Coding and Computational Thinking in a Primary School - Activities and Resources for Every Level

If your school is exploring or developing coding and computational thinking to support teaching, learning and assessment, you can use this guide to help approach it as a whole school activity and to create a **Digital Learning Action Plan**, relevant to your own school's context.

The guide is broken into 4 school levels:

Junior & Senior Infants
1st & 2nd Class
3rd & 4th Class
5th & 6th Class

It sets out suggested activities and learning goals for each class level, and lists a range of resources which can be used to achieve them.

When following the guide, consider your school's current resources, teacher experience and pupils' experience. If your school is completely new to introducing coding and computational thinking, you could consider placing each class at a lower class level starting out.

Many of the resources are free and have offline options or printables. It is worth investigating the free resources while working out which key pieces to invest in.

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Digital Learning Framework

Coding and computational thinking map directly to standards and statements of highly effective practice on the Digital Learning Framework. Here are some examples of standards and statements you can choose for your digital learning action plan. Each of these is in the Teaching and Learning section. There are many other standards and statements you can choose. Visit www.dlplanning.ie to explore these in detail.

Domain 2: Learner Experiences **Standard 2.4**: Students experience opportunities to develop the skills and attitudes necessary for lifelong learning	
Statement (highly effective practice)	Students apply their digital competence in innovative ways to new situations or contexts, creatively develop new solutions and/or products, and see themselves engaging in continuing education and training.
Domain 3: Teachers' Individual Practice **Standard 3.2**: The teacher selects and uses planning, preparation and assessment practices that progress students' learning	
Statement (highly effective practice)	Teachers use appropriate digital technologies to support differentiated learning, enabling learners to take ownership of their individual learning needs.
Statement (highly effective practice)	Teachers use appropriate digital technologies to help students design projects and activities that engage them in collaborative problem solving, research, and/or artistic creation.

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Over the following pages we have outlined suggested activities and the relevant resources required to achieve them. Chosen activities can be selected, and adapted where necessary and relevant resources identified and added to your Digital Learning Action plan.

Junior & Senior Infants

Topic	Suggested Activities and Learning Goals	Resources
Internet Safety	● Pupils explore Digiduck Stories (childnet.com)	Webwise Code.org Barefoot CAS Bee Bots/Blue Bots Bee Bot Emulator Cody Roby Scratch Junior STEAM Park by Lego Lego Coding Express Kodable LightBot Daisy the Dinosaur Tynker Junior Seesaw Blockly Games Twinkl - coding section (printable directional cards/Bee Bot resources)
What is a computer?	● Pupils develop an understanding of computer programming as a series of instructions.	
Think like a computer	● Pupils use unplugged activities to demonstrate and discuss computational thinking key components.	
Algorithms	● Pupils decompose simple problems and create simple sequences of instructions (e.g. how to make a sandwich). ● Pupils explore algorithms through guided play, including hands-on interactive learning experiences.	
Decomposition	● Pupils can label the parts of a house.	
Debugging	● Pupils can check (themselves or with each other/teacher) if their work is correct.	
Online learning platforms	● Pupils take photographs of their work using tablets and upload them to online learning platforms i.e. Seesaw. ● Pupils navigate their online learning platform with assistance from teacher/parent when at home.	

1st & 2nd Class

Topic	Suggested Activities and Learning Goals	Resources
Internet safety	**Webwise:** HTML Heroes 1st/2nd class **Google:** Be Internet Legends **Barefoot CAS lessons:** Who Does This Belong to?, Do the Right Thing	Webwise Code.org Barefoot CAS Lego Boost Scratch OSMO Coding Kit Dash and Dot Sphero Spark/Sphero Mini (directional commands) Makey Makey Seesaw Blockly Games Class Dojo Code Combat Zoom Twinkl - ie code like a pirate resources/coding concepts algorithms pack
What is computer coding?	● Pupils explore ways to represent data using the context of secret messages and code.	
Programming	● Pupils develop an understanding of computer programming as a series of instructions.	
Data visualisation	● Represent data as symbols, numbers and pictures. Collect, sort and present data in digital format.	
Scratch	● Pupils understand and can navigate the Scratch interface.	
Use of technology	● Pupils can use technology purposefully to create, organise, store, manipulate and retrieve digital content.	
Collaboration	● Pupils can work collaboratively in pairs and groups on a class project with shared or individual devices and platforms.	
Algorithms	● Pupils can decompose simple problems and create simple sequences of instructions (like how to make a sandwich) - understand what algorithms are, how they are implemented.	
Decomposition	● Pupils can label the parts of a plant/part of the body. ● Clean the classroom: you make a to-do list for doing your tasks. ● English: planning the different parts of a story. ● Maths: breaking down a problem to solve it.	

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	● Geography: Label map of Ireland, Rivers of Ireland, Countries of the World	
Debugging	● Pupils can check (themselves or with each other/teacher) if their work is correct	
	● Pupils can take photographs of their work using tablets and upload them to online learning platforms e.g. Seesaw. ● Pupils can navigate their online learning platform without assistance and use it to complete and submit work. ● Pupils can engage in their online learning platform from home to complete homework/tasks and tests.	

3rd & 4th Class

Topic	Suggested Activities and Learning Goals	Resources
Internet Safety	● Pupils can use technology safely, respectfully and responsibly; recognise unacceptable behaviour; explore what personal information is safe to share and ways to behave responsibly online, identify a range of ways to report concerns about content and contact. 　　　**Webwise:** HTML Heroes (Webwise) 　　　**Barefoot CAS lessons:** You're the Jury, The Phiserman Game	Webwise Code.org Barefoot CAS Google CS First Makey Makey Swift Playgrounds Dash and Dot (blockly commands) Lego We.do Scratch Sphero Spark/Sphero Mini (coded commands) Minecraft (code commands) Little bits Tickle app Swift Blockly Games Microsoft Make Code Minecraft Google Earth Google Classroom/Workspace Microsoft Teams Class Dojo Zoom Bluejeans Twinkl - creative coding with scratch worksheets. CoderDojo - free Scratch
	● Pupils can represent data in different ways, collect, sort and present it in digital forms.	
Algorithms	● Pupils can decompose simple problems and create simple sequences of instructions (like how to make a sandwich, brush your teeth, bake a cake) ● Pupils understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions ● Pupils follow the problem solving process to design and create a digital solution.	
Decomposition	● Pupils understand what decomposition is and how to apply it to solve problems ● Some Examples: 　○ **Science:** Students research the different organs in order to understand how the human body digests food. 　○ **Social Studies:** Students explore a different culture by studying the traditions, history, and norms that comprise it. 　○ **English Language/Drama Lesson:** Students analyze themes in a text by first answering: Who is the protagonist and antagonist? Where is the setting? What is the conflict? What is the resolution? 　○ **Languages:** Students learn about sentence structure in a foreign language by breaking it down into different parts like subject, verb, and object.	

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| Debugging | Pupils can check (themselves or with each other/teacher) if their work is correct. Pupils are familiar with and able to submit and complete work both at school and at home on their schools online learning platform i.e. Google Classroom/Workspace/ Microsoft Teams etc. Pupils are able to engage with the teacher for feedback/questioning on their school's online learning platform. | resources
Hopscotch
Tynker |

5th & 6th Class

Topic	Suggested Activities and Learning Goals	Resources

Internet Safety	● Pupils use technology safely, respectfully and responsibly; recognise unacceptable behaviour; identify a range of ways to report concerns about content and contact.
	● Teacher revises the importance of passwords, exploring cyberbullying and computer security and using an online space to safely share ideas. (class blog/shared google doc etc)
	    Webwise: MySelfie and the Wider World, All Aboard for Digitown
	    Barefoot CAS lessons: You're the Cyber Expert
		Webwise
		Code.org
		Barefoot CAS
		Scratch
		Microsoft MakeCode
		Minecraft
		Google Earth
		Google CS First
		Swift
		Raspberry Pi
		Micro:bit
		Crumble robots kit.
		Lego Mindstorms
		Khan Academy
		Schoology
		Zoom
		Bluejeans
		Twinkl - ie physical computing lessons and worksheets
		CoderDojo free resources
		Scratch/wearables/ micro:bits/Raspberry Pi
		Makecode
		J2code
		Apple application design process and prototyping resources

Data for problem solving	● Pupils use meaningful context to collect and organise data to answer a question.	
Data visualisation	● Pupils design and create digital information that incorporates a visual aspect - infographic.	
Electronics	● Pupils explore inputs and outputs using a circuit board, electronics kids or programmable board (Makey Makey, Micro:bit, Raspberry Pi).	
Coding solutions	● Pupils design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts.	
Sequencing and variables	● Pupils use sequence, selection, and repetition in programs; work with variables and various forms of input and output.	
Logical reasoning	● Pupils use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs.	
Learning Platforms	● Pupils are able to work collaboratively in groups and complete and submit work at school and at home on the school's online learning platform - Google Classroom/Workspace/Microsoft Teams etc.	

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