



An Roinn Oideachais
Department of Education

LCCS National Workshop 4

Session 1

Session 1	Introduction to Computers and Society
11.45 – 12.00 noon	Break
Session 2	Algorithms II
13.30 – 14.30	Lunch
Session 3	Computer Systems II

Housekeeping



Key Messages for NW4



There are many ways to use the LCCS specification.



The study of Computers and Society is one of the overarching principles of LCCS.



LCCS can be mediated through a constructivist pedagogical approach.

ALTs

ALTs provide an opportunity to teach theoretical aspects of LCCS.



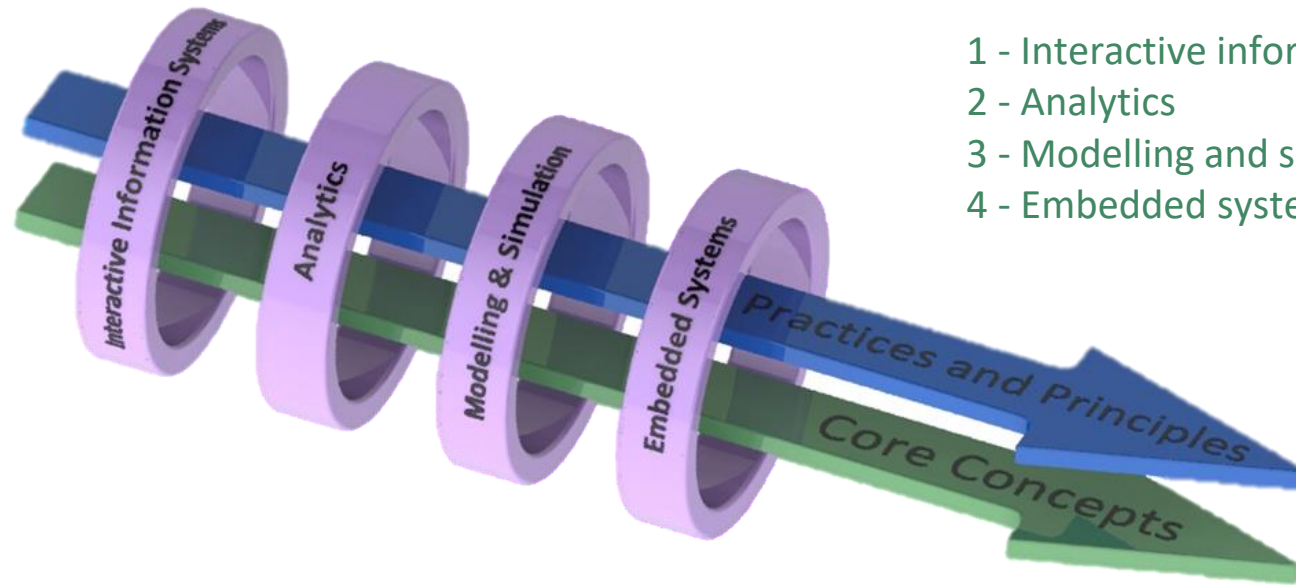
Critical reflection will be a central component of the student experience and the LCCS teacher's PD journey.



Digital technologies can be used to enhance collaboration, learning and reflection.

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 to remember:

Explore and teach the LOs through the lens of ALTs.

Recap on National Workshop 3

Main topics...

Computer Systems | ASCII and Number Systems

Introduction to Algorithms | PC part picker activity

Algorithms for ALT2
(mean, median and mode)

ALT2 Analytics

NCCA Resources for ALT2 |

Computational Thinking |

Curriculum Planning

Hypothesis

Python Libraries for ALT2

ALT2 Investigate and Planning

Unplugged Activities

LCCS Promotion |

Session 1

Computers and Society

By the end of this session participants will have ...

gained a deeper understanding of Strand 1 – Computer and Society including the LOs

taken part in a short activity to acquire additional strategies and ideas on teaching and learning this section of the course

gained a deeper understanding of how to *Stimulate a Debate* in a classroom using the four-step process

experienced the *Stimulate a Debate* via a group activity and, in doing so, appreciate the benefits of this approach

reflected on the how to teach aspects of this section of the course via group activity debrief

Strand 1: Practices and principles

Strand 1: Practices and principles	Strand 2: Core concepts	Strand 3: Computer science in practice
<ul style="list-style-type: none">▶ Computers and society▶ Computational thinking▶ Design and development	<ul style="list-style-type: none">▶ Abstraction▶ Algorithms▶ Computer systems▶ Data▶ Evaluation/Testing	<ul style="list-style-type: none">▶ Applied learning task 1<ul style="list-style-type: none">- Interactive information systems▶ Applied learning task 2 - Analytics▶ Applied learning task 3<ul style="list-style-type: none">- Modelling and simulation▶ Applied learning task 4<ul style="list-style-type: none">- Embedded systems

The overarching practices and principles of computer science are the behaviours and ways of thinking that computer scientists use.

This strand underpins the specification and is fundamental to all learning activities. By becoming familiar with, and fluent in, the practices and principles that underpin good practice, students develop their ability to manage themselves and their learning across the subject.

Strand 1: Practices and principles

The practices and principles of computer science describe the behaviours and ways of thinking that computationally-literate students use to fully engage in a data-rich and interconnected world.

*Studying the role of **computers in society** will enhance students' attitudes towards computer science and make it more meaningful and relevant.*

*In learning about **designing and developing**, students will recognise the creative challenge involved in creating artefacts and in project management.*

LCCS Specification: p18

Computers & Society

Social and ethical considerations of computing technologies

Turing machines: The Internet, Machine Learning, Artificial Intelligence

User-Centred Design

Computers and Society - LCCS Learning Outcomes

- 1.11 - discuss the complex relationship between computing technologies and society including issues of ethics
- 1.12 - compare the positive and negative impacts of computing on culture and society
- 1.13 - identify important computing developments that have taken place in the last 100 years and consider emerging trends that could shape future computing technologies
- 1.14 - explain when and what machine learning and AI algorithms might be used in certain contexts
- 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
- 1.16 - compare two different user interfaces and identify different design decisions that shape the user experience**
- 1.17 - describe the role that adaptive technology can play in the lives of people with special needs
- 1.18 - recognise the diverse roles and careers that use computing technologies

NCCA – The Evolution of Computers in Society

This booklet provides a chronologically structured series of detailed resources and learning plans aimed at supporting LCCS teachers as they explore the topic of Computers and Society with their students.



Stimulate a Debate Strategy

We are now going to look at the *Stimulate a Debate* strategy as a pedagogical tool suited to the LCCS classroom.

We will:

- 1) Define the strategy and the reasons for utilising it in your class
- 2) Quickly walk through a sample *Stimulate a Debate* lesson
- 3) Break into groups and examine specific *Stimulate a Debate* lessons from the *Evolution of Computers in Society* booklet
- 4) Record our ideas, understandings, comments and adjustments in a shared file to which we will all have access

Stimulate a Debate Strategy

Described in detail on page 67 of *The Evolution of Computers in Society* booklet

Pedagogical framework through which complex ideas and concepts can be developed and understood by the class as a whole and each student separately

Speaks to the constructivist ethos underpinning the delivery of LCCS

Facilitation methodologies can be chosen to suit the particular needs of the students in your classroom

Stimulate a Debate Strategy

Four step process:

1. Engage with Stimulus material (e.g. video/text)
2. Provide prompt questions to provoke discussion and elicit opinion
3. Divide into research groups and explore topic from key standpoints
4. Choose a teaching/facilitation methodology

Stimulate a debate – Cloud Computing

(NCCA Booklet p56).

1. Watch a Stimulus Video or read a stimulus piece.

CLOUD COMPUTING PROS

Lower upfront costs and reduced infrastructure costs.
Easy to grow your applications.

Scale up or down at short notice, known as elasticity.

Only pay for what you use.

Everything managed under Service Level Agreements (SLAs).

Overall environmental benefit (lower carbon emissions) of many users efficiently sharing large systems.

CLOUD COMPUTING CONS

Higher ongoing operating costs. Could cloud systems work out more expensive?

Greater dependency on service providers. Can you get problems resolved quickly, even with SLAs?

Risk of being locked into proprietary or vendor-recommended systems?

How easily can you migrate to another system or service provider if you need to?

What happens if your supplier suddenly decides to stop supporting a product or system you've come to depend on?

Potential privacy and security risks of putting valuable data on someone else's system in an unknown location?

If lots of people migrate to the cloud, where they're no longer free to develop neat and whizzy new things, what does that imply for the future development of the Internet?

Dependency on a reliable Internet connection.

2. Prompt questions to provoke class discussion and elicit initial viewpoints

What are the important things to consider when choosing a cloud computing solution?

Are there any security issues with using cloud services?

Whose information are you responsible for and what will happen if there is a data breach?

How can you prevent a data breach if you are using a traditional, non-cloud, service?

What happens if the cloud service stops?

3. Divide into research groups to explore the topic from key standpoints

For example, the ethics of cloud computing:

Information of all kinds is freely available to everyone – has this been a good thing for the world?

What controls are there on those people in charge of cloud computing services?

How do you protect yourself if you build a cloud computing service?

4. Choose a teaching/facilitation methodology

Sample Facilitation Technique – Jigsaw

Students first research each topic in research groups of three.

Use a Jigsaw Learning Technique to create groups of three comprising one student from three different themes. Each person discusses their research within their new group.

Reassemble into original groups and discuss any new learnings.

Recap - The 4 steps:

1. Watch a Stimulus Video or read a stimulus piece.
2. Prompt questions to provoke class discussion and elicit initial viewpoints.
3. Divide into research groups to explore the topic from key standpoints.
4. Choose a teaching/facilitation methodology.

Main Group Activity

Stimulate a Debate – Lesson Discussion

Main Group Activity

Stimulate a Debate – Lesson Discussion

Each group will work on a specific debate topic from the “Evolution of Computers in Society booklet”

They will examine each step of the Facilitate a Debate strategy and discuss/comment/improve/amend as necessary.

Groups will record their work on a shared document which will be provided to all via slack in the coming days

Main Group Activity

Stimulate a Debate – Lesson Discussion

Some scaffold questions have been placed in the document in the hope that they will be of use.

Please allow your own specific context and experience guide your contributions and understanding while creating this resource for your peers

Each group should nominate a *timekeeper*, *note-taker*, *spokesperson* and *discussion chair* in order to facilitate successful group work and feedback

Main Group Activity

Stimulate a Debate – Lesson Discussion

You will have 40 minutes to complete the four steps of the strategy

We will then reconvene at 10:50 to share thoughts and ideas on the process as a whole group

Groups and Topics

Groups 1 & 5	The positive and mostly negative impact of military innovations on both society and technological developments.	Page 19
Groups 2 & 6	How Computer Science is changing our world	Page 29
Groups 3 & 7	How should we respond as a society to the rapid growth of Artificial Intelligence	Page 34
Groups 4 & 8	How much data, and the kinds of data, should governments and giant multi-nationals be allowed to keep on citizens and consumers	Page 51





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