

Writing and neurodivergence



School resources

Writing may present a number of challenges for neurodivergent students. There are several aspects of writing with which they may struggle, including transcription skills such as handwriting and spelling, the planning and organisation of writing, or expressing ideas in writing. In particular, students with dysgraphia and [Developmental Coordination Disorder](#) (DCD) will experience challenges with writing.

Dysgraphia

Developmental dysgraphia is a lifelong cognitive difference that affects a person's ability to compose writing by hand¹. Unless there is co-occurring dyslexia (which is common), dysgraphic people can read fluently. It is a form of innate [neurodivergence](#), which means that the underlying brain differences that may lead to a diagnosis of dysgraphia are present from birth. Both premature birth and genetics play a role in the likelihood of a child being born with a predisposition to dysgraphia, but it is currently unclear exactly how big these roles are².

Dysgraphia affects between 7% and 34% of all people, and it often comes with other cognitive differences such as [autism](#), [ADHD](#), [Developmental Coordination Disorder](#) (DCD), or [dyslexia](#). It is less well-researched and understood than these other forms of neurodivergence, and therefore often less likely to be recognised³. Characteristics of dysgraphia vary between individuals, with each person having their own profile of strengths and difficulties, but common characteristics include poor phonological awareness and various difficulties with handwriting such as poor pencil grip, inconsistent letter formation, slow writing fluency, and inaccurate spelling⁴.

The brain region that has been studied the most in relation to dysgraphia is the cerebellum, which is responsible for coordinating motor movements. It also plays a role in language and automaticity. An injury to this region can cause acquired dysgraphia, where an individual who could previously write by hand loses this ability⁵. However, handwriting requires the coordination of multiple brain regions, recruiting motor, visual, proprioception, language, executive function, and long-term memory systems. Differences in structure or connectivity in any of these regions have also been associated with dysgraphia⁶.

Developmental Coordination Disorder

[DCD](#) is a neurodevelopmental difference that predominantly affects people's gross and fine motor skills. Motor skills describe the set of abilities used to perform or coordinate any physical movement. Whole-body motor actions (gross motor skills) include engaging the larger muscles in the body, used for actions such as walking and running, throwing a ball, or riding a bike. This often involves balance and coordination between different parts of the body. Fine motor skills describe control of smaller movements, such as writing, buttoning clothes, or eating with a knife and fork. The main symptom of DCD is significantly below average motor skills performance compared to people of the same age. The prevalence of DCD is estimated to be between 2 and 6% of the population.

Students with DCD are likely to experience difficulties with handwriting as it requires sophisticated fine motor skills, but they may also struggle with visual spatial working memory, which affects their ability

to recognise letters and numerals. They may also find it challenging to plan and organise their written compositions. [This](#) guide provides more information about DCD.

What might teachers notice?

Teachers may observe a range of signs that could indicate their student is experiencing specific difficulties with writing. These signs include:

- the student writing slowly, pausing often
- the student becoming tired quickly when writing
- the student holding the pencil in an awkward grip, or holding their hand or the paper in an awkward position
- the student's pencil pressure is too light or too heavy, and they may often break pencils
- handwriting that is difficult to read or illegible
- handwriting that is marked by inconsistencies such as mixtures of print and cursive, or upper and lowercase letters
- letters may be reversed or inversed, with irregular size, shape, and slant
- letters and words may be spaced inconsistently, or inconsistently aligned with the lines or margins
- poor spelling
- the student's written work does not reflect their language skills in other areas

Older students will also have difficulty composing essays and may make mistakes in grammar and sentence structure that they would not make while speaking⁷.

It is important to remember that attempting to write is stressful and exhausting for many neurodivergent students, because much of the available cognitive resource has to be allocated to the physical act of producing script. The student therefore has little energy left to focus on the content, composition, and spelling aspects of writing⁸. They may not finish their writing task as a result, or finish but have their writing pronounced illegible by teachers and peers. Repeated failures of this kind can lead to a negative self-image, loss of confidence, shame, and loss of social status⁹. Long-term mental health problems can result¹⁰.

Strategies for supporting students with writing difficulties

In general, research on dysgraphia is rare, and most of the research that does exist has come from fields other than education, such as neuroscience. In keeping with the scientific traditions of these other fields, the focus was on quantitative, generalisable results, and qualitative insights focusing on the lived experience of dysgraphia or classroom influences are lacking¹¹. Therefore, some of the strategies presented here instead draw on the professional experience of therapists and teachers working with neurodivergent children. While these strategies are not peer-reviewed, they still provide valuable insight and inspiration for teachers.

Supporting students with specific writing difficulties can involve making appropriate adjustments and accommodations, but some remediation strategies may also benefit the student. As with any strategy designed to support the needs of neurodivergent students, it is important to involve the student and their family in any discussions, to ensure that whatever is offered is tailored to the student's individual needs, and to be prepared to evaluate and adjust the approach.

Accommodations and modifications should aim to reduce stress and enable the student to access the curriculum, breaking the cycle of failure. This might involve schools adjusting grading expectations for individual students, such as allowing shorter written assignments or grading only on content, not orthography and style¹². Schools can also provide special assessment conditions and alternative formats for demonstrating learning, such as multimedia presentations. Students might be offered the use of note-takers and speech-to-text software, tablets or laptops for typing, pencils with ergonomic grips, and paper with raised lines¹³. Some students may also benefit from writing on a slanted rather than a flat writing surface¹⁴. Allowing all students to use these available accommodations will also help to reduce the stigma for neurodivergent students, and promote an inclusive culture in which neurodiversity is understood and celebrated.

Due to the rise of easily accessible technologies that support typing to communicate, remediation is de-emphasised by some teachers in favour of accommodations and adjustments. Learning to type, in particular, may be a good middle ground, as it is less effortful and has real-life benefits for the student by reducing barriers and enhancing the potential for success¹⁵. This in turn can lead to increased motivation. However, writing by hand is still necessary in some areas of life, such as when filling out paper forms¹⁶. There are also cognitive benefits to handwriting, as handwriting letters and words is more effective for retaining knowledge in long term memory compared to typing¹⁷. Therefore, it is important teachers to have strategies in place for remediating some of the specific difficulties students may experience with writing, such as learning to handwrite, or planning and organising pieces of written work.

Teachers should begin by determining what specific writing challenges the student has, and interventions should then be tailored accordingly. Some students will benefit from exercises targeting visual perception, hand-eye coordination, finger strength, fine motor skills, long-term memory, or a combination of more than one aspect of writing. For example, if fine motor skills present the biggest challenge for the child, it may also be helpful to start learning the shape of each letter using gross motor skills. The teacher can draw the letter on the whiteboard for the student to trace into the air, using their whole arm and, once memory of the letter shape has been established using the easier gross motor skills, the student will have more cognitive resource to devote to writing the letter on paper, using the more difficult fine motor skills.

If visual processing presents the biggest challenge for the student, it may help them to narrate the stroke sequences for each letter as they form them (for example, long stem down, small belly to the right for 'b'), or to watch videos of the letter being drawn rather than looking at static images. One study combined visual and memory strategies to great effect. It taught letter formation explicitly, using numbered arrow cues. Students were told the name of the letter and asked to look at it, studying the stroke order indicated by the arrows. They then covered the letter and visualised the stroke order for a brief period of time. On a cue from the teacher, they then wrote the letter. This strategy reduced reversals and improved fluency¹⁸.

To support students with spelling difficulties, there are a number of strategies that can be used alongside explicit phonological instruction. [This](#) guide provides detailed guidance on spelling instruction.

Many neurodivergent students will struggle with [executive functioning](#), which can impact their ability to plan and organise their writing. There are many ways that teachers can support students to develop their executive function skills, but some specific approaches related to writing including breaking the written assignment down into smaller chunks, providing detailed written and visual instructions that the student can refer back to, and supporting students to make a start on the piece of writing, such as providing a starter sentence.

Endnotes

- 1 The Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) includes dysgraphia under the specific learning disorder category, but does not define it as a separate disorder.
- 2 Chung, P. J., Patel, D. R., & Nizami, I. (2020). Disorder of written expression and dysgraphia: Definition, diagnosis, and management. *Translational Pediatrics*, 9(Suppl 1):S46-S54; Montgomery, D. (2017). *Dyslexia-friendly Strategies for Reading, Spelling and Handwriting: A Toolkit for Teachers*. United Kingdom: Routledge.
- 3 Chung et al. (2020); Kalenjuk, E., Laletas, S., Subban, P., & Wilson, S. (2022). A scoping review to map research on children with dysgraphia, their carers, and educators. *Australian Journal of Learning Difficulties*, 27(1):19-63.
- 4 Hammon, J. (2019, Nov. 21). What teachers should know about dysgraphia. *Edutopia*.
- 5 Chung et al. (2020).
- 6 Berninger, V. W., & Wolf, B. J. (2016). *Dyslexia, dysgraphia, OWL LD, and dyscalculia: Lessons from science and teaching*. (Second edition). Baltimore, Maryland: Paul H. Brookes Publishing Co.
- 7 Chung et al. (2020); Kalenjuk et al. (2022); Ye, Y., Inoue, T., Maurer, U., & McBride, C. (2023). *Routledge International Handbook of Visual-Motor Skills, Handwriting, and Spelling: Theory, Research, and Practice*. Milton: Taylor & Francis Group.
- 8 McBride, C. (2019). *Coping with dyslexia, dysgraphia and ADHD : a global perspective*. Abingdon, Oxon: Routledge.
- 9 Chung et al. (2020); Berninger & Wolf (2016).
- 10 Kalenjuk et al. (2022).
- 11 Kalenjuk et al. (2022).
- 12 Chung et al. (2020).
- 13 Chung et al. (2020); McBride (2019); Kalenjuk et al. (2022); Jones, S. (n.d.). *Dysgraphia accommodations and modifications*. LD Online.
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- 15 McBride (2019).
- 16 Montgomery (2017).
- 17 James, K., & Englehardt, L. (2012). The effects of handwriting experience on functional brain development in pre-literate children. *Trends in Neuroscience and Education*, 1, 32-42.
- 18 Chung et al. (2020); McBride (2019); Ye et al. (2023); Berninger & Wolf (2016).

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