WORKING
GROUP 03

CHAPTER

6

Identifying and supporting children with learning disabilities

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Abstract:

This chapter assesses ways to identify and support children with learning disabilities. Learning disabilities affect many students and are seldom attributable to a single cause. They arise through complex interactions between biological and environmental factors within individual developmental trajectories. Early identification of children at risk for learning disabilities as well as adequate identification of children with learning disabilities are important for ensuring that children have access to the supports they need in order to reach their full potential. Here, we discuss identifying children's learning needs and providing educational support. Although many school systems recognize the need to provide inclusive education to support all learners, more work is needed to raise awareness and enable adequate evidence-based early identification of children with learning disabilities and support their learning trajectories and instructional needs inside and outside of the classroom. It is also fundamental to acknowledge the importance of research on diverse populations that could inform identification and support in various countries and socio-cultural contexts.

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6.1 What are learning disabilities, disorders and differences?

Over 1 billion people from around the world have some form of disability **(WHO, 2011)**. Around 240 million children have a disability **(UNICEF, 2021)**. Disability is diverse. Most official definitions, such as those in the World Health Organization (WHO) **(1980)**, and the United Nations (UN) Standard Rules on the Equalization of Opportunities for People with Disabilities **(UN, 1993)**, include two common features: '(i) a physical or mental characteristic labeled or perceived as an impairment or dysfunction and (ii) some personal or social limitation associated with that impairment' **(Wasserman et al., 2016)**.

Children with disabilities are less likely to attend school, and even when they do, they may be excluded from participating completely in learning to their full potential **(Filmer, 2008)**. An analysis of 18 household surveys conducted across 15 countries[1] on the influence of disability on school attendance reveals that disability explains a larger proportion of the gap in school attendance than other individual or household factors (e.g. socio-demographics factors, sex or residence **(Mizunoya, Mitra and Yamasaki, 2016)**. The study shows that more than 85 per cent of primary-school age children with a disability have never attended

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school and suggests that initial enrolment of disabled children may represent a substantive barrier to inclusion of disabled children. Even in countries having reached close to universal primary education, secondary-school enrolment rates were not correlated to inclusivity (as measured by the ratio of disabled to non-disabled out-of-school children), suggesting that new policies to improve overall attendance are not sensitive to the needs of disabled children **(Richardson, 2018)**.The vast majority of disabled children who are out-of-school live in sub-Saharan Africa, South and West Asia, the Arab States, and North Africa **(Winzer and Mazurek, 2015)**. Children with disabilities, institutionalized children, children with special educational needs, indigenous children or those from pastoral or nomadic communities, or those who are absent from mainstream schooling are systematically excluded from data of large-scale surveys and studies, leading to their invisibility in monitoring and evaluation, and to their exclusion from evidence-based research informing policy reforms in education **(Richardson and Ali, 2014)**. Moreover, many disabilities are invisible, as they affect brain and cognitive functioning, and are not immediately apparent to children's parents, teachers, and peers **(WHO, 2011)**.

The goal[2] to give access to education to everyone has been recognized by the international community through various global initiatives such as the Salamanca Statement and Framework for Action on Special Needs Education adopted in 1994. How to better attain this ambitious goal is still highly debated in the scientific community. The

[1]Albania, Bangladesh, Ethiopia, India, Indonesia, Malawi, Maldives, Nigeria, Papua New Guinea, Saint Lucia, South Africa, Tanzania, Uganda, Vietnam, and West Bank and Gaza

[2]Adopted by ninety-two governments and twenty-five international organizations, this statement was later reinforced by the UN Sustainable Development Goals (SDGs, specifically SDG 4 'Education', which calls upon education systems to eradicate poverty and achieve a better and more sustainable future for all by 'ensur[ing] inclusive and equitable quality education and promote lifelong learning opportunities for all' **(UNESCO, 2020)**.

...an impairment is, by definition, decided based on a comparison to some idea of what is a 'typical' or 'normal' developmental trajectory based on social, cultural and biological norms.

definition of disability and criteria for classifying different educational needs (and qualifying for receiving them) remain contested and vary in different legal and medical systems. Importantly, classification of a child's cognitive or physical variation as an impairment 'may be statistical, based on the average in some reference groups; biological, based on a theory of human functioning; or normative, based on a view of human flourishing' **(Wasserman et al., 2016, p.1)**. In other words, an impairment is, by definition, decided based on a comparison to some idea of what is a 'typical' or 'normal' developmental trajectory based on social, cultural and biological norms. Factors that enable or disable students are many and varied **(Bronfenbrenner, 1976; Anderson, Boyle and Deppeler, 2014)**. These factors sit within the classroom, playground and school contexts, as well as within the broader political, sociocultural and historical contexts. An example can be seen in the influence of the way societies understand and value the entities of education and difference – the further a student's characteristics are from what is considered the norm or standard of the education system or school, the greater their determined level of disability or need **(Mac Ruairc, 2020)**. Therefore, identification of disabilities tends to focus on children's impairments or deficits, and this emphasis on impairments can lead to stigmatization and underestimation of children's potential. The concept of neurodiversity is a response to this stigmatization and emphasizes that variation in neurodevelopment leads to strengths as well as impairments to learning, and that children with disabilities are not inferior to their typically developing peers **(Saltz, 2017) (WG2-ch4 for a detailed discussion of neurodiversity)**. However, reframing disability in a neurodiversity context can lead to suboptimal intervention strategies and ethical dilemmas about 'who' determines 'which' students qualify for services. Here we emphasize the importance of recognizing the many complex ways in which children's education needs vary. Ideally, education should help each student to reach their full

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potential, while being mindful of the variation in individuals' potential.

Despite the acknowledgement by nations worldwide of the importance of education for all, great differences distinguish the Global North and the Global South in terms of approaches to disability[3]. Although disability and its various forms and needs have now found a legitimate place in legislative action, academic research, education programming and professional treatment in the Global North, the opposite is true in most low to middle income countries **(Winzer and Mazurek, 2015)**. In those countries, approaches to disability are slowly moving from issues of social welfare and protection to integral parts of the national development agenda and human rights agenda. However, research on disability in low to middle income countries remains scarce. Studies tend to be sporadic and provide few theoretical or methodological insights to guide policy-making. Collection of data is still at an early stage in many nations, which makes globally comparable data on disability difficult to obtain **(Winzer and Mazurek, 2015)**, and there is still a critical lack of classroom-based research, especially in low to middle income countries **(Hughes and Talbott, 2017)**. For example, in the Indian context, despite its inclusive disability policies, 'there continues to be a significant lack of research examining teaching and learning processes in the classroom and debates continue to draw heavily on personal narratives, inferences drawn from Northern literature and oversimplified generalizations' **(Singal, 2014, p. 203)**.

This chapter focuses primarily on the 'invisible disabilities': learning

[3]The North–South divide (or Global North and Global South) is a political and socio-economic division of the world, popularized in the late twentieth century, roughly based on the categorization of countries by their economic and developmental status. Generally, definitions of the Global North include Australia, Canada, Israel, Japan, New Zealand, Singapore, South Korea, Taiwan, the USA and almost all European countries. The Global South is made up of Africa, Latin America and the Caribbean, Pacific Islands, and most Asian countries, including the Middle East. We recognize that this view is overly simplistic and does not reflect the complexity of global political and socio-economic realities, but a thorough discussion of these terms falls beyond the scope of this chapter.

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disabilities. Statistics on prevalence of learning disabilities in various age populations worldwide are extremely difficult to gather, and so are rates of children receiving support.

This data can be particularly vulnerable to distortion or bias for many reasons, including the absence of a precise operational definition of learning disabilities that is widely accepted, or the fact that many incidence surveys rely on self-reporting. Nonetheless, the incidence rates are considered extremely high. In the United States (USA), for example, in 2019–2020, the number of students aged 3–21 who received special education services under the Individuals with Disabilities Education Act (IDEA) was 7.3 million, or 14 per cent of all public school students in the country. Among students receiving special education services, the most common category of disability (33 per cent) was specific learning disabilities **(Irwin et al., 2021)**.

Early identification for many disabilities, especially learning disabilities, is challenging, because they are hidden. For example, many neurodevelopmental disorders do not present physical or sensory markers for teachers to readily identify them in the classroom. Neurodevelopmental disorders are highly prevalent in school children and encompass a broad array of, often co-occurring, disorders that 'involve impaired development of cognitive or motor functions manifest from childhood' **(Thapar and Rutter, 2015, p. 31)**. There is little consensus across different diagnostic and classification systems for what is considered a neurodevelopmental disorder, but here we will focus on specific learning disabilities (SLDs)[3], developmental language disorders and attention deficit hyperactivity disorder (ADHD). The terms 'disability', 'disorder' and 'difficulty' are sometimes used interchangeably and are a source of contention among researchers, policy-makers and practitioners. Disorder is a medical term used

[4]We use the term specific learning disability in reference to impairments in reading, writing or maths as defined by the DSM.

...many neurodevelopmental disorders do not present physical or sensory markers for teachers to readily identify them in the classroom.

by the Diagnostic and Statistical Manual of Mental Disorders V (DSM-V), which is a manual that guides mental health professionals in North America. Disability is a legal term used in the Individuals with Disabilities Education Act (IDEA) to protect the rights of students with disabilities in the USA. In the field of neurodiversity, the large variation found in human brain function leads researchers to refer to the variation that causes difficulties as a 'difference' rather than a 'disability' or 'disorder' **(Kasten, 2014)**. We are far from reaching a universal definition of a learning disability, and because diagnostic criteria and definitions vary across countries and school systems, throughout this chapter we use the term 'disability' to refer to any condition that impairs a child's ability to learn.

It is important to note that children can struggle with learning and academic outcomes due to a cascade of aetiological factors. This can include (but is not limited to) the lack of adequate (or any) schooling, the quality of schooling, instruction in a language or orthography other than one's primarily home language/orthography, and environmental factors including stress, trauma and neighbourhood factors, as well as nutrition and sleep. Difficulties with learning that arise from these factors may not always be classified as a neurodevelopmental disorder or a learning disability but these children need access to the same interventional strategies within their educational and community settings and resources as children classified with an SLD. It is a common misconception that these children require something substantially different rather than more of the evidence-based interventions that have been shown to remediate reading as well as maths difficulties. However, these additional factors may further require additional interventions to directly address the aetiological factors that can exacerbate or cause difficulties with learning and academic outcomes. Here we draw on evidence from education, psychology and neuroscience to explore the heterogeneity and

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complexity of learning disabilities and how they interact with socio-economic risk factors, such as poverty. Reviewing the evidence surrounding best educational practices across all neurodevelopmental disorders is beyond the scope of this chapter. We focus predominantly on SLDs, because they provide a useful framework for discussing the evidence surrounding best practices for screening to identify children's specific educational needs and targeting interventions to support their learning. We will also discuss evidence surrounding diagnostic practices, reliability and validity issues surrounding diagnosis, and argue that more research is needed to improve ways to identify children with SLD across cultures. It is important to note that children's individual needs should be considered regardless of the aetiology of their difficulties (known or unknown) and whether they have received a diagnosis, because many learners need extra support. There are rarely enough professionals to recognize individual children's needs and requiring a diagnosis can also serve as a barrier to accessing support **(Ahmad, 2015)**.

6.1 .1 KEY QUESTIONS

Throughout the different sections in this chapter, we explore current knowledge and debates concerning children with learning disabilities. We take a multidisciplinary approach, synthesizing expertise based in developmental cognitive neuroscience, learning sciences, genetics and developmental psychology, with expertise based in disabilities studies, special educational needs and inclusive pedagogy. The following key questions in this chapter are addressed in sections **6.2, 6.3** and **6.4** respectively.

- Why do children with learning disabilities need extra support to succeed in school?
- How can we identify children's diverse learning needs?
- How can we support all children's learning?

6.2 Overview of reasons children may need extra support for learning

6.2.1 SPECIFIC LEARNING DISABILITIES

The DSM-V **(2013)** classifies SLDs as neurodevelopmental disorders. It defines neurodevelopmental disorders as 'a group of conditions with onset in the developmental period' that result in impairment in 'personal, social academic, or occupational functioning' **(DSM V, 2013, p. 7)**. SLDs have a neurobiological aetiology and are heritable; however, behavioural/

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psychosocial and environmental factors can significantly influence their clinical manifestation. Exclusion criteria include intellectual impairment, sensory deficits and lack of instruction. SLD in reading is the most common type, accounting for 80 per cent of SLDs **(Snowling, 2013)**.

As indicated above, SLDs often significantly impact areas of academic function. They arise when persistent difficulties acquiring academic skills are unexpected in the context of age and grade level standards. Most common SLDs are in the areas of reading (dyslexia), mathematics (dyscalculia) and/or written expression (developmental coordination disorder or dysgraphia). Academic underachievement is not primarily due to intellectual disability, economic disparity, sensory disorders, emotional and/or motivation disturbances, or lack of instruction or inadequate quality of instruction. While interventions are not always completely successful, in the absence of interventions, SLDs often cause psychological and functional difficulties in childhood that can last throughout the lifespan **(Klassen, Tze and Hannok, 2013)**. SLDs are often associated with other neurodevelopmental disabilities, including but not limited to ADHD, autism and developmental language disorder, as well as behavioural difficulties, psychiatric conditions and mental health problems **(Allington-Smith, 2018; Grigorenko et al., 2020)**. The aetiology (cause) of SLDs is multifaceted and differs among individuals. It can include genetic, neurodevelopmental, perceptual, cognitive and environmental factors. Dyslexia, a specific reading disability, is arguably the most understood among SLDs. We know far less about the underlying causes of dyscalculia, and even less about dysgraphia. Below we review the most recent evidence of the cognitive precursors for dyslexia, dyscalculia and dysgraphia, co-occurring conditions as well as their multidimensional profiles. Knowledge of what characterizes SLDs can improve efforts to develop effective screening tools and targeted interventions.

6.2 .1 .1

DYSLEXIA AND READING DISABILITIES

Developmental dyslexia is a persistent difficulty in learning to read words, especially as it relates to poor decoding, the process by which words are sounded out through letter–sound association **(Hulme and Snowling, 2016)**. Children with dyslexia exhibit severe word reading difficulties and slow reading development relative to their peers; as they mature, their difficulties include slow and error-prone word reading and this can subsequently result in reduced reading fluency and poor text comprehension. If unaddressed, these difficulties persist into adulthood. Although early work on dyslexia sought to characterize it as a difficulty in visual processing **(Orton, 1925)**, the contemporary prevailing view is that of a multifactorial aetiology **(Pennington et al., 2012; Catts and Petscher, 2020)** and that visual factors play a minimal or no role in the aetiology. However, one of the key deficits has been shown to be poor phonological awareness, or the ability to recognize and manipulate the phonemic structure that makes up spoken words **(Bradley and Bryant, 1978)**. Similarly, recommendations for best practices in remediation focus on employing a phonics-based approach, in which children receive intensive training in letter–sound associations **(National Reading Panel, 2000)**. It is important to also note, however, that even in the case of good decoding, a lack of oral language skills (e.g. vocabulary or oral listening comprehension) can also lead to a reading disability, which is then primarily characterized by problems with reading fluency and reading comprehension **(Catts et al., 2015)**. This is illustrated by the reading rope that characterizes Scarborough's 'Reading Rope' **(2001, see Figure 6.1)**. The causes of poor oral language skills are multifaceted and include a language disability, the richness and quality of the language environment in the home, or being a second-language learner in the language of instruction.

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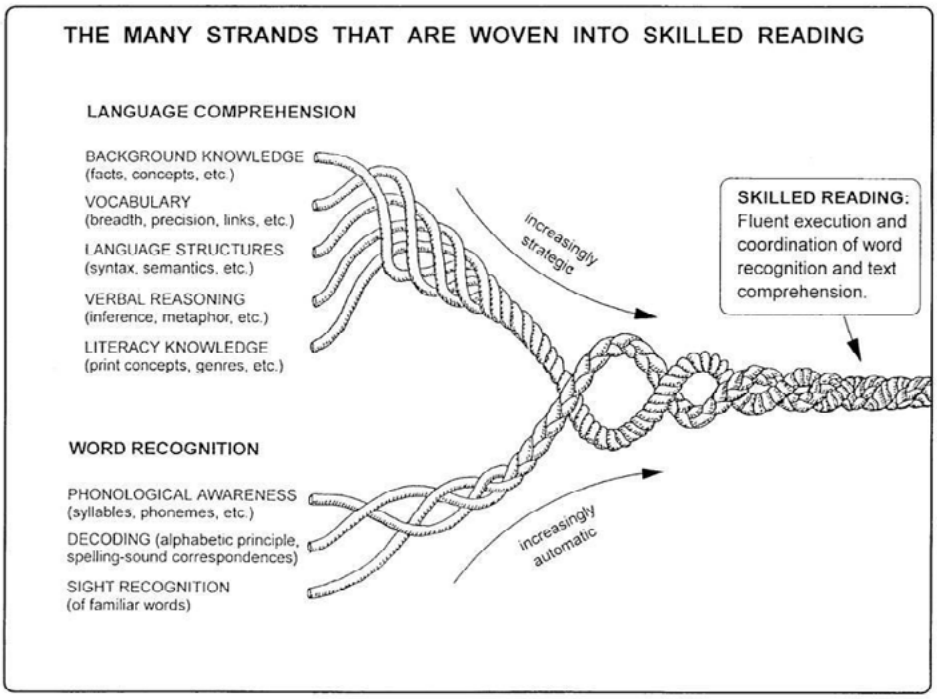

Figure 6.1. The Reading Rope, Source: Scarborough (2001)

Scarborough, H. S. (2001). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory, and practice. In S. Neuman & D. Dickinson (Eds.), Handbook for research in early literacy (pp. 97-110). New York: Guilford Press.

One can summarize that children can struggle with either the 'mechanics' of reading (the word recognition aspect) or with oral language comprehension. Difficulties with language comprehension primarily affect reading comprehension but can also influence reading fluency. However, many children struggle with language comprehension and word recognition. Identifying the specific elements of reading that lead to reading difficulties in an individual child has important implications for instructional and interventional strategies.

A different and well-documented difficulty in dyslexia pertains to problems with rapid automatized naming (RAN), in which individuals are slower at retrieving and naming aloud repeated sequences of highly familiar visual stimuli such as letters **(Denckla and Rudel, 1976)**.

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Notably, this difficulty extends to non-orthographic stimuli such as objects or colours, suggesting it does not simply reflect problems with letter recognition. Likewise, although phonological and RAN deficits can co-occur in poor readers, they are at least partially independent **(Logan, Schatzschneider and Wager, 2011)**. This has led to the double-deficit hypothesis, which explains dyslexia through the joint contribution of both phonological and rapid naming difficulties **(Wolf and Bowers, 1999)**.

Languages' writing systems vary significantly with respect to spelling-sound regularity. For instance, Italian and Finnish map letters to phonemes on a near 1:1 basis, whereas English or French have much lower levels of consistency **(Ziegler et al., 2010)**. At the other extreme, logographic systems like Chinese code words as one or two symbols, featuring much less consistency in spelling-sound mapping. This raises the question whether different cognitive processes underlie reading cross-culturally, and also whether dyslexia is a culturally-specific phenomenon.

On both counts there is strong evidence supporting a unified model cross-linguistically. It has been shown that the similarities among individuals with dyslexia who learn to read in different orthographies are much larger than their differences with the common overlaps primarily shown for rapid automatized naming deficits as well as phonological decoding mechanisms **(Ziegeler et al., 2010)**. The core neurocognitive mechanisms engaged during skilled reading appear to be universally constrained such that the brain signatures of reading are similar irrespective of orthographic structure **(Rueckl et al., 2015)**. Similarly, while behavioural manifestations of dyslexia may vary subtly across languages **(Ziegler and Goswami, 2005)**, these seem to reflect the characteristics of the writing system rather than different underlying causes. It is important to note that the high rate of co-occurrence with other disorders supports a generally inclusive view of reading disorders, rather than one in which poor reading is only considered meaningful if it

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occurs in isolation. The scientific literature has begun to reflect this important nuance by categorizing affected children as having a 'reading disability', and also using more criteria that do preclude children with co-occurring SLDs **(Elliott and Gibbs, 2009)**.

6.2 .1 .2

DYSCALCULIA AND MATHS DISABILITIES

Developmental dyscalculia is characterized by persistent difficulties in processing numerical information and acquiring simple arithmetic skills **(Iuculano, 2016)**. Individuals with dyscalculia can present deficits at the level of basic numerical abilities (i.e. correctly identifying the number of items in a set), or in symbol recognition and transcoding (i.e. knowing that the symbol '3' is associated with the quantity of 'three'). In less severe cases, individuals may not experience basic numerical difficulties, but still struggle with their arithmetical computations or retrieval processes (i.e. solving – or remembering – the result of operations such as '3 + 5 = ?').

To date, we know far less about the manifestations of dyscalculia relative to what we know about dyslexia. One proposal suggests that dyscalculia arises from a core deficit in processing non-symbolic quantities (e.g. a collection of items) **(Butterworth, 2010; Piazza et al., 2010; Reigosa-Crespo et al., 2012)**. In line with this proposal, individuals with dyscalculia have been reported with neural aberrancies in brain regions that are known to be involved in detecting changes in the quantity of items within a set **(Price et al., 2007)**. These brain regions are part of the parietal cortex, located just above our ears. Yet, not all children with dyscalculia show poor performance on non-symbolic quantity tasks relative to typically developing controls **(Rousselle and Noël, 2007; De Smedt and Gilmore, 2013; Bugden and Ansari, 2016)** suggesting different routes to the disorder. An alternative proposal suggests that dyscalculia may be the result of a deficit in

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mapping number symbols (e.g. '3') to their appropriate meanings (e.g. the quantity of 'three') **(Rousselle and Noël, 2007; De Smedt and Gilmore, 2011)**, an ability that has been extensively associated with arithmetic learning **(Xenidou-Dervou et al., 2017)**. A more recent and pervasive view – which can help reconcile these theoretical accounts – is that dyscalculia is characterized by multiple deficits **(Rubinsten and Orly, 2011; Fias, Menon and Szucs, 2013; Bartelet et al., 2014; Iuculano, 2016; Skagerlund and Träff , 2016; Träff et al., 2017; Peters and Ansari, 2019)**. In other words, dyscalculia can result from one (or multiple) cognitive and neural aberrancies at any level of the hierarchical cascade of processes that, sequentially, supports the successful acquisition of formal mathematical knowledge over development. Notably, the discipline of formal mathematics goes beyond the mere comparison of quantities, or transcoding abilities. For example, even learning how to add symbolic quantities together (e.g. '3 + 8') requires a class of complex cognitive functions such as the ability to apply rules and – at least initially – the ability to hold and update intermediate results temporarily. The latter is called working memory and is supported by an efficient crosstalk between regions of the parietal cortex and regions of the prefrontal cortex – in the front of our brain. Critically, children with dyscalculia are often reported with working memory deficits **(Iuculano, Moro and Butterworth, 2011)**, and aberrant connections between these two brain areas have been recently documented in this population **(Jolles et al., 2015)**.

Another crucial step in the successful acquisition of mathematical knowledge is the ability to retrieve the result of an arithmetical operation directly from memory. More specifically, during effective learning, and after many repetitions of practising an arithmetic problem (e.g. '3+5'), an association is slowly made between the correct solution '8' and its addends ('3' and '5') **(Siegler and Shrager, 1984)**. This is aided by another memory system residing in a small, curved

formation in the brain called the hippocampus. Critically, children with dyscalculia can often display marked deficits in remembering arithmetical facts **(Geary, 2011)**, and anomalies in the hippocampus have been recently observed in these children **(De Smedt, Holloway and Ansari, 2011)**.

Altogether, this evidence suggests that the aetiology of dyscalculia can be very heterogeneous – reflecting the hierarchical nature of the discipline of mathematics itself, wherein the next ability to be learned depends on the previously acquired one. A 'disruption' at any (or multiple) level(s) of this cascade of mental computations can lead to dyscalculia, with the most severe cases characterized by perturbation(s) at the level of core systems of knowledge. Being able to identify at which level 'disruption(s)' occur is critical for appropriate diagnosis and for targeting intervention

Developmental dysgraphia is a SLD characterized by persistent difficulties in acquiring handwriting, spelling skills or both, despite adequate schooling

6.2 .1 .2 DYSGRAPHIA

Developmental dysgraphia is a SLD characterized by persistent difficulties in acquiring handwriting, spelling skills or both, despite adequate schooling **(McCloskey and Rapp, 2017)**. Relative to research conducted in the areas of maths and reading, the cognitive and neural manifestations of dysgraphia are less understood. Some research shows that there is considerable overlap in dyslexia and dysgraphia such that children with dysgraphia may also experience phonological processing deficits **(Moll et al., 2009; Moll, Wallner and Landerl, 2012; Döhla and Heim, 2015)**. However, many students with developmental dysgraphia have strong phonological processing, which demonstrates that multiple impairments can lead to dysgraphia **(McCloskey and Rapp, 2017)**. Students with dysgraphia struggle with the sound-to-spelling conversion process and this could be due to difficulties with orthographic working

...learning difficulties are complex and heterogeneous in nature, often overlap, and that the origin of learning difficulties therefore cannot be traced back to a single genetic, neural or cognitive cause.

memory or orthographic long-term memory. Motor control impairments or difficulties with visual memory can also underlie dysgraphia. More research is needed to better understand the acquisition of cognitive writing mechanisms and the deficits underlying developmental writing impairments **(McCloskey and Rapp, 2017)**.

6.2 .2

AETIOLOGIES AND THE MULTIPLE DEFICIT MODEL

In the past, researchers studying learning disabilities, including dyslexia and dyscalculia, have searched for a single cause. For example, phonological processing deficits have long been considered to lie at the root of reading difficulties. However, not all children with dyslexia have phonological deficits, and not all children with phonological deficits are poor readers **(Snowling, 2008; Pennington et al., 2012; Van Der Leij et al., 2013; Catts and Petscher, 2020)**. Hence, a search for single deficits appears no longer tenable. It is becoming increasingly clear that learning difficulties are complex and heterogeneous in nature, often overlap, and that the origin of learning difficulties therefore cannot be traced back to a single genetic, neural or cognitive cause. Hence, the field is changing from single to multiple factorial influences.

A useful framework to investigate the aetiology of learning disabilities is the (intergenerational) multiple deficit model **(Pennington, 2006; van Bergen, van der Leij and de Jong, 2014)**, depicted in **Figure 6.2**. According to this model, there is no one answer to a question like 'what causes dyslexia?'. Rather, such a question can be answered at each level of analysis (environment, genes, brain, cognition), with at each level a multitude of factors that each contribute probabilistically to a risk of developing dyslexia. The relative importance of genetic and environmental

Genetic studies show that, rather than one gene of big effect, there are many, probably thousands of genetic variants each influencing educational skills.

influences can be studied using twins **(see WG3-ch3 for a discussion on twin studies)**. Twin studies have shown that both individual differences in reading and maths are substantially due to genetic differences. That is, these skills are substantially heritable, with estimates for (word-level) reading around 70 per cent and for maths around 60 per cent **(de Zeeuw et al., 2015)**. In other words, 70 per cent of the differences among children in how well they read are due to genetic differences. Note that heritability estimates depend on the context of the studied populations; the heritability is higher in equalitarian and standardized educational systems, like in the Netherlands, compared to Florida, in the USA **(van Bergen et al., 2018; Daucourt et al., 2020b)**. From a genetic and environmental perspective, reading and maths are very similar, with overlapping sets of genetic influences and overlapping influences in the home and school environment **(Daucourt et al., 2020a)**.

Genetic studies show that, rather than one gene of big effect, there are many, probably thousands of genetic variants each influencing educational skills **(Lee et al., 2018; Gialluisi et al., 2020)**. Studies that measure children's learning environments have also shown many correlates of reading and maths achievement **(van Bergen et al., 2017; Liu, Georgiou and Manolitsis, 2018; Purpura et al., 2020)**. The fact that learning environments, especially in the home, are not independent but correlated with one's genetic influences, makes this a challenging research area, because environmental correlates cannot be interpreted as causal influences **(Hart, Little and van Bergen, 2019)**. Taken together, consistent with the (intergenerational) multiple deficit model, reading, maths and their associated disabilities are influenced by many genetic and environmental factors.

At the brain level, research has revealed that learning disabilities are heterogeneous and cannot be reduced to core deficits **(Astle and Fletcher-Watson, 2020; Siugzdaite et al., 2020)**. Both reading and maths rely on complex networks of brain areas, and differences in these

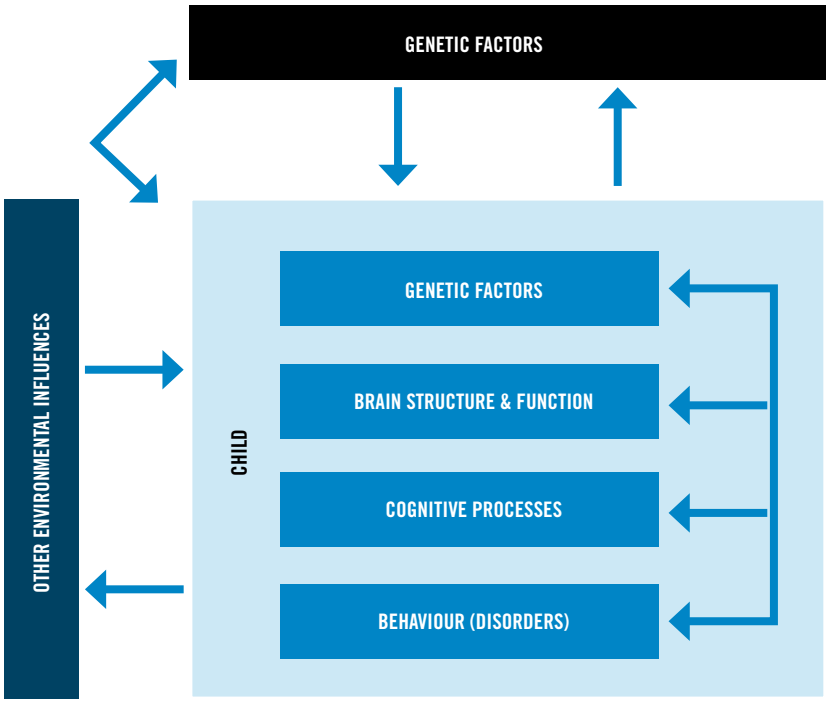

Figure 6.2. The Intergenerational Multiple Deficit Model of Developmental Disorders Source: Adapted from van Bergen et al. (2014).

networks have been identified in children with learning disabilities **(Dehaene, 2010; Peters and De Smedt, 2018)**. However, it has become clear from recent neuroimaging studies that there is no one-to-one mapping between neural profiles and behavioural difficulties **(Astle, Bathelt and Holmes, 2019; Siugzdaite et al., 2020)**. Children with the same learning disabilities do not all have similar neural profiles, and children with similar neural profiles are not all characterized by similar learning disabilities. Additionally, there appears to be substantial overlap between children with various learning disabilities at the level of the brain. Neuroimaging studies using different methods of analysis have shown that children with dyslexia and children with dyscalculia show remarkable similarity in brain activation in the context of maths and reading tasks, and in brain anatomy **(Peters et al., 2018; Moreau et al., 2019)**. These sources of

...children with learning disabilities form a somewhat heterogeneous group, because different profiles of strengths and weaknesses can lead to the same behavioural difficulties.

evidence make it clear that many neural factors influence children's learning abilities.

Finally, and as noted above, the profiles of children with learning disabilities cannot be traced back to single, cognitive origins. Clusters of different cognitive profiles have, for example, been reported in a group of children with maths difficulties **(Bartelet et al., 2014)**. This demonstrates that maths performance is influenced by more than the most commonly studied cognitive correlate, that is, numerical magnitude processing **(Butterworth et al., 2011)**. Rather, a variety of cognitive correlates has been found to be associated with reading and maths difficulties, such as processing speed, working memory and attention **(Lee and Bull, 2016; Peterson et al., 2017; Daucourt et al., 2020a)**. Some of these cognitive correlates appear to be shared between reading and maths disabilities and could therefore help clarify the high rates of comorbidity. It is becoming increasingly clear that (an interplay of) various cognitive factors influence children's learning abilities.

Together, it follows from the (intergenerational) multiple deficit model and the evidence presented here that children with learning disabilities form a somewhat heterogeneous group, because different profiles of strengths and weaknesses can lead to the same behavioural difficulties. Hence, not all children with dyslexia or dyscalculia are the same.

6.2 .3 CO-OCCURING CONDITIONS

Children with learning disabilities often have co-occurring neurodevelopmental, psychiatric or mental health disorders. For example, many children struggle with both mathematics and literacy learning **(Landerl and Moll, 2010; Peters, de Beeck and De Smedt, 2020)**, which is unsurprising given that achievement in these academic domains is overlapping **(Moll et al., 2016)**. Amongst children with a diagnosed mathematical

learning disability, approximately 25 per cent also have a language disability, 18 per cent have ADHD and as many as 70 per cent also have dyslexia **(McGrath, Peterson and Pennington, 2020)**. Dyslexia also often co-occurs with a language impairment **(Bishop and Snowling, 2004)** and ADHD **(Boada, Wilcutt and Pennington, 2012)**. Children with learning disabilities also have more anxiety symptoms on average when compared to children without learning disabilities **(Nelson and Harwood, 2010)**. Relatedly, individuals with co-occurring learning disabilities have lower school achievement and mental health than those identified with a single impairment **(Martínez and Semrud-Clikeman, 2004)**. There is evidence of increased co-occurrence of learning disabilities as children develop, with accumulated cognitive challenges **(Costa, Edwards and Hooper, 2016)**. In other words, children with an identified neurodevelopmental disorder may be at risk for developing co-occurring conditions due to behavioural, neuropsychological and genetic overlap. For example, the majority of children with autism spectrum disorder (ASD) (31–95 per cent) also have symptoms of ADHD, and there is also overlap between ASD and intellectual disability (Grigorenko et al., 2020). Similar to SLDs, autism cannot be traced back to single genetic, neural or cognitive causes. Moreover, genetic research has also shown that it is not straightforward to predict risk for co-occurring disorders from genetic data **(Brki et al., 2020)**. Autism has evolved from a narrow definition of a rare neurodevelopmental disorder to a complex, multi-dimensional view that recognizes a neurodiversity perspective **(Happé and Frith, 2020)**. Autism is much more prevalent than previously believed, with some estimates as high as one in 100 **(Happé and Frith, 2020)**. Many of the behaviours that are characteristic of autism are also seen in children with severe learning disabilities **(O'Brien and Pearson, 2004)**. There is also substantial overlap between children with a SLD and ADHD, and approximately 40 per cent of children who have an SLD also have ADHD **(DuPaul, Gormley**

Autism has evolved from a narrow definition of a rare neurodevelopmental disorder to a complex, multi-dimensional view that recognizes a neurodiversity perspective.

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...mental health struggles often present differently in children with disabilities and so may not be recognized until later in adolescence.

and Laracy, 2013). ADHD is a very heterogeneous condition, which is why most children with ADHD have co-occurring disorders, including anxiety and depressive disorders **(Gnanavel et al., 2019)**. Children with ADHD tend to have lower levels of academic achievement compared to their typically developing peers and often struggle with motivation, study skills and other behaviours that are important for academic success **(Rogers et al., 2015)**.

Children with learning disabilities are at greater risk for developing a diagnosable mental health disorder compared to their typically developing peers **(Coughlan, 2011)**. However, mental health struggles often present differently in children with disabilities and so may not be recognized until later in adolescence **(Coughlan, 2011)**. Moreover, teachers are often not given adequate guidance on how to identify and support the mental health needs of their students **(Rose et al., 2009)**. Approximately 10–20 per cent of children and adolescents worldwide have mental health problems **(Kieling et al., 2011)**. The consistency of this estimate throughout the last forty years is a striking result considering that significant inter-study heterogeneity exists. A recent meta-analysis of forty-one studies conducted in twenty-seven countries (between 1985 to 2012) estimated a worldwide prevalence of any mental disorder in children and adolescents of 13.4 per cent **(Polanczyk et al., 2015)**. According to this meta-analysis, approximately 241 million youths around the world were affected by a mental disorder in 2015. The most common group of mental disorders were: anxiety disorders, affecting 117 million; disruptive behaviour disorder, affecting 113 million; ADHD, affecting sixty-three million; and depressive disorders, affecting forty-seven million. Interestingly, the variability of prevalence estimates was not explained by geographic location of studies and year of data collection.

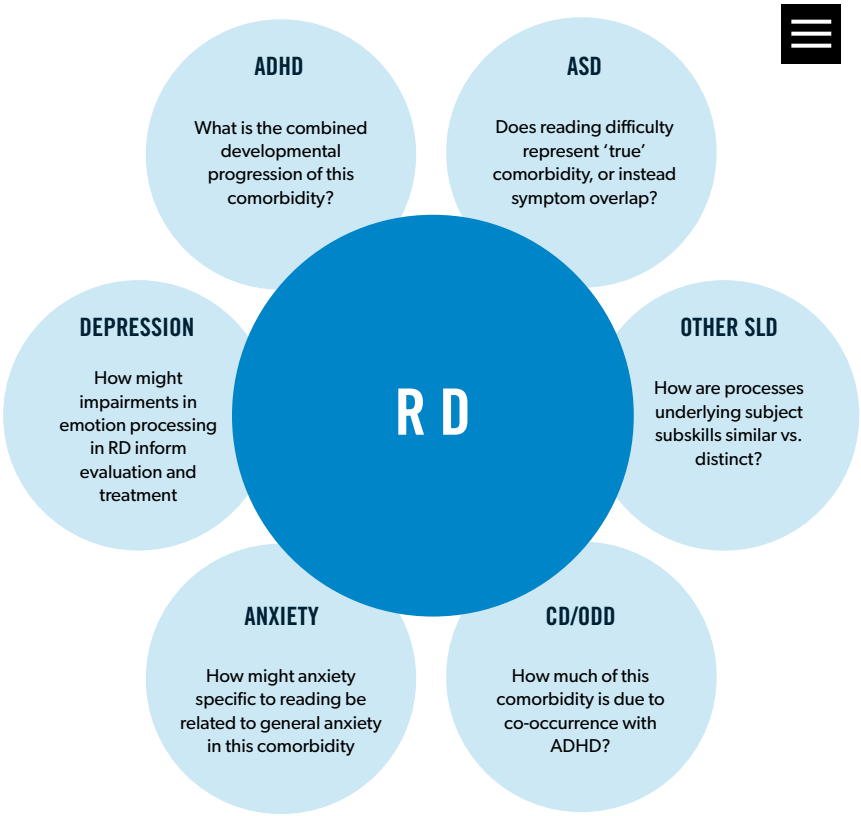

Figure 6.3. Current issues, areas of investigation, and suggestions for future research in conditions commonly occurring with RD in children. RD, reading disorder; ADHD, attention deficit hyperactivity disorder; ASD, autism spectrum disorder; SLD, specific learning disorder; CD, conduct disorder; ODD, oppositional defiant disorder.

Source: Hendren et al. (2018)

6.2 .4

VULNERABLE POPULATIONS: RELATIONSHIP BETWEEN DISABILITY, POVERTY AND EDUCATION

As already indicated at the beginning of this chapter, there are many other reasons why people struggle to learn and flourish in their daily lives. For example, there is growing evidence revealing complex relationships among disability, poverty and levels of education **(Singal, 2017)**. The Department for International Development **(DFID, 2000)** describes this relationship as cyclical in nature, stating that disability is both a cause and a consequence of poverty. According to large-scale analyses and reviews of cross-country data from low to middle

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...there is growing evidence revealing complex relationships among disability, poverty and levels of education.

income countries, disability is significantly associated with higher multidimensional poverty, lower employment rates and lower educational attainment **(Groce et al., 2011; Mitra, Posarac and Vick, 2013; Winzer and Mazurek, 2015).** The reverse is also true such that lack of educational attainment is a key factor in predicting poverty during adulthood for people with disabilities **(Groce et al., 2011; Mitra, Posarac and Vick, 2013; Winzer and Mazurek, 2015).** For instance, it has been shown that literacy is associated with many indices of academic, social, vocational and economic success and is a widely recognized determinant of health **(Irwin, Siddiqui and Hertzman, 2007).** Furthermore, the duration of education, which is highly dependent on academic success and especially reading proficiency, has been considered to be an important predictor of health and longevity. Winzer and Mazurek **(2015, p.161)** have summarized this: 'When school enrolment is restricted, curtailed, or simply denied, it often marks the beginning of a lifetime of exclusion from mainstream society for persons with disabilities and means that they are more likely to remain poor'.

Owing to systematic exclusion from basic health care services, political and legal processes, and education and employment, people with disabilities are likely to have significantly reduced income-generating opportunities, leading to poverty **(Mitra, Posarac and Vick, 2013).** In turn, poverty can deeply hamper the learning process and limit accessibility to education **(Winzer and Mazurek, 2015; WG2-ch4)**, particularly when parents are unemployed, or are illiterate, and consequently struggle to support the learning of their children **(Nel and Grosser, 2016).** In areas of poverty there is usually a higher incidence of physical and emotional stress (e.g. violence, sexual abuse) that may affect learners so severely that they lose their ability to fully take part in the learning process or could lead to absenteeism from school, and eventually dropping-out **(Peterson and Hittie, 2003).** Nevertheless, it is important to re-emphasize that all children who

struggle with learning need access to instructional and interventional strategies to maximize their potential and joy of learning regardless of the aetiology of their struggles, their diagnostic status and other factors influencing their learning struggles **(WG3-ch5)**.

Similarly, being poor increases one's probability of acquiring an impairment due to limited access to health care, poor sanitation facilities, lack of basic services, low nutritional intake and increased risks of living in hazardous conditions, among others **(DFID, 2000; Nel and Grosser, 2016)**. These factors can contribute directly and indirectly (through the mother, if they impact pregnancy or birth) to physical and mental impairments, such as mobility deficits and intellectual, behavioural, learning and cognitive disabilities **(UNICEF, 2013)**. Specifically, poverty is one of the greatest environmental risk factors for learning difficulties **(UNESCO Institute for Lifelong Learning, 2021; Winzer and Mazurek, 2015; WG2-ch4)**. Disability prevalence rates are much higher in the Global South as compared to the Global North **(Winzer and Mazurek, 2015)**.

...poverty is one of the greatest environmental risk factors for learning difficulties.

Not only can disability and poverty influence access to schooling **(WG2-ch4)**, but they are also likely to shape the learner's experience in the classroom. Although the low quality of education and lack of learning of children with disabilities has been observed in many cultural contexts, the underlying reasons may strongly differ between countries. Learning disabilities, along with other physical or cognitive impairments such as neurological disabilities (e.g. cerebral palsy), sensory barriers (e.g. hearing loss or visual impairments), epilepsy, physical impairments, communication disorders, attention, distractibility and memory problems, and chronic health impairments can threaten academic success. Other medical problems at birth, such as premature births, anoxia[5], and damage to the brain after birth

[5]Absence or deficiency of oxygen reaching the tissues, and particularly the brain.

because of head injuries caused by accidents, or child abuse and illness, could also contribute to learning disabilities **(Nel and Grosser, 2016)**. Apart from the difficulties directly related to the disability itself, which are relatively similar across cultures, other complex sociocultural factors may hinder the learning process. In India for example, large classroom-based studies point to a lack of teacher expertise and confidence in meeting the needs of children with disabilities **(Singal, 2017)**. Similar results have been found in South Africa **(Engelbrecht, 2003)**. A lack of international large-scale studies and international comparable data makes it difficult to draw clear and general conclusions. Because scientific knowledge and theoretical models mainly developed in the Global North often shape policy and educational practices for students with disabilities and learning difficulties in completely different cultural contexts, several authors underscore the risks of applying such knowledge without allowing for a thorough analysis of the disability context of particular countries, of how disability and learning difficulties are perceived in that country, and without seeking to build upon successful local ways of working with people with disabilities **(see for example Kalyanpur, 2014 and Maudslay, 2014 for a discussion in the Nepali and Cambodian contexts, respectively)**.

A lack of international large-scale studies and international comparable data makes it difficult to draw clear and general conclusions.

Neurodisability (i.e. the deficits or impairments that an individual can experience when they have been affected by a brain injury; ND) is highly prevalent and often neglected in education settings, especially in poorer and more vulnerable populations. One cause of ND is acquired brain injury (ABI), which can involve injury (e.g. from a fall or road accident), infection (e.g. herpes simplex) or illness of the brain (e.g. stroke). Traumatic brain injury (TBI) is the most common form, and is the leading cause of death and disability in those under forty years of age. TBI can result in

...the most disadvantaged 5 per cent of children under five years of age in the United Kingdom (UK) are five times more likely to have a TBI compared to their peers.

significant ongoing difficulties, which have been associated with adverse life outcomes such as substance abuse, self-injurious behaviour and entrance into the criminal justice system **(Gunter et al., 2013; McKinlay et al., 2014)**. The peaks in prevalence are during infancy (zero to five years of age), and during adolescence, with a worldwide incidence of forty-seven to 280 per 100,000 children **(Dewan et al., 2016)**. Of critical importance is the large social divide in this epidemic: the most disadvantaged 5 per cent of children under five years of age in the United Kingdom (UK) are five times more likely to have a TBI compared to their peers **(Chris Bryant, MP; Hansard, 2019)**. Though TBI is thought to affect approximately 8–12 per cent of the population, it is not routinely assessed and recognized by the education system, with children misinterpreted as 'difficult'. It is of no surprise that children are therefore struggling to adequately and fairly access education, limiting future prospects **(Silver et al., 2001; Frost et al., 2013; Kahn et al., 2018)**.

Considered an 'invisible disability' owing to children's purported physical recovery after most TBIs, the consequences of the injury are often unidentified and misdiagnosed **(Glang et al., 2019)**. There is a clear risk that later in life the effects of injury are forgotten or considered insignificant. Cognitive and behavioural difficulties often occur after TBI and lead to poorer outcomes in adulthood **(Di Battista et al., 2012)**. These difficulties have been linked to measurable and lasting damage to the brain **(Roberts, Mathias and Rose, 2016)**. Impulsivity, attentional problems, reactive aggression and issues with behavioural or emotional regulation are common problems following TBI **(Pastore et al., 2018; Williams et al., 2018)**. In cases of severe TBI, theory of mind (ToM) is often affected (the ability to put oneself 'in another's shoes', and understand how others may think, feel and act in a manner different from our own experiences) **(Hoskinson et al., 2019)**. Poorer cognitive and affective ToM are predictive of higher levels of reactive aggression in childhood

(Austin, Bondu and Elsner, 2017). These are issues that could interfere with classroom behaviour and contribute to school exclusion, as well as peer relationships and mental health **(Yeates et al., 2013; Lantagne et al., 2018)**.

TBI is a pervasive factor impacting educational attainment. Structural equation modelling has shown that childhood TBI mediates the relationship between poor educational attainment and offending behaviour in adolescents, showing the significance of addressing TBI related-needs earlier in the education system **(Clasby et al., 2020)**. Parenting practices can influence outcomes following childhood TBI, and poor parental supervision is associated with both more severe TBI and higher levels of reactive aggression in young offenders **(Kent et al., 2021)**. TBI can exacerbate existing difficulties with maturity and social development, and greatly reduce an individual's ability to cope with, and adapt to, the social and academic pressures of school **(Williams et al., 2020)**. In school, these difficulties are often labelled as oppositional or defiant behaviour, and when classroom resources are stretched poor motivation and withdrawal can be easily overlooked **(Lantagne et al., 2018; UKABIF, 2018)**. The British Psychological Society has called for the earlier screening of children to identify TBI – for example at the point of exclusion from school **(British Psychological Society, 2015)**. Systemic school-based screening for neurodisability – including TBI – using tools such as the Clasby Neurodiversity Assessment Tool (CNAT), paves the way for appropriate support being provided and the subsequent introduction of TBI-specific educational interventions.

...childhood TBI mediates the relationship between poor educational attainment and offending behaviour in adolescents.

TBI in infancy and childhood is associated with more severe long-term neurocognitive and psychosocial outcomes than TBI sustained in late adolescence. The worst outcomes of TBI in adolescents are associated with both more severe injuries and delay in assessment and intervention **(Di Battista et al., 2012)**. Childhood is a period of rapid, protracted brain development

Systemic school-based screening for neurodisability - including TBI - paves the way for appropriate support being provided and the subsequent introduction of TBI-specific educational interventions.

and TBI interferes with the emergence of rapidly developing skills and magnifies any deficits later in life **(Gogtay et al., 2004; Donders and Warschausky, 2007)**. Mild TBI is also an important trans-diagnostic risk factor associated with developmental patterns of psychopathology in children and adolescents **(McCormick, Connolly and Nelson, 2020)**.

Children with TBI are vastly under-identified in schools and education services. A study conducted in the USA in 2019 identified that an estimated 145,000 children and adolescents in the USA are living with long-lasting and significant difficulties with behavioural, physical, social and cognitive functioning following a TBI. However, only 26,371 students receive special education services for TBI currently. Therefore, a significant number of children and adolescents with ongoing disability resulting from TBI are unidentified in the education system, and not receiving proper support **(Nagele et al., 2019)**. Education offers a global possibility to implement early, targeted interventions so that children with TBI are supported and not left out of opportunities to secure positive life outcomes.

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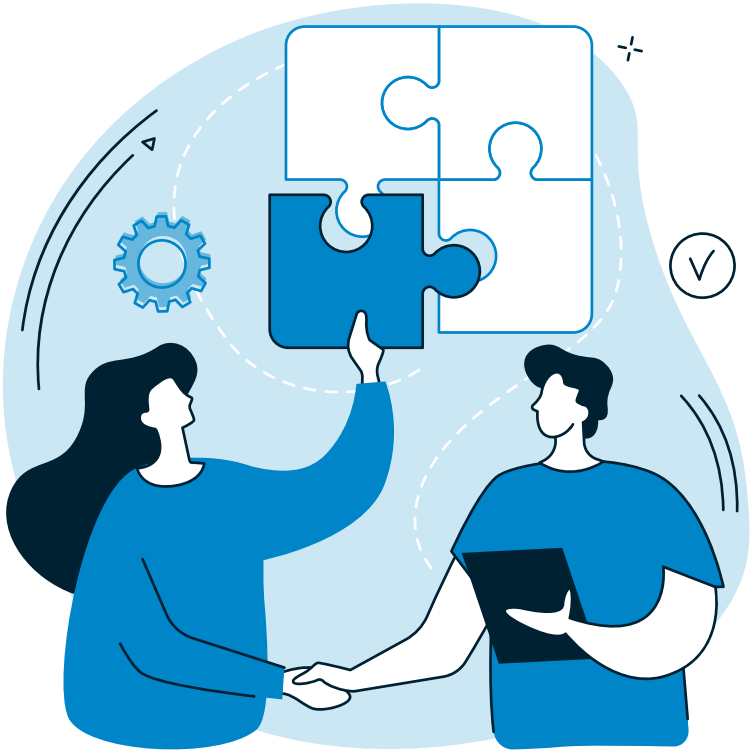

6.3 How can we identify children who need extra learning

6.3 .1 DIAGNOSIS OF SPECIFIC LEARNING DISABILITIES

Establishing universal criteria to identify children with SLDs is historically one of the most controversial issues among researchers and practitioners **(Harrison and Holmes, 2012)**. Some of the challenges arise from the heterogeneity and high co-occurrence of SLD with other neurodevelopmental disorders, arbitrariness associated with applying cut-offs along a continuous measure of

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achievement, as well as federal and local legislature (or lack thereof) guiding definitions or 'cut-off criteria' of SLDs. Multiple methods for conceptualizing and operationalizing significant academic underachievement based on individual's age and development have emerged.

The Intelligence–Achievement discrepancy model is an approach to conceptualize the unexpected underachievement and general cognitive abilities associated with SLDs. By this method, in order to be considered to have a learning disability, the individual must have a significant difference, or discrepancy, between his or her IQ and achievement test score. This strategy of identifying SLDs is considered archaic and inappropriate. Although the discrepancy definition historically has been a part of an assessment of learning differences, the inclusion of a measure of intelligence is not supported by research and has excluded individuals from being identified as having a learning difference who have, in fact, had reading difficulties. **(For a review of the evidence see Fletcher, 199; Siegel, 1988, 1992).** There is little evidence that poor readers with low intellectual achievement show qualitatively different patterns of reading difficulties **(Stanovich, 2005).** Similarly, children with maths learning disabilities showed poor performance on measures of numerical magnitude processing independent of IQ **(Brankaer, Ghesquière and De Smedt, 2014).** Intelligence tests are generally very heavily loaded on language measures, now understood to be a common weakness for individuals with dyslexia **(Siegel and Ryan, 1984).** As a result, individuals with dyslexia are more likely to have their intellectual functioning underestimated. Children with dyslexia are equally likely to respond to intervention irrespective of whether they have co-occurring intellectual difficulties and it is important to note that these interventions can benefit any child struggling with word reading regardless of the underlying aetiology **(Hurford et al., 1994; Shaywitz, 1996; Pogorzelski and Wheldall, 2002; Weber, Marx and Schneider, 2002).** Moreover, a number of studies have reported giftedness in children with SLD

(van Viersen et al., 2016; Toffalini, Giofrè and Cornoldi, 2017), and these students may be more challenging to identify as they may be more able to compensate for their learning difficulties compared to peers with lower IQ. Despite the long history of evidence demonstrating that the IQ-discrepancy is unreliable at identifying SLDs, a recent study found that approximately 37 per cent of sampled school psychologists across the USA are still using this approach **(Benson et al., 2020)**. There is no evidence to support the use of IQ for identifying children with SLD who need extra support in the classroom,

Another approach used to identify SLDs is the patterns and strengths model. In this method, an assessment for dyslexia or other SLDs often includes a number of tests of cognitive processes, for example, verbal comprehension, fluid reasoning (a cognitive ability that requires minimal prior knowledge to solve novel tasks), visual processing, processing speed, working memory, visual-spatial thinking, auditory processing, and so on. These tests are designed to examine aspects of cognitive functioning and identify patterns in strengths and weaknesses in the individual being assessed. There are several forms of the patterns of strengths and weaknesses model **(Naglieri, 1999; Hale and Fiorello, 2004; Flanagan, Ortiz and Alfonso, 2007)**. One of the main assumptions of the patterns of strengths and weaknesses models is that the performance of individuals with learning disabilities will differ from that of typically achieving individuals. Yet, this difference between performance of students with and without learning disabilities is not always found, and there is great intra-group variability using patterns of strengths and weaknesses analysis. Therefore, their diagnostic utility and validity has been questioned by several authors **(Miciak et al., 2015; McGill and Busse, 2017; Benson et al., 2018)**. Most importantly, a particular cognitive profile of strengths and weaknesses does not predict who will benefit from remediation **(Miciak et al., 2016)** or what particular intervention strategy

...a particular cognitive profile of strengths and weaknesses does not predict who will benefit from remediation or what particular intervention strategy should be employed.

should be employed. These should not be considered when making diagnostic decisions **(Vaughn et al., 2008; Restori et al., 2009)**.

Identification of SLDs is generally achieved using cut-off scores based on falling significantly below expected level on one or more measures of achievement. However, because the impairment is quantitative in nature, there is no broad consensus about the degree of impairment necessary for diagnosis. Generally, we observe cut-off scores one to two standard deviations below the expected mean, roughly corresponding to the third to fifteenth percentile. That said, choice in cut-off scores is largely arbitrary. Dyslexia is typically identified during the primary school years, via a psychometric evaluation that includes measures of phonological processing, letter sound knowledge, single-word reading and spelling, reading comprehension, and oral language skills. Dyscalculia is often identified using measures of arithmetic fluency and calculation performance. Although recent studies have suggested that assessing basic numeracy skills **(Jordan, Glenn and McGhie-Richmond, 2010; Merkley and Ansari, 2016; Bugden, Szkudlarek and Brannon, 2021)** can improve the efficiency for early classification of maths learning disabilities, more work is needed to identify reliable assessment tools to identify dyscalculia.

6.3 .2 BEST PRACTICES IN EARLY SCREENING AND INTERVENTION FOR SLDS AND OTHER INDIVIDUALS AT RISK FOR POOR EDUCATION

6.3 .2 .1 IMPORTANT CONSIDERATIONS FOR SCREENING AND IDENTIFICATION

Screening practices are ubiquitous in education in the Global North as part of a preventive

Screening is the first step in supporting vulnerable populations...

systems approach to the early identification of individuals who are at risk for poor education outcomes. Screening is the first step in supporting vulnerable populations, not only to identify learners who need additional educational supports, but to subsequently provide direct, explicit instruction and intervention to improve lifelong trajectories of human flourishing. Conventional screening processes in education systems in the Global North are typically brief, reliable and valid assessments that are administered to whole classrooms of students. Performance on screeners are then compared to criteria that typically classify students into one of three groups: (1) those who are low risk (typically >80 per cent chance of meeting an expected threshold of performance on a later assessment); (2) those who are at a moderate level of risk (typically 50 per cent chance of meeting an expected threshold of performance on a later assessment); and (3) those who are at a high level of risk (typically <20 per cent chance of meeting an expected threshold of performance on a later assessment). The diversity of available screeners for reading, maths, behaviour and other educational or social-emotional outcomes necessitates a detailing of both the core considerations one should take stock of when choosing a screener as well as the barriers, access and equity issues related to using screeners.

Choosing a screener. A particular burden on those using screeners is the decision-making of what supports to provide to individuals once scores are obtained. What should be considered during the selection process of a screener should include an evaluation of the following technical and usability characteristics.

Population of interest. Evaluating the norming sample for a selected screener is critical to understanding for whom the scores generalize and are best suited for implementation. An understanding of the intended age-range or grade-level of the child and operationalized definition of how risk is defined are both necessary for comparing

Evaluating the norming sample for a selected screener is critical to understanding for whom the scores generalize and are best suited for implementation.

and evaluating usefulness to the local context (e.g. dyslexia as <20th percentile or <5th percentile on an end of year, standardized word reading measure).

Scope of the assessment. Most screeners measure skills through speeded assessments designed to measure fluency (i.e. the automaticity of skills), accuracy assessments (e.g. computer-adaptive and computer-administered power-based assessments) or observational assessments (e.g. teacher observations of child behaviours). Depending on the goal of the screening process and available resources for the assessment, certain types of assessments may be more feasible, such as where stable internet is not available or where computer adaptive assessments may not be tenable.

Reliability of scores.
The consistency of scores from a measure is necessary but insufficient statistical property to evaluate according to both the type of reliability that is reported in technical manuals (e.g. internal consistency, test–retest, parallel form) as well as the technical adequacy of reported reliability.

Classification accuracy.
The correct identification of individuals who are at risk and not at risk for poor outcomes is often the hallmark of statistical adequacy in evaluating the quality of screener. Such statistics include the sensitivity of scores (i.e. the ability of the screener to correctly identify those who will not meet an expected threshold of performance on a later assessment), the specificity (i.e. the ability of the screener to correctly identify those who will meet or exceed an expected threshold of performance on a later assessment), the false positive and false negative rates and other important features of technical adequacy (e.g. predictive power, area under the curve and base rates).

Barriers, access, equity for screeners.
When used within a responsive, prevention framework, screening has tremendous potential to

...implementing a screener in a local context should be done by taking stock of not just the technical adequacy of the screener, but also administrative and ecological considerations for the learner...

reduce educational disparities. Armed with valid and reliable scores about how students are performing, school personnel are well positioned to provide effective instruction and interventions to all learners. However, there are several assumptions that must be met to ensure that screeners and the information gained from them do lead to improved academic performance. Unfortunately, for many learners, these assumptions are often not met.

For example, when students are receiving evidence-based instruction, screeners can help teachers determine which students are not responding to classroom instruction or specific interventions and require more intensive support. However, students from vulnerable or discriminated populations (e.g. in the USA, students of colour, students attending high-poverty schools with many children who are growing up in poverty, students who are English learners and students with disabilities) are less likely to be receiving evidence-based instruction in the classroom or even in small group instruction **(Morgan et al., 2015)**. Another assumption is that teachers, clinicians and other professionals who make use of screeners have the knowledge, expertise, experiences and cultural competence necessary to assess and interpret performance for these student populations. The differential diagnosis and treatment of language and learning differences and disabilities in these student populations is challenging for a number of reasons, including a lack of valid and reliable assessment tools, appropriate approaches to modifications of assessments and availability of alternative assessment approaches.

Unfortunately, conditions like these not only limit the potential of the screening process, but also contribute to the misrepresentation of vulnerable student populations in special education. Therefore, implementing a screener in a local context should be done by taking stock of not just the technical adequacy of the screener, but also administrative and ecological considerations for the learner,

...it is important that teachers, clinicians, and other practitioners engaged in the screening process develop their own cultural competence.

the classroom context and the surrounding community. The administration format of the assessment may be a barrier in choosing a particular type of assessment based on whether the screener is given on an individual or group basis. As well, the choice of a screener should be informed by the administration and scoring time and the scoring format (i.e. manual scoring or automatic scoring). Choosing a screener should be informed by, for example, linguistic variability in the local setting compared to the norming sample of the screener, individual variations that arise from geographic settings where poverty and inequitable funding appropriations exist, parent/caregiver styles of communication, and alignment with styles of assessments. Moreover, data gathered from screeners should be interpreted in concert with other informal and formal assessment data, family and educational history, and other information available on the student and instructional context to help ensure that recommendations are representative of the student's ability and free from bias. Finally, it is important that teachers, clinicians, and other practitioners engaged in the screening process develop their own cultural competence. Culturally competent educators are aware of their own culture, knowledgeable about cultural interactions around them and use that knowledge and awareness to support the needs of their diverse learners **(NEA, 2008)**. Cultural competence is particularly important in education settings, not only because many teachers do not share the cultural backgrounds of their students but also because many teachers report low levels of competence in working with students from different race, ethnic and cultural backgrounds and from low-income households **(Bogdan et al., 2019)**. Armed with greater cultural competence, practitioners can ensure that their interpretation of student performance on screeners and the instructional recommendations that follow are culturally and linguistically appropriate for the student's developmental level and needs.

Currently most schools apply a 'wait to fail' or 'reactive approach' when it comes to learning disabilities.

The proper assessment of learning disabilities should consist of tests of various aspects of academic achievement. Wherever possible, these assessments should be standardized. However, assessments are not available in many languages. Assessments are also important for collecting data and on the prevalence and learning progress of children with disabilities **(Nel and Grosser, 2016)**. For example, South Africa does not yet have a standard tool for measuring the prevalence of learning disabilities nationally and therefore cannot know whether children with disabilities are receiving the educational supports they need **(Nel and Grosser, 2016)**. It should be a goal to construct these assessments based on the language and culture in different regions. Moreover, dynamic assessment, which is testing adapted based on a student's level of performance can be particularly useful for assessing the learning trajectories and potential of children with learning disabilities **(see WG3-ch3 for a detailed description)**.

6.3 .3

PREVENTIVE EDUCATION MODEL

Currently most schools apply a 'wait to fail' or 'reactive approach' when it comes to learning disabilities. This is often referred to as the 'dyslexia paradox' in the domain of reading acquisition **(Ozernov-Palchik et al., 2016)**. However, several models and a range of legislation have tried to initiate a shift from a reactive to a proactive or preventative model, for example Individuals with Disabilities Education Act **(IDEA, 2004)**. In such a model, children are identified as being at risk for a learning disability using screening approaches followed by remediation/intervention within primarily general but also special education for children at risk with the aim to prevent a learning disability before it manifests.

These preventive or proactive approaches have already been shown to be successful for the

...preventive or proactive approaches have already been shown to be successful for the prevention of reading disabilities.

prevention of reading disabilities. For instance, it has been shown that word reading interventions are more effective for improving reading outcomes when administered in kindergarten and first grade than when they were administered during later elementary grades **(Wanzek and Vaughn, 2011)**. Overall, converging research strongly supports an early and targeted approach for the prevention of learning disabilities **(Catts et al., 2015; Catts and Hogan, 2020)**. In the USA, for example, numerous states have already passed legislation directly related to the prevention of SLDs. While these legislative efforts are primarily directed towards the prevention of dyslexia and language-based learning disabilities, the concept of 'preventive education' is much older. For instance, within IDEA **(2004)**, the Response to Intervention (RtI) model is the primary approach for students at risk for SLDs and consists of assessment, instruction and intervention phases in three tiers **(for an overview see Grigorenko et al., 2020)**. The RtI model of SLD identification involves universal screening of all young students for early predictors of academic achievement. Based on the screening results, students who are 'at risk' for learning disabilities then receive tiered targeted intervention and their progress is monitored. Students who continue to perform below grade expectations despite intervention can be identified as having an SLD. While in theory, RtI offers a practical approach to early identification and intervention of students at risk for SLD, there are still some concerns and controversies with the approach **(Grigorenko et al., 2020)**. For example, many schools face challenges to implementing RtI adequately **(Balu et al., 2015; Fuchs and Fuchs, 2017)**. Thus, if interventions are not implemented properly, a student can mistakenly be identified as having an SLD, when their learning difficulty is actually due to poor instruction and remediation.

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6.4 How can we support children who need extra help with their learning?

6.4.1 INSTRUCTIONAL DESIGN AND INTERVENTIONS FOR LEARNING DIFFICULTIES

In classrooms across the world, there are students with learning disabilities who demonstrate a lack of adequate progress relative to their peers. How does a teacher effectively embrace a large range of learners and maximize opportunities for success for all? There are far more students who struggle with learning than have been diagnosed with a specific disorder. Unfortunately, this field still lacks large-scale evidence-based studies systematically testing the effectiveness of various interventions for children with learning difficulties. As stated by Vaughn and Fletcher **(2020)**, we know more about the science of reading than the science of reading instruction. Classroom teachers and instructional support staff can take small but intentional

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steps daily to ensure access to the curriculum for all of their students. The techniques and methods shared in this section will provide quick time efficient and evidence-based practices associated with improved outcomes for children with learning disabilities but also improved learning outcomes for students who do not have learning difficulties **(Vaughn et al., 2000)**. Although these practices can benefit an entire class, they can be essential for children with learning disabilities. We will provide examples of how to accommodate and support children with learning disabilities while also providing opportunities for skill building through the following instructional approaches: (1) design; (2) key daily practices; (3) classroom interventions; and (4) one-minute interventions.

6.4 .1 .1

INSTRUCTIONAL DESIGN

Explicit instruction is an effective research-based feature of instructional design. Explicit instruction can be used across all grades and classrooms, as it is not specific to any single curriculum or intervention but is 'systematic, direct, engaging and success-oriented' **(Archer and Hughes, 2010)**. Four ways to integrate explicit instruction into any lesson and/or unit to increase opportunities for successful learning **(Vaughn and Fletcher, 2020)**: (1) break down or chunk complex tasks into more manageable units; (2) purposefully introduce manageable chunks and connect them to previous learning, so that students can build skills to accomplish an advanced task; (3) provide brief and precise instructions using modelling or think-aloud in daily practice to address the important features of the content (e.g. show students in an organized and clear manner how to do something); and (d) utilize routines that move fluidly from modelling to guided practice and ultimately independent practice when teaching new tasks.

...instruction should: be explicit and systematic; foster high levels of engagement, on-task behaviour, and emotional support...

6.4 .1 .2

KEY DAILY PRACTICES

Examples of instructional practices that can be integrated into every lesson to support atypical learners include multiple opportunities for students to respond and heterogeneous grouping to facilitate cooperative learning, purposeful practice and feedback. Daily opportunities to respond mean that during every lesson, students respond to prompts either through engaging in discussion, writing or using response tools (e.g. dry erase boards). Students can respond with a partner, small group or the whole class. Heterogeneous grouping refers to students with different skills and abilities working together to learn from their peers, as students with stronger skills can provide a model for less proficient students **(Baker et al., 2014)**. Perhaps most importantly, frequent opportunities for practice can provide purposeful time for students to utilize all new skills and refresh learned ones **(Swanson and Deshler, 2003; Vaughn and Fletcher, 2020)**. Lastly, purposeful feedback, especially when provided immediately, can help guide students through error correction.

6.4 .1 .3

CLASSROOM INSTRUCTION

To support all children in the classroom, particularly those with maths difficulties, instruction should: be explicit and systematic; foster high levels of engagement, on-task behaviour, and emotional support **(Namkung et al., 2019)** using motivational techniques and positive reinforcement; provide multiple opportunities to respond and receive immediate feedback; and use frequent retrieval practice and cumulative review **(Fletcher et al., 2019)**. Whole-class techniques include peer tutoring in which lower and higher performing children are purposefully paired to work on discrete maths skills, taking turns being the teacher and the learner. To effectively introduce new maths skills, teachers break down a problem into its underlying conceptual

structure, use concise language as they model the steps to solve, and then encourage student verbalization of the steps as they attempt to solve the problem. It is also helpful to draw connections between mathematical concepts and authentic, real-world representations.

Mathematical difficulties can greatly impact both individuals and societies **(National Mathematics Advisory Panel, 2008)**. Because maths difficulties are relatively stable from kindergarten to the end of high school **(Shalev et al., 1998; 2005; Morgan et al., 2011)**, high quality classroom instruction is important for all, with intensifying intervention needed for children who do not respond adequately to instruction. There are several domains of mathematics (think whole number operations to trigonometry) and fluency in one domain may be foundational for, but not sufficient to, transfer to success in another **(Fuchs et al., 2009)**. This necessitates ongoing, universal maths screening and assessment; children whose previous maths difficulties have been remediated may require additional intervention as the curriculum changes, and children without previous difficulties may begin to struggle when new domains are introduced.

6.4 .1 .4

THE POWER OF ONE-MINUTE INTERVENTIONS

While it may not be possible for a teacher to provide thirty minutes (or more) of intensive support to students who need additional instruction, the power of a one-minute intervention should not be underestimated as it can be incredibly useful to reteach, practise, make learning more explicit and give feedback to selected student(s). Two powerful one-minute interventions are: One-Minute Check-In and One-Minute Feedback. One-minute interventions can happen at any time while the majority of students are engaged in work (i.e. turn and talks, group work, individual work). A One-Minute Check-In is when a teacher

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Effective teacher feedback is a feature consistently associated with improved student outcomes.

circulates to check-in with individual students reviewing and practising target skills. This would also be a great time to gather information from students' responses to determine what to reteach or review. One-Minute Feedback is when a teacher meets with one to two students to explain why their responses are correct or incorrect or help students develop stronger responses. Teacher feedback should be clear, focused and directly related to the learning task and guides the student(s) to continue and/or to adjust learning practices. Effective teacher feedback is a feature consistently associated with improved student outcomes **(Hattie, 2009)**.

It should be noted that a small percentage of students with persistent learning difficulties may not adequately respond, even to high-quality instruction and intervention **(Fuchs et al., 2008; NCII, 2013)** and might need individualized instruction **(NCII, 2013)**, when possible. For these students, we encourage educators to consider how they might intensify the practices we recommend here. For example, it may be important to remember that students with the most intensive needs may require ten to thirty times as much practice as their peers **(Gersten et al., 2009)** and may profit from tutoring. With attention to instructional design, key daily practices and one-minute interventions, teachers can more effectively embrace a large range of learners and provide opportunities for success for all.

6.4 .1 .5

SMALL GROUP INTERVENTIONS

Effective whole group practices are necessary, but not sufficient, for children with significant maths difficulties. Take for example maths word problem-solving with whole numbers **(Fuchs et al., 2009)** or fractions **(Fuchs et al., 2017)**. Students with maths difficulties will need additional ongoing written and graphic support for the steps that have been modelled **(Jitendra, 2002)**, as well as guided practice in verbalizing the steps.

Teaching practices that maximize solution predictability and minimize constraints on memory and reasoning are helpful for learning and transfer.

Instruction in higher-level skills, such as maths problem-solving, is essential even if foundational skills require continued support; for example, five-minute calculation practice in thirty-minute word problem-solving lessons improved both calculation and problem-solving **(Fuchs et al., 2009)**. Teaching practices that maximize solution predictability and minimize constraints on memory and reasoning are helpful for learning and transfer. For example, the three most common word problem types in early elementary school are combine, compare and change problems, which can be taught in categories so that not every problem seems novel **(Fletcher et al., 2019)**. Also important for transfer is contextual variation in which students solve standard and nonstandard problems with similar underlying conceptual structures to improve more abstract mathematical reasoning, such as relational understanding of the equal sign (e.g. $4 + x = 7$ vs. $7 = x + 4$) **(Powell et al., 2020)**. For children who do not respond to the combination of high-quality classroom-based maths instruction and small group interventions described here, techniques for further intensification are in Powell and Fuchs **(2015)** and Powell and Stecker **(2014)**. Research specific to interventions for secondary school students are in Jitendra et al. **(2018)**.

6.4 .1 .6

HIGH DOSAGE TUTORING: A PROMISING INTERVENTION FOR PUPILS STRUGGLING WITH MATHS

Researchers and policy-makers alike have for decades lamented how rarely interventions aimed at disadvantaged (middle and high school) students successfully generate measurable increases in student performance as measured by standardized achievement tests. This fact, along with the strong results emerging from meta-studies based on randomized controlled trials (RCTs) or quasi-experimental designs investigating the effectiveness of various kinds of tutoring interventions **(Gersten et al., 2009; Ritter et al., 2009; Dietrichson**

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High dosage tutoring is an intensive form of tutoring used at present mainly to help middle and high school students struggling with mathematics.

et al., 2017; Nickow, Oreopoulos and Quan, 2020; Pellegrini et al., 2021), help explain the recent excitement about the possibility that tutoring programs can offer an effective means of addressing persistent (if not growing) inequalities in educational outcomes among more and less privileged learners **(Ander, Guryan and Ludwig, 2016; Kraft and Falken, 2020; Slavin et al., 2020)**. This state of affairs highlights the following question: Which specific types of tutoring interventions appear to be most effective with regard to consistently driving measurable increases in academic skills and outcomes?

High dosage tutoring (HDT) is an intensive form of tutoring used at present mainly to help middle and high school students struggling with mathematics. In several settings in the USA and, more recently, the Netherlands (where the findings are still preliminary), smaller and larger scale RCTs have repeatedly demonstrated that this form of tutoring can generate breakthrough outcomes for disadvantaged pupils for whom typical classroom educational experiences have (at least in the domain of mathematics) not been effective **(Cook et al., 2014, 2015)**. Increasingly cost-effective HDT models are being tested by various teams of independent evaluators in the US and in the Netherlands **(Cook et al., 2014, 2015; Fryer, 2014; Kraft, 2015; Fryer and Howard-Noveck, 2020)**. At each stage, RCTs are pinpointing the standard deviation treatment effects that correspond, at least in the settings in which they have been tested, to the various models. The aim is to produce, for policy-makers and professionals, customized models that are both RCT tested and inexpensive enough that they can be offered at a large scale to disadvantaged students.

HDT is characterized by highly personalized instruction in a small group tutorial setting. Paraprofessional tutors who are usually not certified teachers (e.g. graduates of BA programs offering a 'service year' before moving on to graduate studies) offer tutoring sessions during regular school hours primarily to students who have fallen (many years) behind

grade level in maths. A number of non-profit organizations offer this more or less clearly identifiable type of tutoring, including Saga Education in the USA **(sagaeducation.org)** and The Bridge Learning Interventions in the Netherlands **(tbli.nl)**. In the versions of HDT offered by these organizations, a 'site director' helps tutors individualize lesson plans before tutoring sessions, monitors what goes on in the tutoring room during these sessions and offers ongoing feedback to each tutor thoughtout what is typically a year long intervention. Tutors maintain regular contact with their students' parents or guardians (e.g. through weekly or bi-weekly phone calls). A central aim is to bring students back up to grade level so that they can re-engage with regular classroom material. Crucially, tutors attempt to find what precisely each learner is struggling with in a given domain (e.g. subtraction or decimals) and what the best strategies are for helping them gain confidence by overcoming the specific barriers they face. Unlike classroom teachers, tutors have the luxury of helping their pupils with specific areas of learning until they genuinely achieve and demonstrate mastery. For obvious reasons, this has implications for both the development of skills usually associated with social emotional learning (SEL) and the plausibility of longer-term treatment effects. The latter, however, remains uncertain and requires more (RCT-based) evaluations drawing on longitudinal data.

A central challenge, in the years ahead, will be to create and sustain the conditions in which consistent execution of HDT can be achieved. Training, careful monitoring, adaptations to specific contexts and, where necessary, 'fidelity recovery' will be essential as HDT interventions are scaled up and rolled out in new settings. This will require deep and durable partnerships between managers of non-profit organizations offering HDT, on the one hand, and, on the other, consortium members representing public schools, public school districts/ managerial authorities, (local) governments and philanthropic

Training, careful monitoring, adaptations to specific contexts and, where necessary, 'fidelity recovery' will be essential as HDT interventions are scaled up and rolled out in new settings.

organizations. The 'joining up' or 'co-creation' approach most famously developed by the Abdul Latif Jameel Poverty Action Lab, or J-PAL, appears to offer the most actionable insights into how such bridging of scientific research and educational reform – including HDT – can be achieved moving forward.

6.4 .1 .7

NEW RESEARCH

Given that cognitive competencies such as attention, working memory and spatial cognition are related to mathematics **(Bailey, Dunlosky and Hertzog, 2014; Verdine et al., 2014; Peng et al., 2016)**, can we improve maths with cognitive training? Cognitive competencies do appear to determine for whom a particular intervention is more or less effective **(Fuchs et al., 2013; Swanson, 2014)**. Understanding how and why the cognitive abilities children bring into the instructional setting with them interact with particular instructional components will be valuable for improving the fit between our interventions and the children they are meant to help. Given that maths and reading difficulties often co-occur, even early on **(Willcutt et al., 2013; Barnes et al., 2020)**, research to design feasible and efficient interventions that concurrently address difficulties across academic domains (e.g. reading comprehension and maths word problems) is needed and underway. In sum, current evidence supports the use of maths-specific whole class and small group interventions such as those described above while also considering the cognitive **(WG3-ch3)** and emotional competencies **(WG3-ch4)** that children bring into the learning context.

We are confident that with attention to instructional design, key daily practices and one-minute interventions, teachers can more effectively embrace a large range of learners and provide opportunities for success for all.

6.4 .2

ASSISTIVE TECHNOLOGY

Disabilities manifest themselves in many different forms and severities. Yet, the single unifying characteristic of students with disabilities involves challenges and difficulties in performing routine tasks at a level comparable to their peers. Assistive technology (AT) is sometimes considered an equalizer **(Michaels and McDermott, 2003)** because of its potential to enhance academic, behavioural, social and economic outcomes of students with disabilities. The right AT augments, bypasses or compensates for a disability.

...the single unifying characteristic of students with disabilities involves challenges and difficulties in performing routine tasks at a level comparable to their peers.

The WHO **(2018)** describes AT as follows.

- AT is an umbrella term covering the systems and services related to the delivery of assistive products and services.

- Assistive products maintain or improve an individual's functioning and independence, thereby promoting their well-being.

- AT enables people to live healthy, productive, independent and dignified lives, and to participate in education, the labour market and civic life. AT reduces the need for formal health and support services, long-term care and the work of caregivers. Without AT, people are often excluded, isolated and locked into poverty, thereby increasing the impact of disease and disability on a person, their family and society.

- The United Nations Convention on the Rights of Persons with Disabilities **(2006)** has afforded AT the status of a human right. For this reason, ratifying countries commit to facilitating access to AT solutions for those who need them in order to foster participation in democratic society on an equal basis with others and improve independence in daily life. The

[6]https://www.povertyactionlab.org/case-study/individualized-tutoring-improve-learning

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When appropriate AT devices and services are provided, an individual is able to complete tasks more effectively, efficiently and independently than otherwise possible without the tools.

value and significance of AT can be understood in relation to performance problems. That is, a person with a disability encounters a task they are unable to successfully complete. Following the identification of an appropriate AT device, acquisition of the product, as well as training and support in its use, a person is subsequently able to use their AT to complete the same task that was previously difficult or impossible. When appropriate AT devices and services are provided, an individual is able to complete tasks more effectively, efficiently and independently than otherwise possible without the tools **(WG2-ch6)**. See text box 2 for examples of how AT can support individuals with autism.

Despite the general advocacy for AT by policy-makers, educators and developers, there is no credible evidence to suggest that everyone who could benefit from AT has access to appropriate AT devices and services **(Edyburn, 2020)**. As a result, AT is an under-utilized intervention to provide pupils and students with special needs and disabilities, a means for accessing and engaging in the curriculum in ways that are representative of the ubiquitous nature of technology in society. As a first course of action, we should be mindful that advances in universal usability have provided accessibility tools on every smartphone, computer tablet, laptop and desktop computer. Parents and educators are encouraged to explore the accessibility features on their devices as a critical first step in locating appropriate AT to help a struggling student.

At this time, only a small number of AT interventions can be documented as having a moderate or strong evidence base **(Anttila et al., 2012; Brandt, Hansen and Christensen, 2020)**. There is a considerable need for AT research that focuses on quantitative measures of return on investment and performance under varying conditions. Studies by Koester and Arthanat **(2018a, 2018b)** offer a model for AT research that advances the profession's empirical evidence base while simultaneously providing critical

data for consumer decision-making about what works rather than simply relying on consumer satisfaction. For more detailed reviews of EdTech and learning disabilities, please see **WG2-ch6** and a report from the UK Council for Science and Technology[7].

ASSISTIVE TECHNOLOGY AND AUTISM

Approximately 25 per cent of autistic children are non-speaking/minimally verbal. Often, people assume that these children do not understand speech or are incapable of communicating. However, speech is not a proxy for intelligence, and using non-invasive technology such as electroencephalogram (EEG) it is possible to identify good receptive language skills in non-speaking autistic individuals **(Petit et al., 2020)**. Once these children are identified, it is then possible to augment communication with augmentative and alternative communication (AAC) technology. This technology ranges from simple cardboard letterboards to eye-tracking and EEG devices. While using AAC can be quite effective, it must be individualized and can require a lot of trial and error as well as intensive training for both user and any communication supporters that are required. Additionally, while speech averages to 150 words/min, AAC at best achieves 10 word/min **(Chang and Anumanchipalli, 2020)**, thus there is much room for improvement. Further considerations must also be made when thinking globally. While cardboard letterboards are easily scalable, EEG and eye-tracking technology may be more difficult to implement depending on regional resources **(see WG2-ch6 on social robots and autism education)**.

There is a considerable need for AT research that focuses on quantitative measures of return on investment and performance under varying conditions.

[7] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/926052/specific-learning-difficulties-spld-cst-report.pdf

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6.5 Teacher and parent education and advocacy

6.5.1 FAMILY SCHOOL PARTNERSHIP IN EDUCATION

Across the literature, many different terms are used to depict the interaction of families with the school system. For example, authors describe 'family involvement', 'family engagement', 'parent engagement', 'family interaction', 'parent–school relationships' and 'family partnership'. In this section, we apply the term 'family–school partnerships'. Turnbull et al. **(2021, p. 8)** state that family–school

Positive, trusting partnerships are crucial for educational systems to function effectively and enable all stakeholders to benefit.

partnerships are 'characterized by an alliance in which families and professionals confidently build on each other's word, judgment, and wise actions to increase educational benefits to students and themselves'. They conceptualize family–school partnerships as relationships that encompass and surpass parent/family involvement and engagement. Whereas 'involvement' refers to families merely taking part in an activity, partnership embodies equity, mutual responsibility and commitment **(Christenson and Reschly, 2010; Hornby, 2011; Goodall and Montgomery, 2014; Epstein et al., 2018)**. Parental involvement is a prerequisite to family–school partnership **(Hornby and Blackwell, 2018)**. Positive, trusting partnerships are crucial for educational systems to function effectively and enable all stakeholders (e.g. children, parents, teachers, school administrators) to benefit **(Francis et al., 2016a, 2016b; Haines et al., 2017)**.

6.5 .1 .1

OUTCOME AND IMPACTS OF PARTNERSHIP

Family–school partnerships are important in the education of all children, both with and without disabilities **(Fox, 2005; Goldman and Burke, 2017; Kyzar et al., 2019; Mantey, 2020)** and lead to positive learning outcomes, academic achievements and improved self-esteem of the child **(Henderson and Mapp, 2002; Fox, 2005; Rogers et al., 2009; Mantey, 2020)**. For example, Kurni et al. **(2009)** highlight that deeper partnerships between parents and the school lead to greater improvement in the emotional, social, behavioural, language, cognitive and motor skill development of children with a learning disability. Partnerships are critical to the successful implementation of an inclusive education programme at all school levels **(Fox, 2005; Kurani et al., 2009; Goldman and Burke, 2017)**. This is because parents and families more generally have an advanced understanding

of their child's capacity, needs, abilities, limitations, likes/dislikes and ways of coping with challenging situations, and can provide meaningful insights for their child's learning and growth **(Henderson and Mapp, 2002; Kurani et al., 2009; Rogers et al., 2009; Kyzar et al., 2019)**. If families are engaged in the education of their children with a disability, their stress levels are reduced, and their sense of fulfilment, satisfaction and self-confidence is simultaneously increased **(Reio Jr and Fornes, 2011; Fishman and Nickerson, 2015; Park and Holloway, 2017)**. It can also lead to improved parent–teacher relationships, improved teacher morale and school climate **(Hornby and Blackwell, 2018)**. Partnering with families in education enables various stakeholders to be aware of the child's disability **(Fox, 2005; Mantey, 2020)**, can reduce stigma around the child's disability **(Kurani et al., 2009)** and empowers families to be advocates and active change agents **(Rogers et al., 2009; Singal, 2016)**. Several authors highlight that partnerships between families and teachers provide a safe and sound foundation for the children to explore their social environment, and can result in improved academic outcomes (i.e. grades, attendance), increased cooperative behaviour and lower dropout rates **(Kurani et al., 2009; Goldman and Burke, 2017; Tuggar, 2019; Mantey, 2020)**. This relationship holds across families of all economic, racial/ethnic and educational backgrounds and for students of all ages and abilities **(Marcon, 1999; Henderson and Mapp, 2002; Reynolds and Shlafer, 2010)**. Families from diverse cultural backgrounds can, and often do, have a positive influence on their children's learning (e.g. some are more involved at home, others more at school and some at both) **(Lareau and Horvat, 1999; Jordan, Snow and Porche, 2000; Fan and Chen, 2001; Reynolds and Shlafer, 2010)**. For example, Sui-Chau and Williams **(1996)** highlight that in an American context, Asian, Hispanic, African American and white parents were equally active in their middle and high school children's education.

Families from diverse cultural backgrounds can, and often do, have a positive influence on their children's learning

cultural and power imbalances between families and teachers due to education differences and stigma around the child's disability may lead families to believe that teachers know more about children's education and, thus, affect their partnerships with teachers.

6.5 .1 .2

BARRIERS TO PARTNERSHIPS

Hornby and Blackwell **(2018)** identify four types of barriers to the establishment of effective family–school partnerships.

1. Parent and family barriers: parents' belief about their engagements, family's current life context, SES – limited financial capacity, time and energy, ethnicity and gender **(Hornby and Lafaele, 2011; Hornby, 2015; Hornby and Blackwell, 2018)**

2. Child factors as barriers: children's age, type of special need, grade level **(Fishman and Nickerson, 2015)**, learning difficulties, disabilities and behavioural problems **(Hornby and Lafaele, 2011)**

3. Family–teacher factors as barriers: differing agendas, attitudes and language **(Hornby and Lafaele, 2011)**, as well as communication difficulties for families of children with disabilities with lower education levels **(Hornby and Blackwell, 2018)** (e.g. difficulties in understanding school-based materials **(Hornby and Blackwell, 2018)**, limited understanding about their child's disability and disability-related needs **(Šukys et al., 2015)** can negatively affect partnerships. Additionally, cultural and power imbalances between families and teachers due to education differences and stigma around the child's disability may lead families to believe that teachers know more about children's education and, thus, affect their partnerships with teachers **(Reio Jr and Fornes, 2011; Fishman and Nickerson, 2015; Šukys et al., 2015)**. Other barriers include teachers' lack of time, minimal direct and targeted communication, lack of training or limited invitations for family involvement and little individualized attention to partnering with families **(Fishman and Nickerson, 2015; Hornby and Blackwell, 2018)**.

4. Societal barriers: historical, demographic, political, religious and economic issues **(Hornby and Lafaele, 2011)**, prevailing stigma

around the child's disability **(Singal, 2016)** and racism experienced by the child in the classroom **(Hornby and Blackwell, 2018)**.

To improve family, teacher and child outcomes, schools should strive to reduce or eliminate barriers that prevent positive and effective family–school partnerships.

6.5 .1 .3

WHAT NEEDS TO BE DONE?

Several authors highlight the need to create school environments that are supportive and accepting, and that promote inclusion and equity, including understanding and consideration of diverse cultures **(Francis et al., 2016b; Goldman and Burke, 2017; Park and Holloway, 2017; Gonen-Avital, 2018; Rivera-Singletary and Cranston-Gingras, 2020)**. School leadership is key to fostering values and behaviours that can create a positive school culture where parents feel safe and encouraged to collaborate **(Lendrum, Barlow and Humphrey, 2015; Francis et al., 2016b; Hirano and Rowe, 2016; Goldman and Burke, 2017)**. Such partnerships require mutual communication, respect, equality, trust and commitment from families and schools **(Francis et al., 2016a, 2016b; Al-Dababneh, 2018)**. Globally, many parents lack the knowledge and confidence to be active partners in their child's education, hence strengths-based, culturally relevant training/workshops for parents can enhance awareness of their own and their child's rights, develop their skills and motivate proactive involvement **(Al-Dababneh, 2018; Mantey, 2020; Rivera-Singletary and Cranston-Gingras, 2020)**. Families need opportunities for leadership development so that they can partner in their child's day-to-day education, but also collaborate in policy development for implementing effective inclusive education **(Francis et al., 2016a; Shepherd and Kervick, 2016; Tuggar, 2019; Rossetti et al., 2020)**. Establishing parent or family networks and support groups can also enhance positive family–school partnerships as families feel a sense of support and belonging within the school

...create school environments that are supportive and accepting, and that promote inclusion and equity, including understanding and consideration of diverse cultures.

Families need opportunities for leadership development so that they can partner in their child's day-to-day education, but also collaborate in policy development for implementing effective inclusive education.

community **(Fishman and Nickerson, 2015; Park and Holloway, 2017; Al-Dababneh, 2018; Rice, 2018; Jigyel et al., 2019)**. In particular, more support is needed for families of lower socio-economic backgrounds and for involving fathers **(Goldman and Burke, 2017; Park and Holloway, 2017; Jigyel et al., 2019)**. Additionally, teachers require support and training (initially and ongoing) so that they can competently address the educational needs of all children and effectively partner with families **(Fishman and Nickerson, 2015; Kayama et al., 2017; Rice, 2018; Kyzar et al., 2019; Mueller, 2019)**.

6.5 .2

EMPOWERING TEACHERS WITH THE SCIENCE OF LEARNING

Understanding how the brain develops and the role of experience can transform how teachers view students' learning potential **(Ansari et al., 2017)**. Therefore, an understanding of the science of learning can empower teachers with the knowledge to customize or adapt instruction to better target student learning needs. Such knowledge would be especially empowering for teachers of students with learning disabilities. Moreover, basic reading and maths skills are powerfully linked to a country's economic growth, individual earnings and the distribution of the country's incomes **(Hanushek and Woessmann, 2008)**. In the USA, the National Institute of Health considers illiteracy an issue of public health and has provided extensive funding support to identify reasons for the high incidence of reading problems and to develop appropriate evidence-based practices to help children become better readers. According to the National Assessment of Educational Progress **(2019)**, 33 per cent of students in grade 4 in the USA cannot decode and comprehend grade 4 reading materials, with this percentage reaching as high as 66 per cent among minority and inner-city

school children. Moreover, in the USA, Juel **(1988)** finds that children who read poorly at the end of grade 1 are likely to remain poor readers at the end of grade 4. Similarly, Landerl and Wimmer **(2008)** find that in Germany about 70 per cent of poor readers in grade 1 are also poor readers in grade 8. Although various factors, such as low socio-economic status **(Fahle and Reardon, 2018)** and home literacy environment **(Chiu and McBride-Chang, 2006)**, may contribute to the high incidence of reading problems, Denton, Foorman and Mathes **(2003)** assert that effective instruction can 'beat the odds'. Thus, it is imperative to provide a strong instructional foundation at early grade levels to prevent future reading problems. However, the question arises: Are teachers prepared to provide explicit, systematic instruction?

...it is imperative to provide a strong instructional foundation at early grade levels to prevent future reading problems.

6.5 .2 .1

WHAT TEACHERS NEED TO KNOW

The reality of educating students in a group context is that they are all learners with differences. The learning sciences demonstrate that a learner's ability is not fixed. That being the case, state-of-the-art teacher training, in addition to focusing on training about individual differences in learning, can now also provide more concise information about how to use formative assessment to identify and teach to students' strengths. Formative assessment is important for leading students from where their skills are now and what they know to what comes next. A student could compensate for a learning difficulty with their strengths in other areas. For example, gifted students may underachieve because they also have a learning disability, such as dyslexia, that may go unnoticed because they manage to perform at an average level **(Kalbfleisch, 2013)**. Unless a teacher can understand the context of the behaviour, they will have little success at influencing the students' learning. More precise and elaborate training about learning and individual differences prepares a teacher by improving their ability to adapt the content, process and

Formative assessment is important for leading students from where their skills are now and what they know to what comes next.

flow of instruction to benefit students.

Studies have consistently shown that teachers lack explicit knowledge of constructs related to language and literacy **(Moats, 1994)**, particularly in concepts such as phonemic awareness, phoneme and morpheme identification, etymology of words, and word origins **(Cunningham et al., 2004; Brady et al., 2009)**. Additionally, teachers exhibited poor understanding of dyslexia **(Washburn et al., 2017)** with many teachers believing dyslexia was reversals of letters and words. This lack of knowledge among teachers was observed in other English-speaking countries (i.e. UK, Canada, New Zealand) in addition to the USA **(Washburn et al., 2016)**. For instance, in-service teachers from all four countries performed poorly on tasks relating to morphological awareness. However, there were differences among countries as teachers from the UK performed better on items relating to phonics while teachers from the USA performed better on items relating to phonological awareness. Similar findings have been observed among teachers of English as a foreign language (EFL). For instance, both Chinese and Korean EFL teachers demonstrated weaknesses in their explicit knowledge of phonological awareness, phonemic awareness and phonics **(Zhao et al., 2016; Bae, Yin and Joshi, 2019)**. Among EFL teachers in Israel, Vaisman and Kahn-Horwitz **(2020)** find that teachers who perform poorly on phonological awareness tasks spend less time teaching those concepts than teachers who perform better on these tasks.

It has been shown that when in-service teachers are trained in explicit evidence-based instruction, students' reading performance improves significantly **(McCutchen et al., 2009; Piasta et al., 2009; Ehri and Flugman, 2018)**. This trend is reflected in low- and middle-income countries as well, where providing teacher guides and teacher training are significant predictors of improved reading outcomes **(Piper et al., 2018)**. Binks-Cantrell et al. **(2012)** observe that pre-service teachers taught by university professors with explicit knowledge of literacy

Empowering teachers with the science of learning means a rethink of the profession of teaching.

concepts perform better on such tasks compared to pre-service teachers taught by university professors lacking such knowledge. This may affect the reading performance of students taught by teachers without sound knowledge of the concepts.

As noted above, poor reading skills may have debilitating effects on the individual, society and nation, but students, especially at early grade levels, can be helped by providing explicit, systematic instruction. However, both pre- and in-service teachers, along with the university professors who train these teachers, lack knowledge about concepts relating to explicit instruction. Thus, colleges of education must do a better job of training teachers and ensuring their instructors possess the knowledge to do this effectively.

6.5 .2 .2 DIRECTIONS FOR FUTURE RESEARCH AND POLICY ACTION

Empowering teachers with the science of learning means a rethink of the profession of teaching. We need to empower teachers with not only science of learning and pedagogical competencies but also scientific knowledge on domains such as neuroscience and cognitive science in order to prepare them to deal with students with learning difficulties.Teachers are not traditionally trained to be clinical practitioners, where evidence and judgement are used to identify learning difficulties. Developing targeted remediation plans to support learners to reach their full potential in light of their assessed learning abilities requires specialized training **(Guerriero, 2017)**. Teachers participating in the 2018 edition of the Teaching and Learning International Survey (TALIS) teacher survey self-reported that they continue to need professional development on student assessment, analysis and use of student assessment data, and teaching students with learning disabilities **(OECD, 2019)**.

6.6 Special and inclusive education

One of the most critical issues in education involves the optimal way to provide good educational services to students with disabilities. Educational services to children exist on a continuum from special education to inclusive education. Although special education and inclusive education are sometimes depicted as polar opposites, in reality there are many degrees of both. In the extreme version of special education, children are taught in special schools according to their disability. Additionally, these children are often congregated into segregated classrooms according to their disability. In contrast, inclusion is a human-rights based approach to education where there is respect for diversity and 'all members of the learning community are welcomed equally ... All students must feel valued, respected, included and listened to' **(UN, 2016, p. 5)**. Therefore, inclusion is important for equitable education.

CHAPTER 6

6.6 .1

EFFECTIVENESS AND LIMITATIONS OF SPECIAL AND INCLUSIVE EDUCATION

6.6 .1 .1

UNDERSTANDING SPECIAL EDUCATION AND INCLUSIVE EDUCATION

The special education versus inclusive education debate has ensued for more than quarter of a century. Inclusive education as a notion emerged from the special education field, when academics, educators and families challenged the segregation of students on the basis of disability, and it was formally declared as the prevailing philosophy for the education of students with a disability in the Salamanca Statement **(UNESCO, 1994)**. More recently the Convention on the Rights of Persons with Disabilities **(UN, 2016)** and the Incheon Declaration and the Framework for Action **(UNESCO, 2016)** have sought to ensure that inclusive and equitable quality education for all remains on the agenda of governments globally. Yet inclusive education finds itself interminably entangled in the politics of disability and special education **(Artiles and Kozleski, 2016; Mac Ruairc, 2020)**, and to date there are few, if any, systems that are inclusive of all students **(Boyle and Anderson, 2020)**.

Special education provides schooling to students with disabilities (both physical and psychological in nature) in separate educational settings from that of their peers without disability. Education should be designed to provide the best education for all children. For example, if a child gets some specialized help outside the classroom (Braille, sign language, specialized help for dyslexia, etc.), but spends most of the time in a general classroom, is it considered inclusive or special education?

It is important to recognize that inclusive education does

Critics of special education describe it as discriminatory and exclusionary, and situate inclusive education as a fairer more just way of doing education that benefits all students.

not mean that a student cannot get specialized help outside the classroom walls. Detractors of inclusive education position it as the enemy of special education **(Imray and Colley, 2017)**, and continue to advocate for separate educational provision for students with disabilities on the grounds that it better serves their needs **(Kauffman et al., 2020)**. Critics of special education describe it as discriminatory and exclusionary, and situate inclusive education as a fairer more just way of doing education that benefits all students **(Graham, 2020)**. It is perhaps unsurprising that the education of students with disabilities (and other learning needs) has been described as a wicked problem **(Armstrong, 2017)**, one for which there is no simple solution.

6.6 .1 .2

CHALLENGES OF SPECIAL EDUCATION AND INCLUSIVE EDUCATION

Special education and inclusive education exist within complex cultural and social contexts **(Duke et al., 2016)** and Arduin **(2015, p. 112)** notes that it is the 'understandings, beliefs and assumptions' of these contexts that will guide the way phenomena, such as special education and inclusive education, are understood. Consequently, interpretations of special education and inclusive education will differ from place to place and as contexts change over time **(Carrington, Tangen and Beutel, 2019)**, having an impact on discussions about everything from education policy, to curriculum and pedagogy, to school structures **(Cooc and Kiru, 2018)**. This is evident in the variation between special education and inclusive education policies, both within and between nations **(Hardy and Woodcock, 2015)**.

6.6 .1 .3

ESSENTIAL FOR SOME, GOOD FOR ALL' – MULTI-TIER SYSTEMS OF SUPPORT (MTSS): UNIVERSAL DESIGN FOR LEARNING AND DIFFERENTIATED INSTRUCTION

It is important to note that the central idea of inclusive education

Research in ability grouping indicates that it is not successful for improving academic outcomes in lower ability students and in fact creates more inequity rather than alleviating it...

is that a student receives the best and most comprehensive education that is appropriate for their needs. The Multi-Tier Systems of Support (MTSS) framework sets up children for success rather than taking a 'wait and fail approach'. Tier 1 consists of universal strategies (i.e. Universal Design for Learning – UDL) that plan for a range of learners in the classroom from the beginning rather than attempting to change lessons once teachers are aware of the learners in their classroom. UDL principles and guidelines support curriculum and instruction that is maximally accessible through multiple means of: (a) representation by presenting information through different modalities; (b) expression by enabling students to express their knowledge through oral, written or other modalities; and (c) engagement by providing multiple ways to motivate and engage students **(CAST, 2018)**. Tiers 2 and 3 of the MTSS framework exist for students whose learning needs are not met at the universal Tier 1 level. No one would deny that some students require tier 2 and 3 support, and that sometimes this help must occur outside the general classroom. Research in ability grouping indicates that it is not successful for improving academic outcomes in lower ability students **(Spina, 2019)** and in fact creates more inequity rather than alleviating it **(Parekh and Brown, 2019)** which is, in fact, harmful **(Oh-Young and Filler, 2015)**.

Within an inclusive framework, MTSS supports the development of individual learning profiles that provide a strengths-based approach to help guide educators' support of the child. Learning profiles provide guidance for differentiating the instructional programme for a child Differentiating requires structuring lessons in such a way that each student has an opportunity to work at a moderately challenging, developmentally appropriate level. Teachers can differentiate: (a) the content (what the students are learning); (b) the process (the activities); and (c) the products (the accomplishments that show learning) **(Tomlinson, 2017)**, but Tomlinson would argue that groups must be flexible, dynamic

In classrooms where teachers use universal design for learning and differentiated instruction, they accept that students differ in important ways.

and varied and that if done correctly, no student would ever be in Tier 2 and 3 all the time. In classrooms where teachers use universal design for learning (UDL) and differentiated instruction (DI), they accept that students differ in important ways. Classroom teachers can engage in all three tiers within the classroom. At times, supports may be needed for successful learning and there may be times when students engage in learning outside of the classroom environment, but the goal must always be to learn with their peers in their neighbourhood school.

6.6.2 CHALLENGES AND APPLICABILITY IN VARIOUS GEOGRAPHICAL/ CULTURAL/ ECONOMICAL/ POLITICAL CONTEXTS

Although the special education vs. inclusive education debate rages on, it is evident that countries globally have struggled to deliver system wide inclusive reform **(Haug, 2017)**. In some nations, where education systems are less developed and/or resources scarce, the provision of special education for students with disabilities may not be viable, and therefore the principles of inclusive education guide the work being undertaken to improve the educational provision for students with disabilities. Paradoxically, it is nations with well-established schooling systems that have experienced significant challenges with the implementation of effective inclusive practices as they operate within 'inflexible twentieth-century education system … built with only particular students in mind' **(Graham, 2020, p. 20)**. To ensure progress towards an inclusive and equitable quality education for all **(SDG 4)**, governments globally must commit to 'a process of systemic reform embodying changes and modifications in content, teaching methods, approaches, structures

and strategies in education' **(UN, 2016, para. 11)**. Until that time, special education settings will continue to provide a specialized level of access and support that is not currently afforded consistently across local schools.

The UN Declaration of the Rights of the Child, UN Declaration on the Rights of Disabled Persons and SDG 4 ('inclusive and equitable quality education') provide guiding principles and agreements for inclusive education globally. Countries may experience challenges in achieving inclusion due to reasons such as economic poverty, civil war or natural disaster. However, even in fragile and challenging contexts, inclusive education has become increasingly recognized as the standard for countries to achieve **(Amor et al., 2019)**.

...even in fragile and challenging contexts, inclusive education has become increasingly recognized as the standard for countries to achieve.

Inclusive education was included as a right under Article 24 of the Convention on the Rights of Persons with Disabilities (CRPD) **(UN, 2016)** and superseded the earlier conception of the right to education. The 'Thematic study on the right of persons with disabilities to education' by the United Nations High Commissioner for Human Rights left no room for doubt: 'the right to education is a right to inclusive education' **(UN, 2013, p.3)**, something that was thoroughly addressed in General comment No. 4 on the right to inclusive education **(UN, 2016)**.

6.6 .2 .1

INCLUDING ALL STUDENTS IN LEARNING

Ensuring all students have the opportunity to learn is more important than ensuring all students are educated in the same physical space **(Imray and Colley, 2017; Kauffman et al., 2018)**. Inclusive education and special education is not a dichotomy; it is a continuum. The most important concern is the best education for individual children. Most of the time that is in a general education classroom. However, there is the need for specialized help in some situations and, in that case, there should be appropriate

Ensuring all students have the opportunity to learn is more important than ensuring all students are educated in the same physical space.

withdrawal from the general classroom. Importantly, there is a dearth of evidence on effective education approaches for children with disabilities **(Singal, 2017; Slee, 2018b)** and a need to collect both quantitative and qualitative data on the learning experiences of children with disabilities globally **(Gorgens and Ziervogel; Kuper et al., 2020)**. Future research must be participatory and recognize a diversity of views, especially those of people with disabilities **(Singal, 2017)**. One study found that, in Kenya, Zambia and Uganda, many people with disabilities had experienced both mainstream and special education and individual preferences varied **(Horton and Shakespeare, 2018)**. Some found special schools hugely beneficial and appreciated having their physical needs accommodated as well as having the opportunity to meet other people with disabilities. Others felt that being segregated from mainstream education, and sometimes separated from their families, had negative repercussions. Furthermore, the majority of respondents reported experiencing some form of discrimination or barriers to participation in mainstream schools. It is not sufficient to allow children with disabilities to attend mainstream schools, they must be able to fully participate in learning without suffering any discrimination. More ethnographic case studies are needed to better understand the experiences and educational attainment of children with disabilities **(Slee, 2018b)**.

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6

CHAPTER

6.7 Future directions: how can education help all learners reach their full potential?

We assessed research on identification and intervention for learning disabilities. The contributions in this chapter provided an overview of the current state-of-the-art and controversies surrounding the classification of learning disabilities and provision of special and/or inclusive education to support students with learning disabilities. The insights from this chapter and directions for future research can be summarized in the following key findings and recommendations.

6.7 .1 KEY FINDINGS

- Definitions of 'disability' are contentious, and terminology is confusing. In many places, disability is a legal and medical term, and it is important to note that often a diagnosis is required for accessing support services.

- Learning disabilities arise through a dynamic interplay of biological and environmental factors and therefore are seldom

Children need, and have the right, to receive help regardless of what has caused their learning difficulty.

attributable to a specific cause or are only present in children with low cognitive abilities. Children need, and have the right, to receive help regardless of what has caused their learning difficulty. Moreover, there are far more people who struggle with learning than have been diagnosed with a specific disability.

- Research has largely focused on understanding specific reading disabilities, such as developmental dyslexia, yet there are similar prevalence rates among children who have reading, maths and writing learning disabilities that significantly impact their quality of life. Many children with specific learning disabilities have co-occurring neurological and mental health disorders.

- There is a clear lack of research in the Global South on inclusive education and the experiences of children with a disability in various education contexts.

- Despite a global acknowledgment of the importance of a more inclusive approach to education, the ways and extent to which learning disabilities are identified vary across, and even within, countries.

- Universal screening and assessment can help identify targets for prevention and remediation.

- Interventions such as high dosage tutoring and some assistive technologies have evidence of effectiveness; however, there is a dearth of evidence on the effective educational approaches for children with learning difficulties.

CHAPTER 6

Greater investment is needed to fund large-scale research studies to determine the culturally-specific infrastructure required for successful implementation of universal screening and evidence-based response to screening as well as (intensive) intervention.

6.7.2 RECOMMENDATIONS

- Universal screening of skills that predict academic achievement could help identify children at risk for learning disabilities.

- Early intervention and monitoring of progress is needed and significantly impacts academic and mental health outcomes.

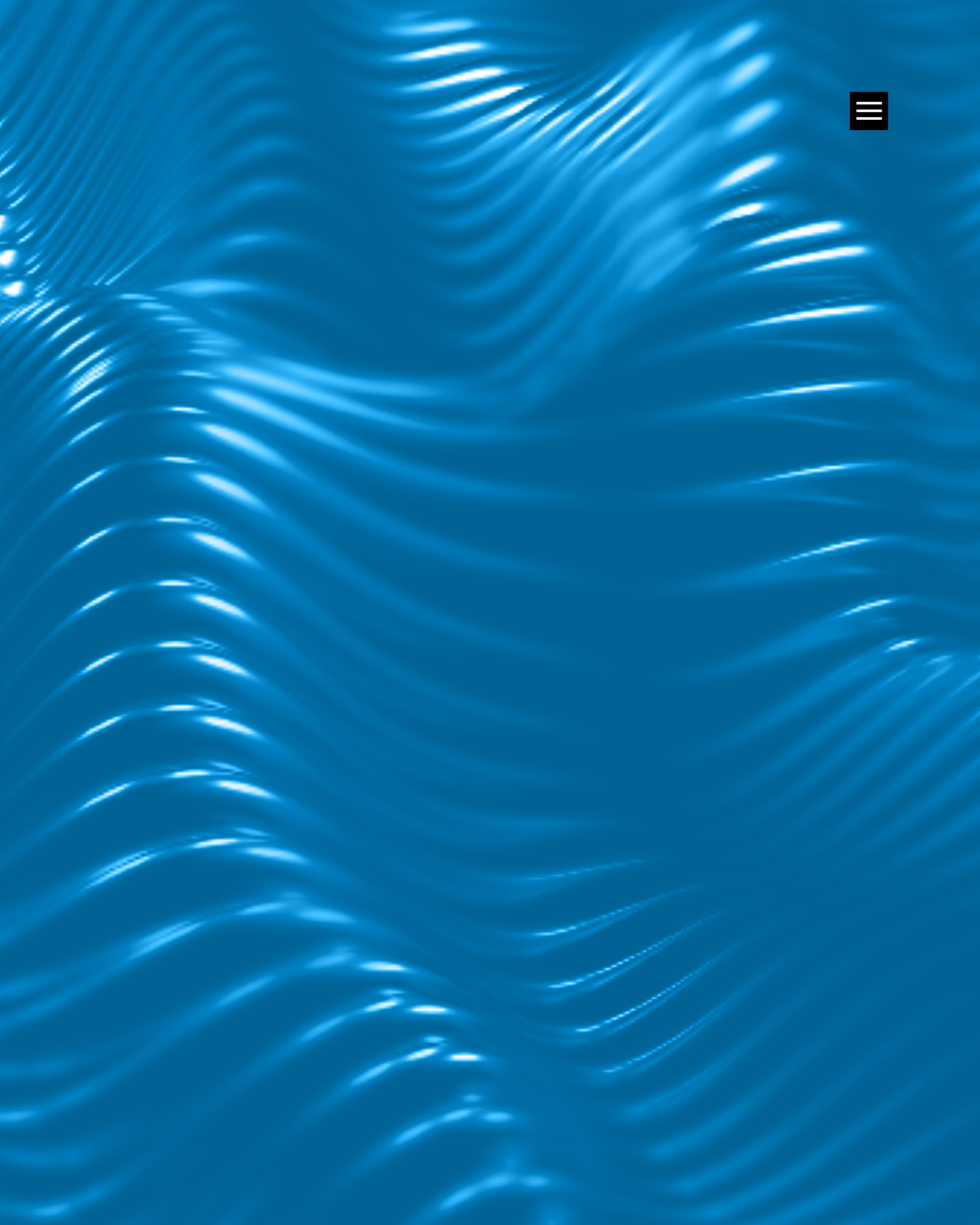
- Greater investment is needed to fund large-scale research studies to determine the culturally-specific infrastructure required for successful implementation of universal screening and evidence-based response to screening as well as (intensive) intervention.

- Regular monitoring of basic skills to determine whether or not there are problems is required.

- Improving teacher education and training teachers to implement screening tools could help make universal screening feasible. However, it is important to implement an adequate evidence-based response to screening.

- Parents can be powerful advocates for their children through parent–school partnerships.

- How can inclusive education truly be effective for all students? Guidelines should be developed to help determine whether different school systems meet the needs of each of the students they serve. Equal education for all does not mean identical education for everyone.



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