

Supporting the Professiona Learning of School Leaders and Teachers

Leaving Certificate Computer Science National Workshop 2 Day 2



Day 2 - Workshop Overview

Session 4 09:00 - 11:00	Introduction to ALT4			
Tea/Coffee 11:00 - 11:30				
Session 5 11:30 - 13:00	ALT4: Investigate + Plan			
Lunch 13:00 - 14:00				
Session 6 14:00 - 15:30	ALT4: Design + Create			

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Key Messages

There are many
ways to use the
LCCS specification



The Applied Learning Tasks (ALTs) provide an opportunity to teach theoretical aspects of LCCS



The learning outcomes (LOs) are non-linear

LCCS can be mediated through a constructivist pedagogical approach

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LCCS NW2 Session 4 Introduction to ALT4







By the end of this session...

Participants will ...

- be introduced to ALTs
- be introduced to ALT4
- develop an understanding of Embedded systems
- be introduced to Micro:bit Demonstration
- participate in Micro:bit group activities
- develop an understanding of Design Methodologies

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Introduction to ALTs







Applied Learning Tasks (ALTs)

Students work in teams to carry out four applied learning tasks over the duration of the course each of which results in the creation of a real or virtual computational artefact and a report.

These artefacts should relate to the students' lives and interests.

Where possible, the artefacts should be beneficial to the community and society in general.

Examples of computational artefacts include programs, games, web pages, simulations, visualisations, digital animations, robotic systems, and apps.



LCCS Specification page 15

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LCCS Interwoven

The four applied learning tasks explore the four following contexts:

- 1 Interactive information systems
- 2 Analytics
- 3 Modelling and simulation
- 4 Embedded systems



Key point to remember: Explore and teach the LOs through the lens of ALTs.

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Introduction to ALT4







Considering the ALTs...

Strand 1: Practices	Strand 2: Core	Strand 3: Computer science
and principles	concepts	in practice
 Computers and society Computational thinking Design and development 	 Abstraction Algorithms Computer systems Data Evaluation/Testing 	 Applied learning task 1 Interactive information systems Applied learning task 2 - Analytics Applied learning task 3 Modelling and simulation Applied learning task 4 Embedded systems

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ALT4 - Embedded systems

The design and application of computer hardware and software are a central part of computer science.

Students will implement a microprocessor system that uses sensors and controls digital inputs and outputs as part of an embedded system.

By building the component parts of a computer system, students will deepen their understanding of how computers work and how they can be embedded in our everyday environments.



LCCS Specification page 23

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ALT4 - Learning outcomes

Students learn about:	Students should be able to:		
Embedded systems	3.11 use and control digital inputs and outputs within an embedded system		
Computing inputs and outputs	3.12 measure and store data returned from an analogue input		
Computer systems	3.13 develop a program that utilises digital and analogue inputs		
Design process	3.14 design automated applications using embedded systems		

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Embedded Systems





Activity: Think-Pair-Share









Participants spend time in silence writing or thinking about their own ideas

Participants turn to the person beside them to discuss their ideas

Pairs share their answers with other pairs (square) or the wider group

Consider and discuss:

1. What are the uses of Embedded Systems?



2. What is the difference between digital and analogue data?

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Embedded Systems



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This washing machine has an embedded system in it.

The microcontroller displays the status of the machine in the display

You can program the microcontroller by pressing the buttons and turning the dial

The microcontroller in this embedded system controllers the speed of the motor (drum)



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In a car, we have a lot of embedded systems as shown below. We will have more and more as cars evolve into future car.



https://www.sharetechnote.com/html/EmbeddedSystem_WhatIsIt.html

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Embedded Systems

Embedded systems are a combination of hardware and software designed to perform a specific function. They are called 'embedded' because they are often used as part of a larger system. Many embedded systems use sensors to receive analogue or digital inputs. The input data which is often supplied in real time is then processed resulting in some sort of output. While not every embedded system will have a user interface, some are designed to meet the principles of universal design. Q15, LCCS HL 2021

Characteristics of an Embedded System:

• Task-specific.

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- Typically, consists of hardware, software, and firmware;
- Microprocessor-based or microcontroller-based
- Often used for sensing and real-time computing in **Internet of Things (IoT)** devices



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Matching Exercise



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Microprocessors/ Microcontrollers





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Introduction to Micro:bit









Links between Micro:bit and Core Concepts

"The core concepts are developed theoretically and applied practically. In this way, conceptual classroom-based learning is intertwined with experimental computer lab-based learning throughout the two years of the course." PAGE 20 Spec

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LCCS Learning Outcomes

2.11 describe the different components within a computer and the function of those components

2.12 describe the different types of logic gates and explain how they can be arranged into larger units to perform more complex tasks

2.13 describe the rationale for using the binary number system in digital computing and how to convert between binary, hexadecimal and decimal

2.14 describe the difference between digital and analogue input

2.15 explain what is meant by the World Wide Web (WWW) and the Internet, including the client server model, hardware components and communication protocols

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Getting started





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Reaction Game - Demonstration











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Resources for Micro:bit

Teaching Programming using the BBC micro:bit



https://drive.google.com/file/d/1iZ6l3rRvqeUAliAYfWn9mycN--uIONJy/view?usp=sharing

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Resources for Micro:bit



https://makecode.microbit.org/courses/csintro



Lessons 1. Making 2.<u>Algorithms</u> 3. Variables 4. Conditionals 5. Iteration 6.<u>Review/Mini-Project</u> 7. Coordinate grid system 8.Booleans 9.Bits, bytes, and binary 10.<u>Radio</u> 11.<u>Arrays</u> 12.Independent final project

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Resources for Micro:bit



SUPPORTING LEAVING CERT COMPUTER SCIENCE



LCCS CPD PDST CPD events and resources



Q&A Section Find common questions that teachers have about Computer Science.

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CESI CS

CESI mailing list - Join the discussion.

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Ceslecs

micro:bit | classroom - Beta

https://classroom.microbit.org/







https://www.youtube.com/playlist?list=PL On6wprxGatifics.ar.bhFoghlain_Sps1Supporting the Professional Ghairmiuil i mease Geannairi Scoile agus Múinteoirí and Teachers

Micro:bit kits













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Design methodologies







Agile vs Waterfall



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Waterfall





https://www.theserverside.com/tip/Agile-vs-Waterfall-Whats-the-difference

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Agile

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The Design Process



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