. and Patel, D.R. (2015) 'Dyscalculia', *International Journal of Child and Adolescent Health*, 8(1), pp. 15-26. Available at: <https://search.proq/openview/58a30d546cfb3743a7f538c05ac7d3cd/1?pq-origsite=gscholar&cbl=2034872uest> (Assessed: 30th March 2021).

Wilson, A.J., Andrewes, S.G., Struthers, H., Rowe, V.M., Bogdanovic, R., and Waldie, K.E. (2014) 'Dyscalculia and dyslexia in adults: Cognitive bases of comorbidity', *Learning and Individual Differences*, 37(2015), pp. 118-132. Available at: www.elsevier.com/locate/lindif (Assessed: 1st April 2021).

Wing, T. and Tacon, R. (2007) 'Teaching number skills and concepts with Numicon materials', *Down Syndrome Research and Practice*, 12(1), pp. 22-26. Available at: <https://library.down-syndrome.org/en-gb/research-practice/12/1/teaching-number-skills-concepts-numicon-materials/> (Assessed: 3rd April 2021).