



Professional Development | An tSeirbhís um Fhorbairt
Service for Teachers | Ghairmiúil do Mhúinteoirí



An Roinn Oideachais
agus Scileanna
Department of
Education and Skills

National Workshop 5



LEAVING CERTIFICATE
COMPUTER SCIENCE

Session 2

Creating an Inclusive Classroom: SEN in Computer Science

Objectives

Participants will be enabled to:

Develop an understanding of Inclusion, SEN and current policy.

Make the link with Leaving Certificate Computer Science.

Recognise the broad range of guidelines and resources available.

Use current accessibility features and tools.

Bring inclusive teaching practices for CS back to the classroom.

Develop a shared understanding of the challenges and possible strategies for a wide range of SEN categories.

What is Inclusion?



Perspectives on Inclusion

‘Technology should be a vehicle by which students reflect and demonstrate understanding of their intersectional identities’

‘Inclusion is creating space for nurturing and caring relationships’

- *Shuchi Grover at InclusiveSTEMCS '21*

Perspectives on Inclusion

‘Different forms of assessment privilege different forms of understanding’

- *Dr Shuchi Grover*

‘[Our classrooms contain] ... minoritised learners, rather than minority learners’

- *Prof Tia Madkins*



Current Policy

Special Educational Needs are defined as:

A restriction in the capacity of the person to participate in and benefit from education on account of an enduring physical, sensory, mental health or learning disability, or any other condition which results in a person learning differently from a person without that condition.

The EPSEN Act recognises that special educational needs may arise from four different areas of disability: • *physical* • *sensory* • *mental health* • *learning disability*.

Current Policy

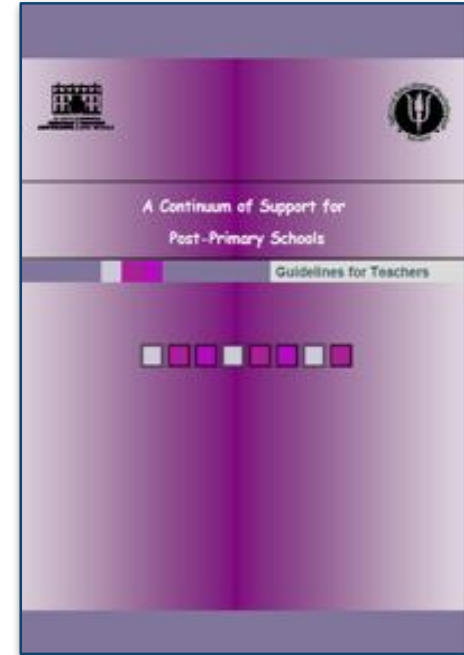
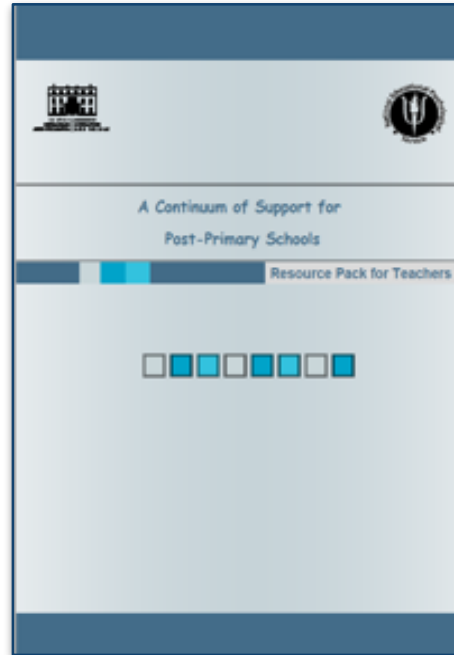
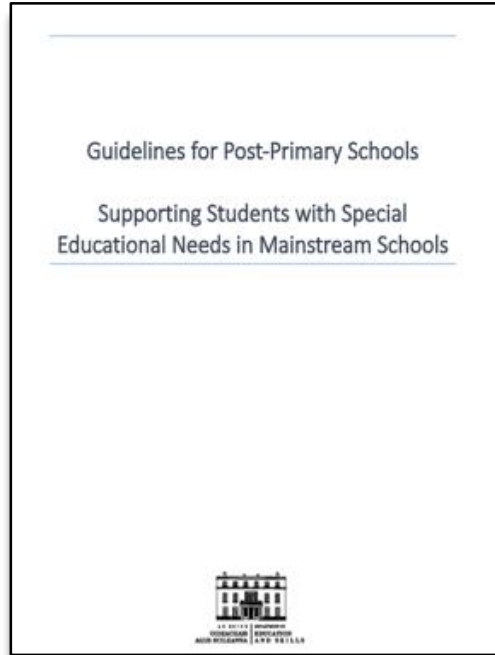


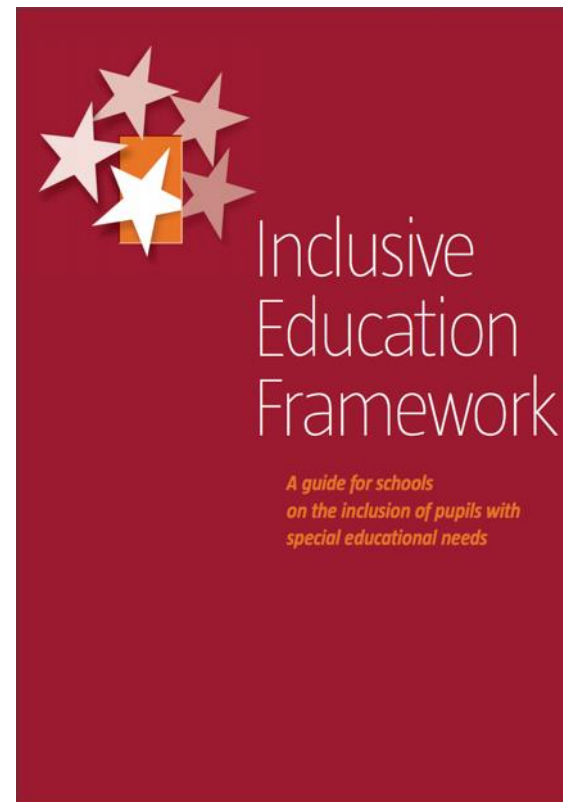
It is the responsibility of the classroom teacher to ensure that each student is taught in a stimulating and supportive classroom environment where all students feel equal and valued.

- *13. The Role of the Classroom Teacher*

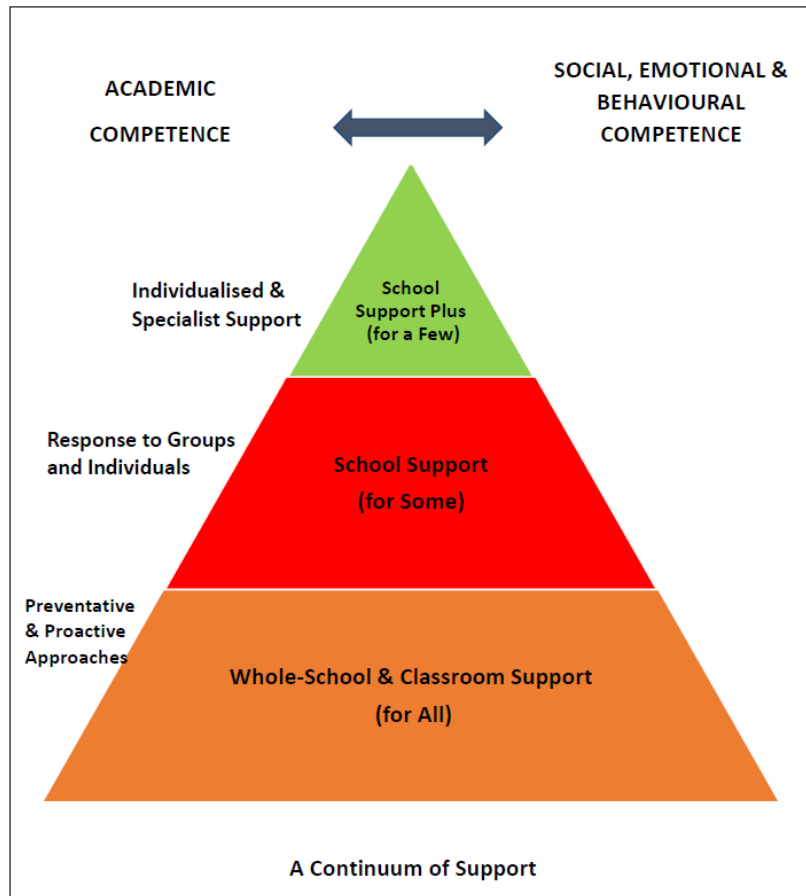
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Current Policy





Continuum of Support



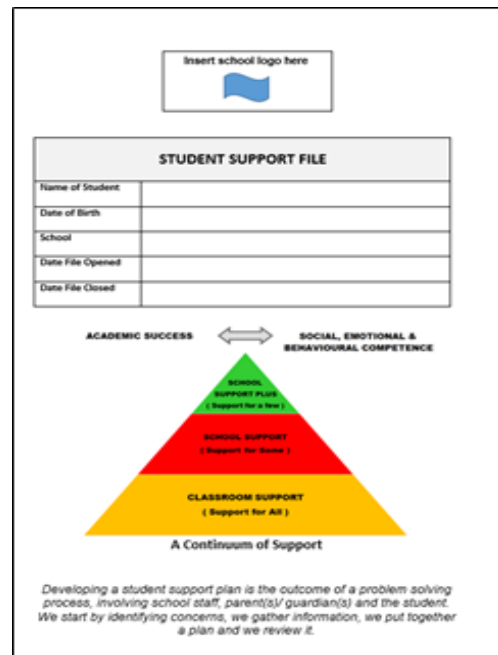
The Student Support File

Highlights a student's particular Strengths and Needs

Sets a small number of goals and targets for the year/term.

Give teachers insight into areas of particular skills/interests for the student

Allows teachers to create specific supports to help meet students' current needs/targets.



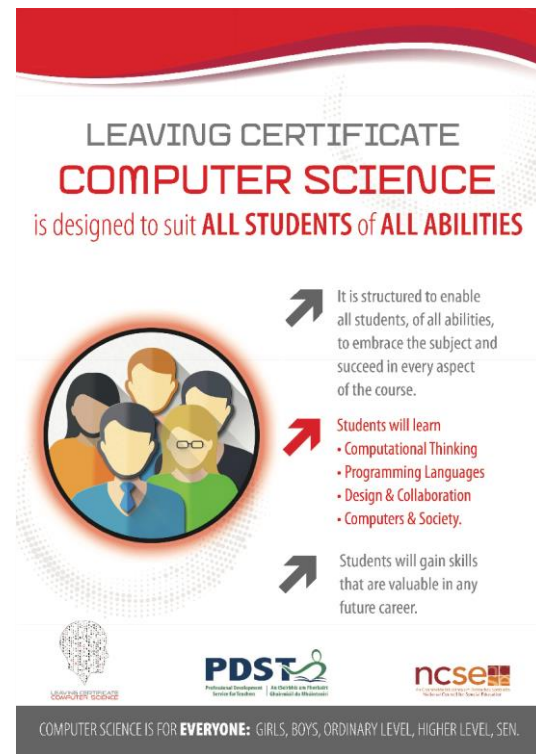
Leaving Certificate Computer Science



CS For All – For all students who want to do it!

CSforALL

<https://www.csforall.org/>



**LEAVING CERTIFICATE
COMPUTER SCIENCE**
is designed to suit **ALL STUDENTS** of **ALL ABILITIES**

- ➔ It is structured to enable all students, of all abilities, to embrace the subject and succeed in every aspect of the course.
- ➔ Students will learn
 - Computational Thinking
 - Programming Languages
 - Design & Collaboration
 - Computers & Society.
- ➔ Students will gain skills that are valuable in any future career.

PDST Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

ncse National Council for School Education

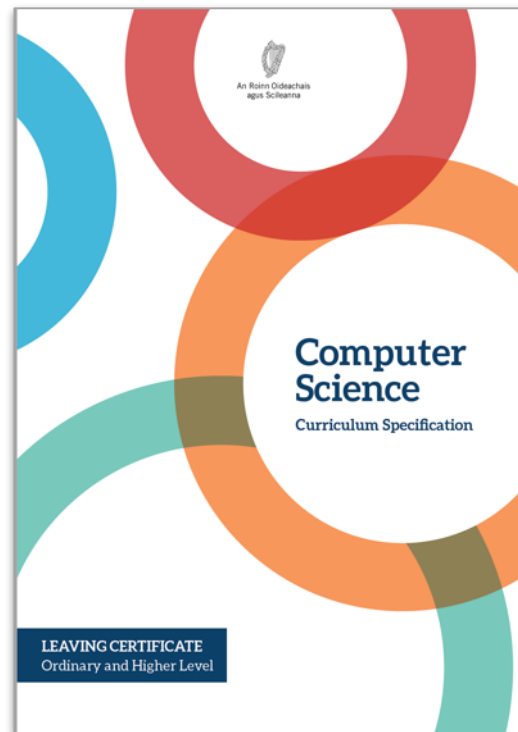
COMPUTER SCIENCE IS FOR **EVERYONE**: GIRLS, BOYS, ORDINARY LEVEL, HIGHER LEVEL, SEN.

‘Students will explore the role that adaptive technology can play in the lives of people with special needs and how access to, and engagement with computing and technology is of ever-increasing importance to societies, democracies and human progress.

LCCS Specification p9

1.15 consider the quality of the user experience when interacting with computers and list the principles of universal design, including the role of a user interface and the factors that contribute to its usability.

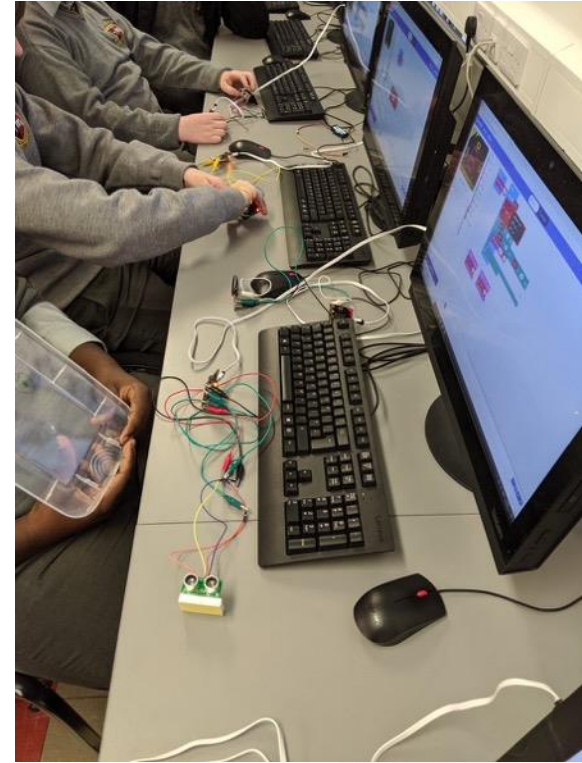
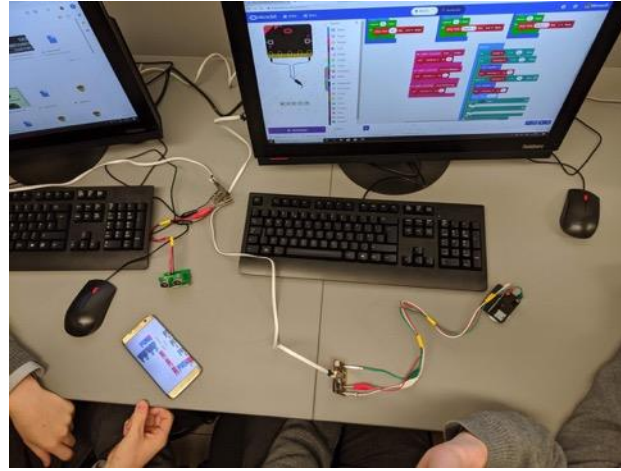
1.17 describe the role that adaptive technology can play in the lives of people with special needs.



Current Technologies



LCCS Classroom

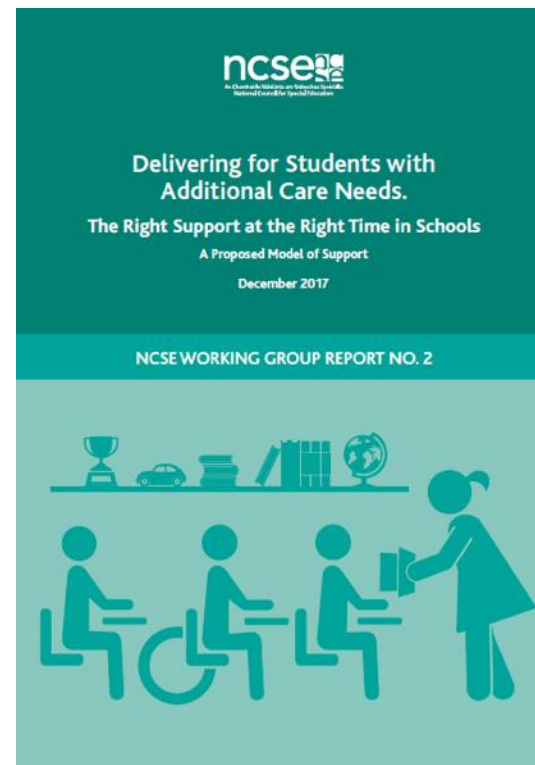
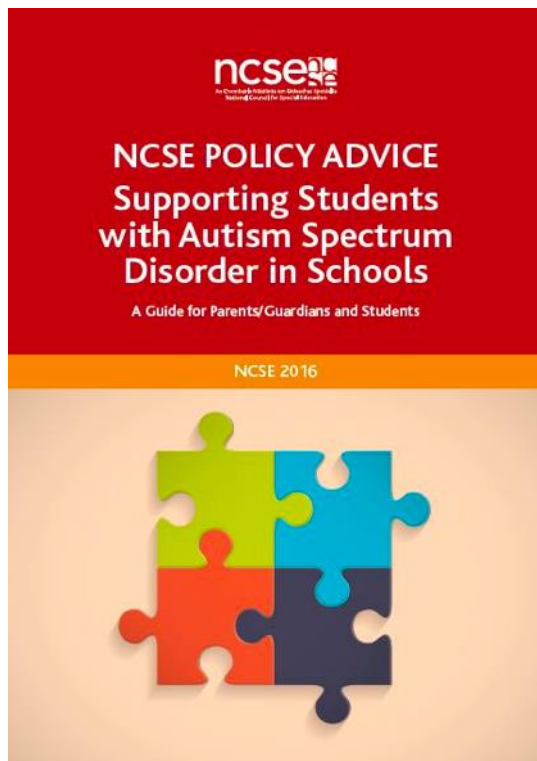


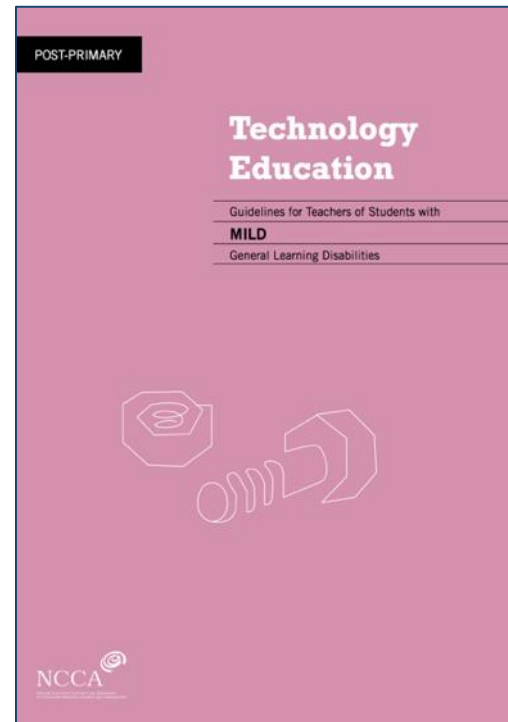
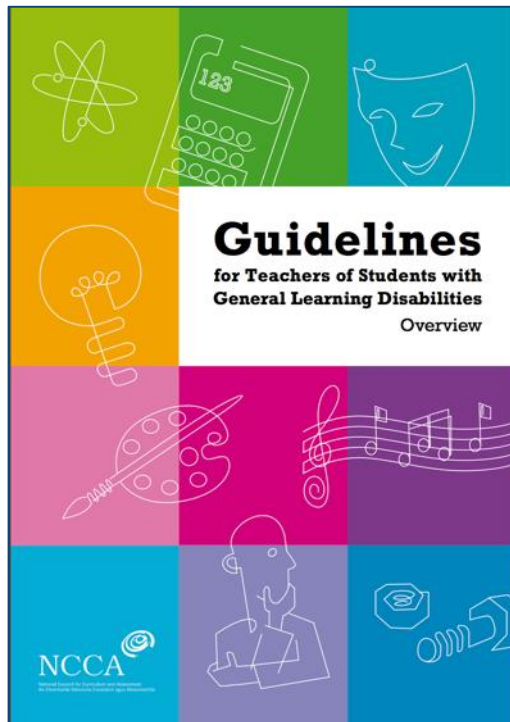


Discussion: SEN Supports



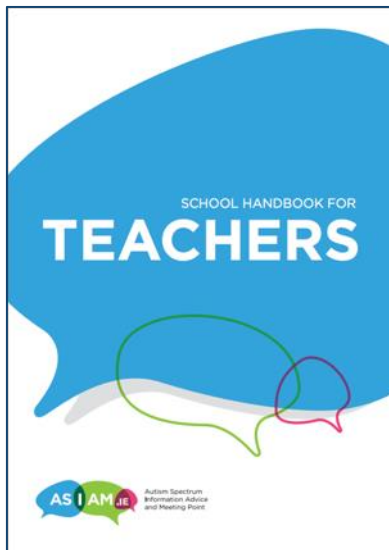
SEN Guidelines & Resources





https://www.ncca.ie/media/1980/overview_guidelines.pdf

https://www.ncca.ie/media/2508/pp_tech.pdf



FACTSHEETS ON DYSLEXIA FOR SECOND LEVEL SCHOOLS

- Factsheet 1 What is Dyslexia?
- Factsheet 2 Screening and Identification
- Factsheet 3 Understanding the educational psychological assessment report
- Factsheet 4 The assessment report and its implications for learning
- Factsheet 5 Supports for students with dyslexia in Irish Education
- Factsheet 6 The dyslexia friendly school
- Factsheet 7 General classroom strategies for mainstream teachers
- Factsheet 8 Developing reading and comprehension skills across the curriculum
- Factsheet 9 Developing vocabulary and writing skills across the curriculum
- Factsheet 10 Mathematics: dyslexia and dyscalculia
- Factsheet 11 Teaching mathematics to students with dyslexia and/or dyscalculia
- Factsheet 12 Teaching languages to students with dyslexia
- Factsheet 13 Educational choices for students with dyslexia
- Factsheet 14 Making information accessible, the dyslexia-friendly style guide
- Factsheet 15 Computers and assistive technology
- Factsheet 16 How parents can support the student with dyslexia
- Factsheet 17 Study tips for the student with dyslexia including a section on resources
- Factsheet 18 Useful resources for teachers



General Considerations	⊙
Deaf/Hard of Hearing	⊙
Mental Health Difficulties	⊙
Physical/Mobility Disability	⊙
Specific Learning Difficulties	⊙
Speech & Language Difficulty	⊙
Blind/Visual Impairment	⊙
Seizure Disorders	⊙



Assistive Technology - Tools and Applications

1. Overview
2. Keyboards
3. The Mouse
4. Voice Recognition
5. Touch Screens
6. Switches and Scanning
7. On-Screen Keyboards
9. Visual Impairment
10. Hearing Impairment
11. Speech Impairment



<http://universaldesign.ie>

<https://www.ahead.ie/inclusiveteaching>

<https://www.sess.ie/resources/assistive-technology-overview>



5 minute stretch break

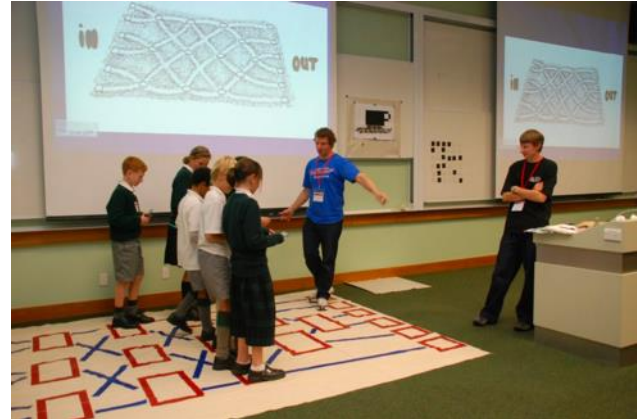
Inclusive Approaches for Teaching CS

1 - Reduce Cognitive Overload

2 - Unplugged Activities

Unplugged activities are tasks that take place away from a computer in order to model key concepts (e.g. selection, variables, algorithms) in different ways.

The term ‘unplugged’ originated with the CS Unplugged project in the 1990s, and it has become a popular approach to teaching computational thinking and other computer science concepts.



(A) - Making the abstract tangible

Unplugged activities can help learners understand abstract concepts through physical objects that can be touched, manipulated.

By providing a physical representation, the learner can point to and ask the question at the level of the analogy rather than having to fully verbalise it at the technical level.

Can be of great benefit to learners with communication or learning difficulties who find abstract concepts difficult and require a multimodal approach

Unplugged activities can include a range of sensory approaches, from physical movement to music, and from manipulating objects to drawing pictures

(B) - Harnessing authentic and familiar contexts

Teachers can use familiar contexts to teach new concepts and knowledge through unplugged activities.

For example, you can introduce count-controlled loops through dance, or create search algorithms to match up odd socks.

Topics can be set in a context that relates to a student's interests and pre-existing knowledge and understanding, then that interest can drive their learning.

Generalising knowledge – making links

Teachers need to spend time helping students connect new knowledge, skills and strategies to different contexts rather than expecting that transfer will happen spontaneously.

An explicit link needs to be made between the unplugged activity and the computational model that it is helping to describe.

This is good practice for all learners, but some learners with SEN may need extra support to make the connection.

For example:

When teaching the concept of selection using everyday instructions (for example, “If you have brown hair, then hop 3 times, else sit on the floor”).

Discuss why we use selection in programming, and trace through existing code together to find examples of selection.

Model the key language throughout the unplugged activity, to help as a prompt when revisiting the concept.

When moving on to programming activities, refer back to the unplugged activity.

3 - Physical computing

Physical computing involves interaction with the real world, through a physical system or object.

Physical computing devices generally provide a sensory output for the code, such as movement, sound, or lights, and some also have a physical interface. This tangible input and output helps learners make the connection between their code and the outcome of the program.

In his book *Mindstorms*, Seymour Papert referred to the original floor turtles as ‘objects-to-think-with’ (Papert, 1980).



Bee bot



Dash and dot



Sphero



Botley the coding robot



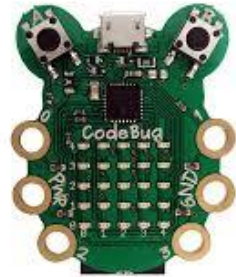
Code-a-Pillar



Lego Mindstorms



Arduino



Codebug



Circuit Playground

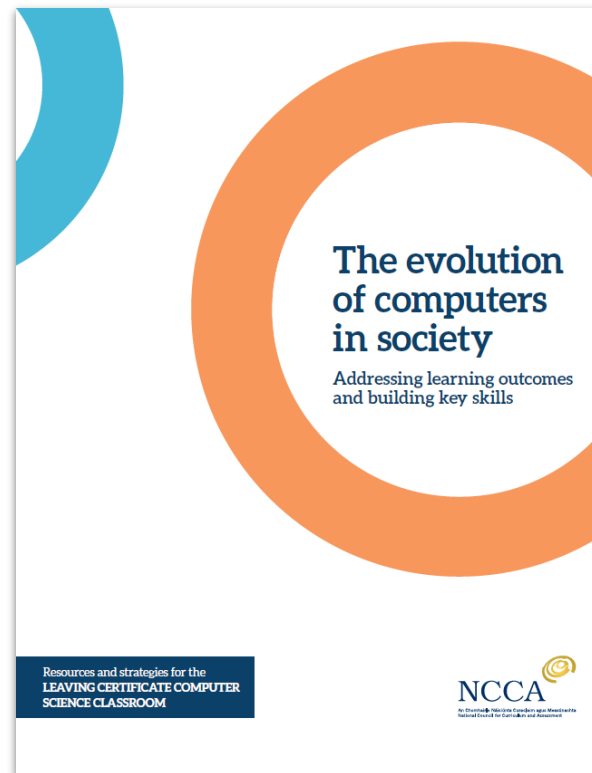


Crumble

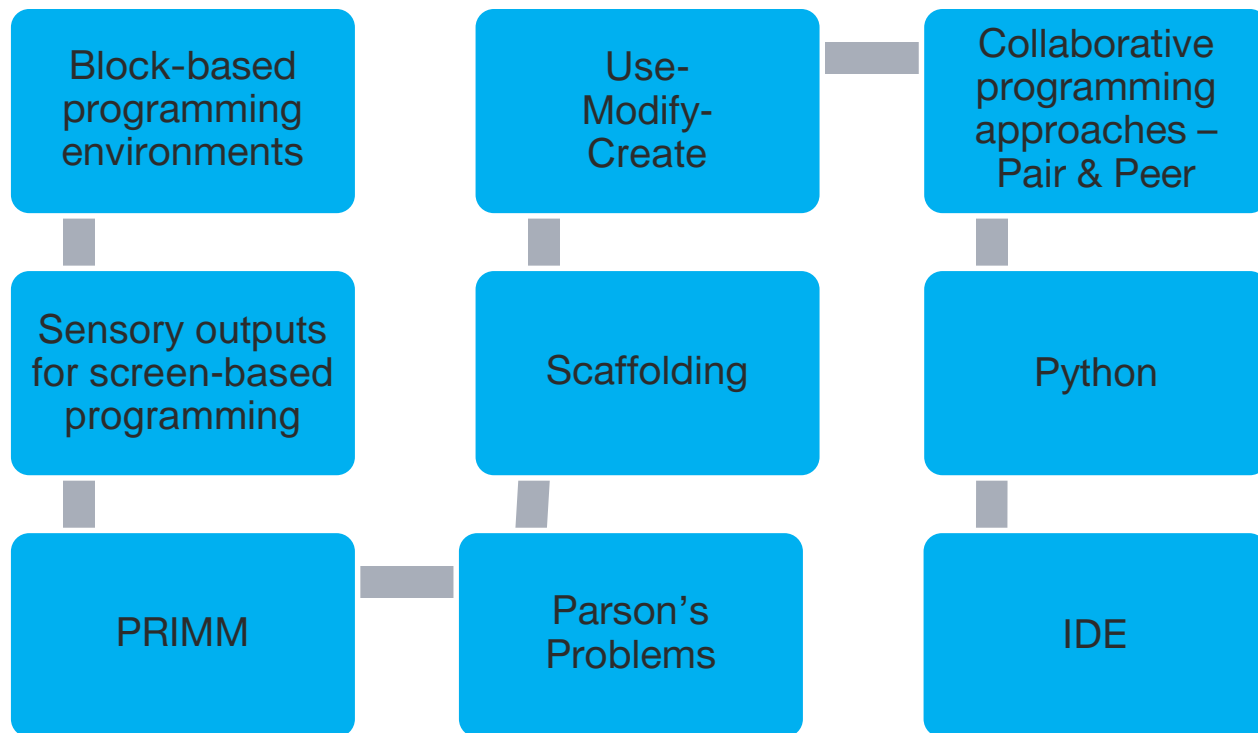


4 - Teach to the Emergent Skill

5 - Scaffold Group Work



6 - Tips for Supporting Programming



5 - Advantages of a neurodiverse classroom

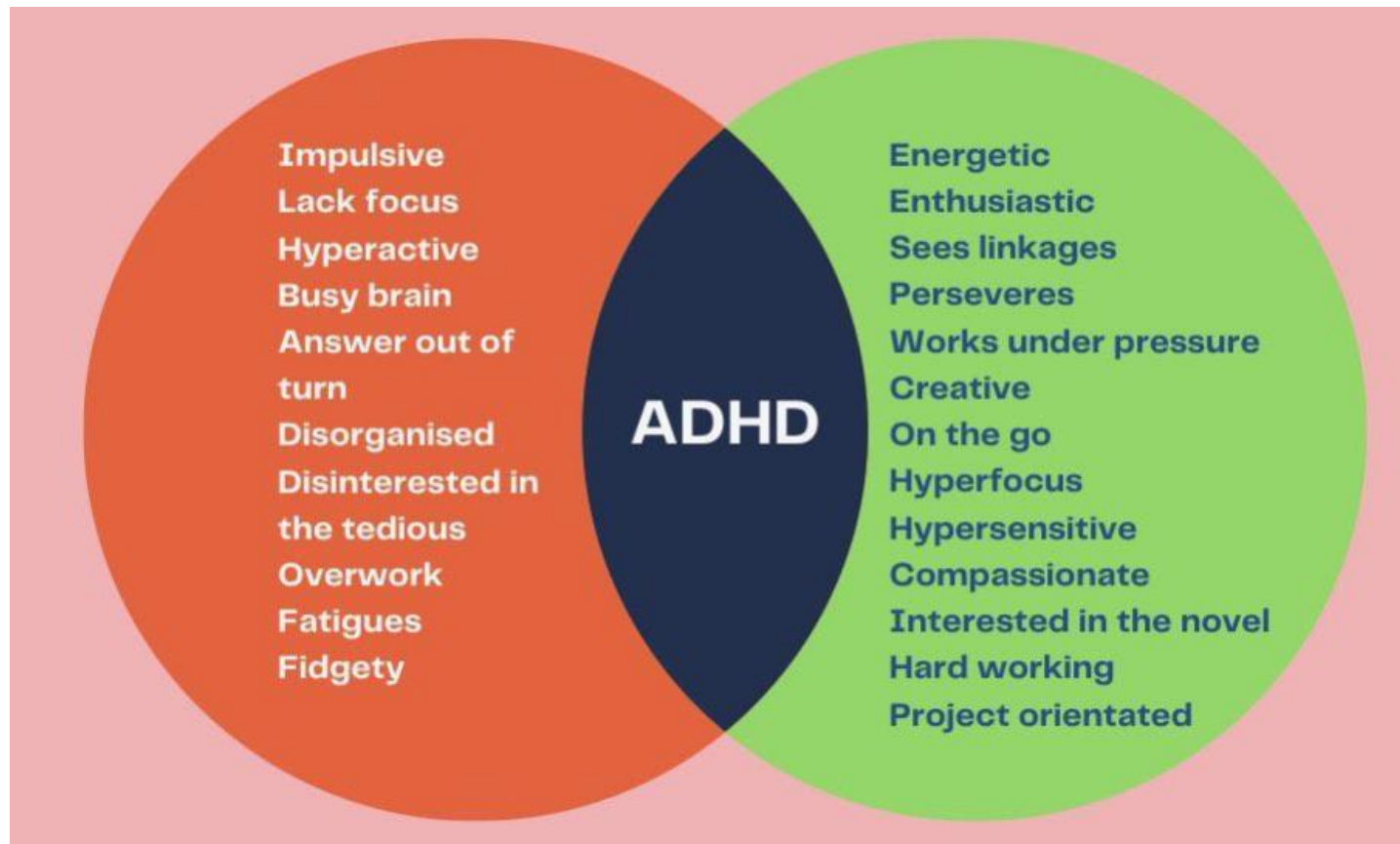


Image: Amanda Kirby, twitter.com/profAmandaKirby

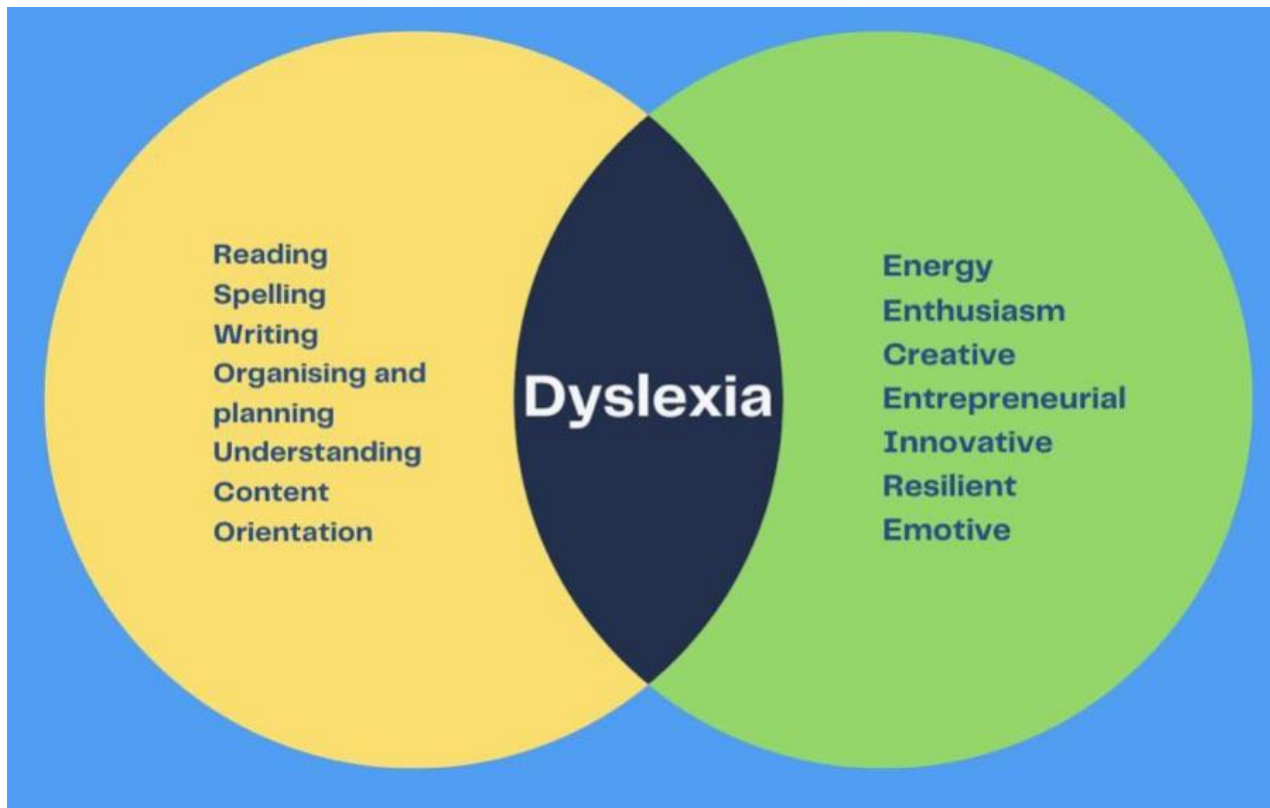


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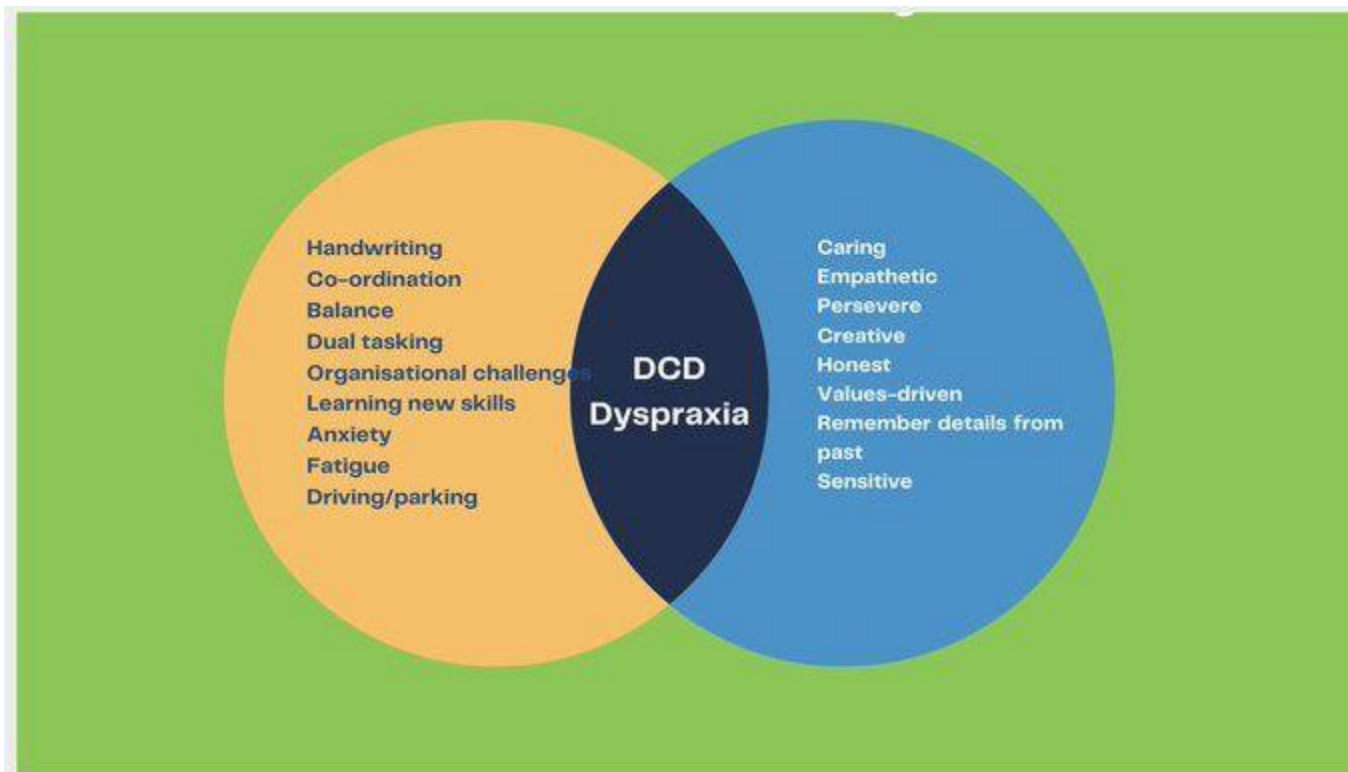
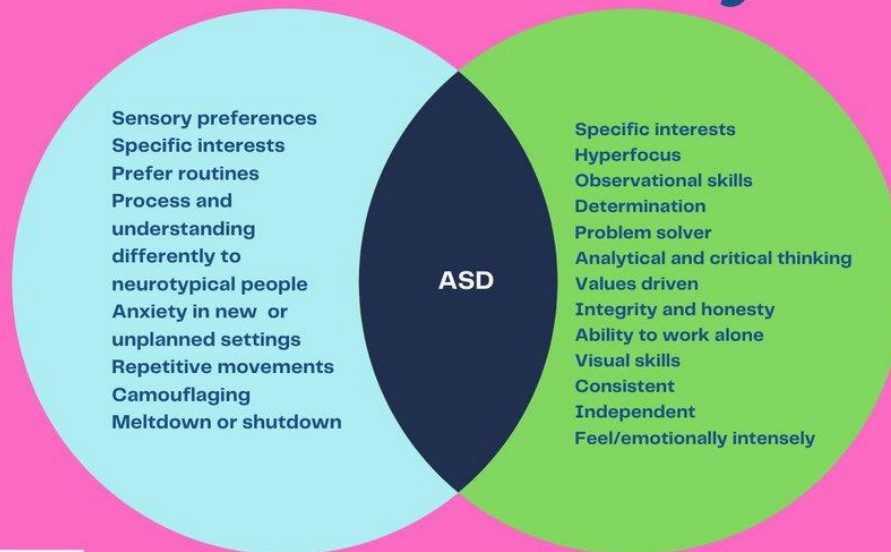


Image: Amanda Kirby, twitter.com/profAmandaKirby

Two sides to every coin



Do-IT>



Image: Amanda Kirby, twitter.com/profAmandaKirby

6 - General Tips

Differentiate the learning experiences.

Encourage support for the student from classmates.

Consider physical access issues such as ramps, toilets, lifts and classroom layout.

Incorporate advice from the SEN coordinator in the school.

Use computers and audio-visual aids in the student's learning and teaching programme.

Specialised equipment may also be necessary such as adapted keyboards, page turners, word boards or special desks.

Encourage communication to prevent isolation.

Allow students extra time to complete tasks.

Students may have a low self-image, therefore it is important to ensure that the student feels included and is encouraged and praised.

As students tend to become distracted quite easily minimise distractions in the classroom environment.

Read each students' Student Support File and think about where LCCS fits into helping these students achieve the goals therein.



Group Activity

Group Task: Creating an Inclusive Classroom

Your LCCS classes each have a wide variety of students and most likely a number of students presenting with a wide variety of special educational needs. What supports might you need to put in place to create a classroom that includes these learners?

What are the challenges this student might face in engaging with the learning in your classroom?

What supports can you put in place to mitigate these challenges?

Consider also the strengths these students bring to the classroom - how might you use these to their - and your - advantage?

Group Tasks

Group 1:

Autism Spectrum

Group 2:

Hearing Impairment

Group 3:

Specific Speech
and Language
Disorder

Group 4:

Non-reader/writer

Group 5:

Attention Deficit
Disorder

Group 6:

Physical Disability

Group 7:

Emotional/
Behavioural
Disorder

Group 8:

Dyspraxia





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