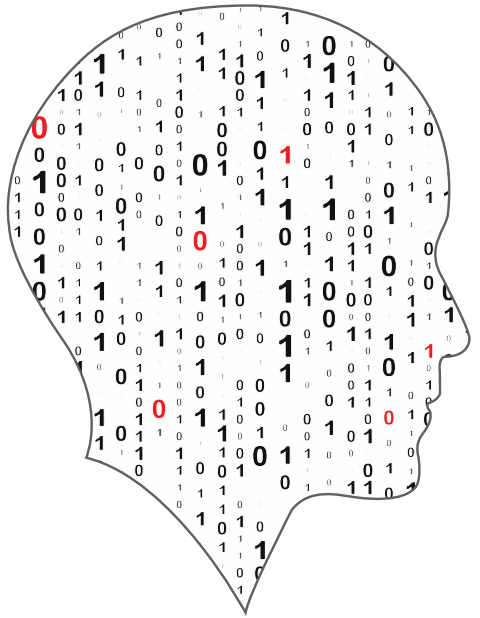
PDST
Professional Development Service for Teachers
An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

An Roinn Oideachais agus Scileanna
Department of Education and Skills

National Workshop 4

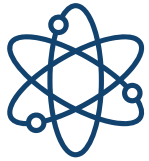


LEAVING CERTIFICATE
COMPUTER SCIENCE

Schedule – Day 2

9.00am - 11.00am	*Session 3:* Computer Systems
	Break
11.30pm – 1.00pm	*Session 4:* ALT1 – Interactive Information Systems (Part I)
	Lunch
2.00pm – 4.00pm	*Session 5:* ALT1 – Interactive Information Systems (Part II)

Key Messages



All learning outcomes are interwoven and should be studied concurrently at different stages of the course and should not be studied in a linear order.

LCCS can be effectively mediated through the use of a constructivist pedagogical orientation which will incorporate participatory and enquiry focused teaching and learning activities.

The assessment will afford students the opportunity to generate responses that reveal that the objectives of the LCCS course have been met (see p6 specification).

Digital technologies used in LCCS have the potential to enhance collaboration, learning and reflection, by enabling students to learn more efficiently and to facilitate work that might not otherwise be possible.

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By the end of this session participants will have:

- gained a deeper understanding of computer systems concepts and terminology including number systems, data representation, computer components, basic electronics, Boolean algebra, logic gates and circuits
- experienced inquiry-based learning (IBL) and in doing so appreciate the benefits of IBL
- taken part in and reflected upon an IBL activity
- acquired additional knowledge and ideas on how they will facilitate the learning of computer systems in their own classrooms

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Session 3

Computer Systems

Strand 2: Core Concepts

Strand 1: Practices and principles	Strand 2: Core concepts	Strand 3: Computer science 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

"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."

NCCA Curriculum specification, Page 20

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

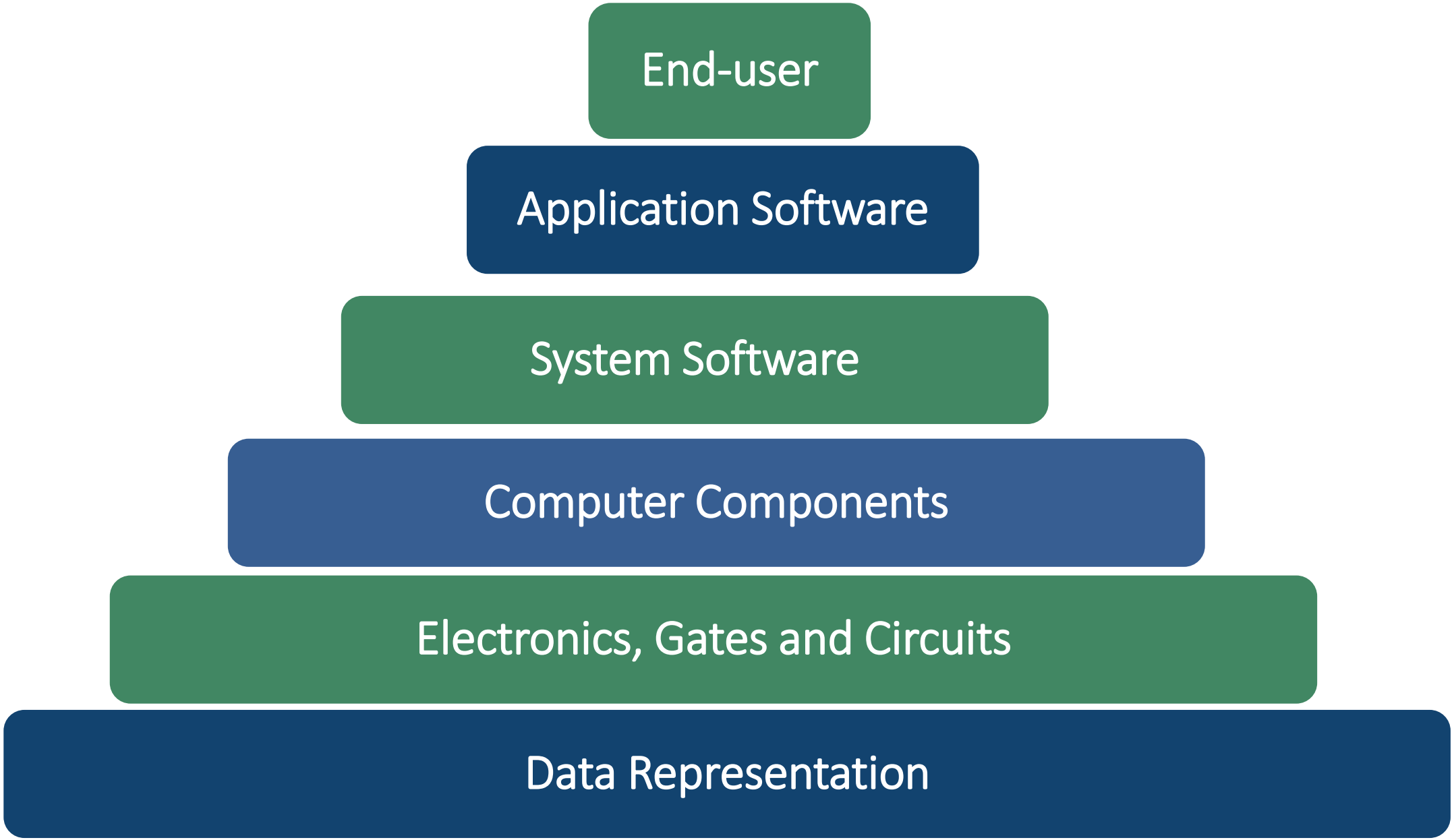
2.14 describe the difference between digital and analogue input

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**

Computer Systems - Topics

Computer Components
Basic Electronics
Input and Output Devices
Voltage, current, resistors, capacitors, transistors
Central Processing Unit (CPU)
Logic Gates and Circuits
Fetch-Execute Cycle
Web Infrastructure
Registers (Special+General Purpose)
Network Protocols
Arithmetic Logic Unit (ALU)
Operating Systems
Von Neumann Architecture
Types of Software

Layers of a Computing System



Warm Up Activity

Warm Up Activity

Counting in Binary

Binary Addition

Boolean Expressions

Gates and Circuits

Converting Binary <-> Decimal

Converting Binary <-> Hexadecimal

Converting Hexadecimal <-> Decimal

Von Neumann Architecture

Main Group Activity

Groups and Tasks

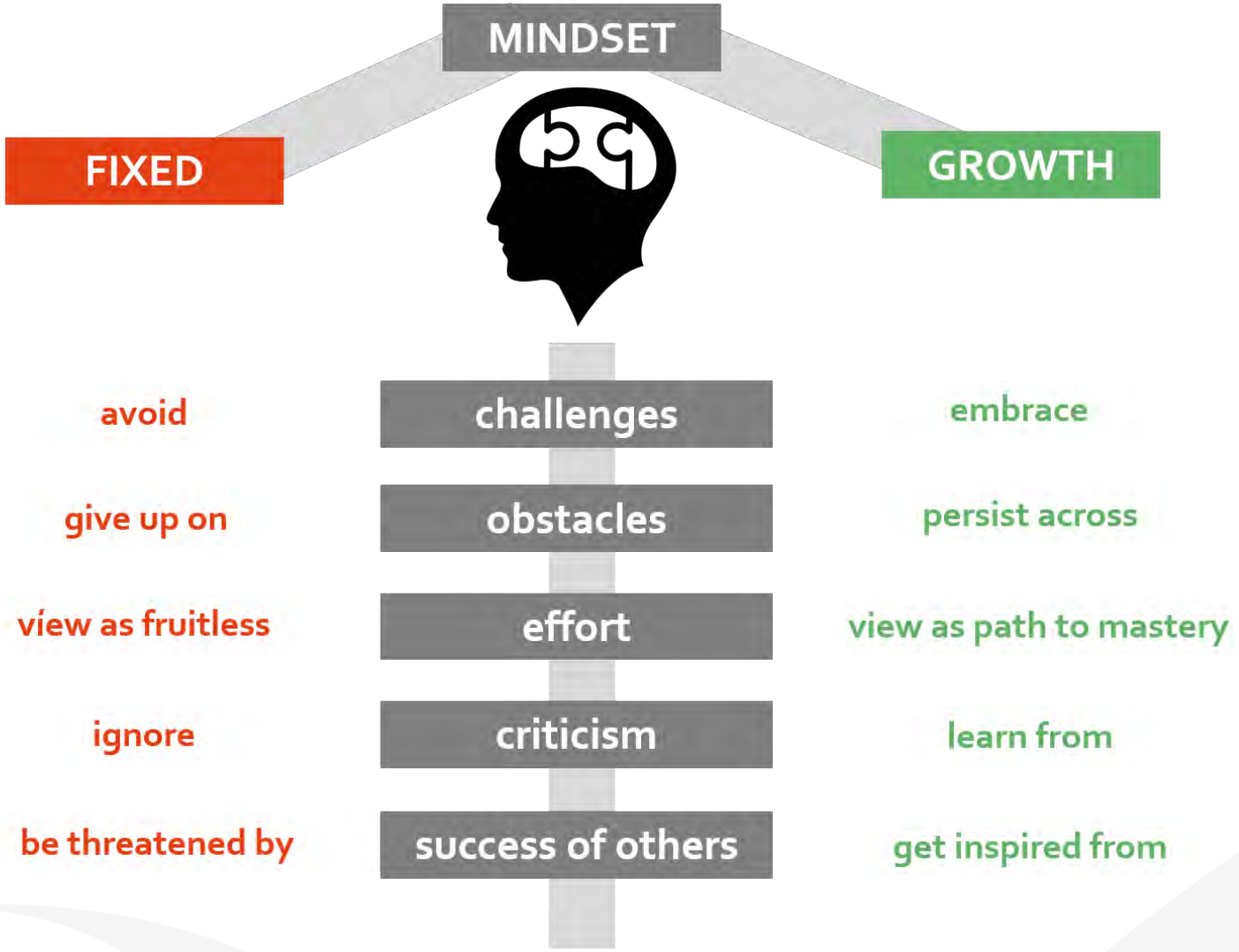
Task 1: Computer Architecture Presentation

Task 2: Lemon Battery (Microsoft Hacking STEM)

Task 3: Design a Half-Adder (NCCA booklet Pg.23)

Task 4: Build a Virtual Computer

Growth Mindset



Presentation & Debrief

Explain your activity

What problem?

What resources are needed?

Possible solutions?

Possible entry points?

Questions that promote deeper thinking?

Where and how could you make links with other parts of the course?

Experiential Learning

Problem-Based Learning and Inquiry-Based Learning (EBL)

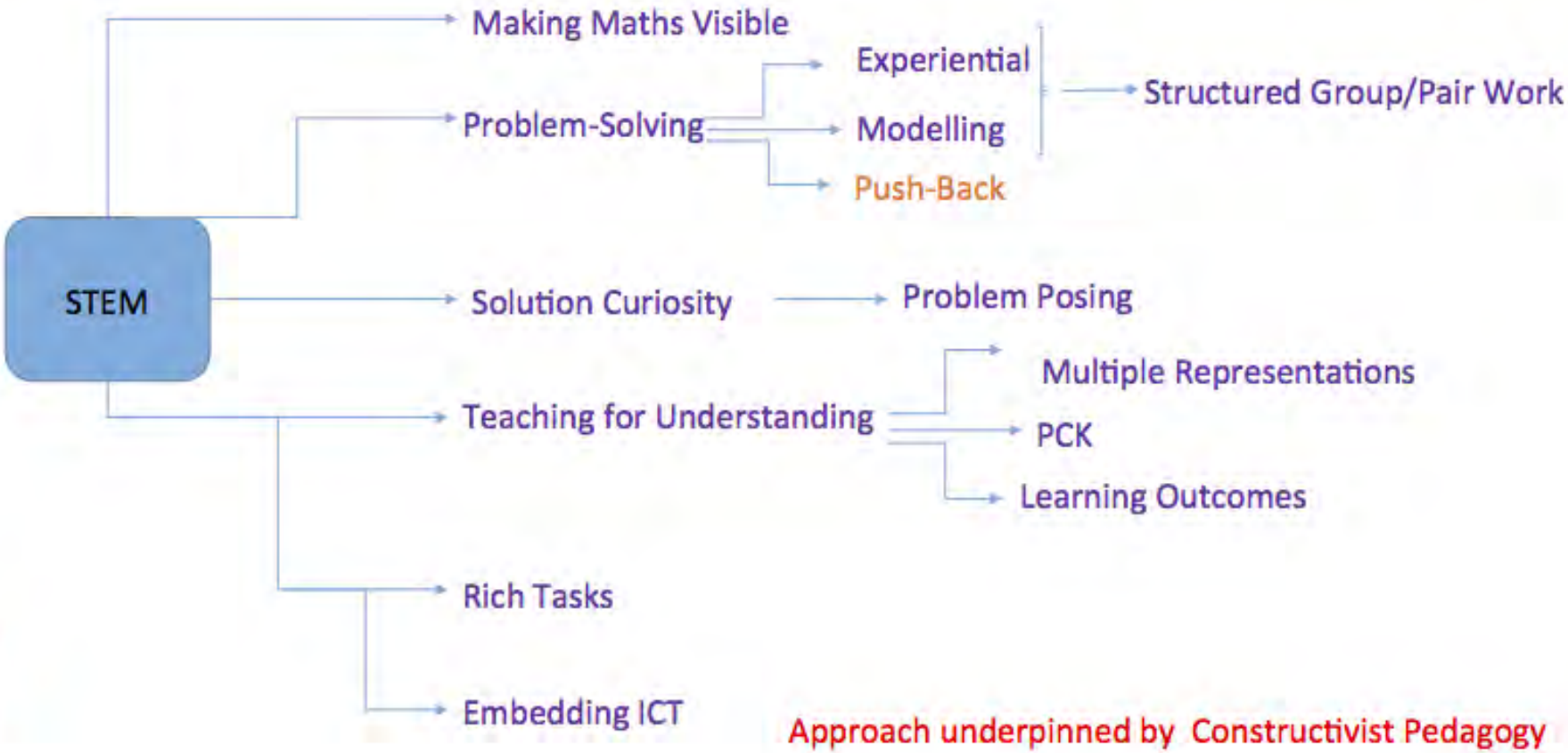
- Optimal learning happens when students are confronted with real and substantial problems to solve (Dewey)
- Learning is driven by challenging open-ended problems
- Enquiry is natural to how we learn
- Enquiry is a process of both problem posing and problems solving
- A realistic problem is presented with incomplete information (PBL)
- In order to provide a sense of relevancy a topic might be framed in a concept (Short)
- Students work in small collaborative groups
- Teachers act as facilitators of learning
- EBL (IBL) can be structured, guided or open
- Timing is important (Hattie)

Classroom Strategies for Inquiry-Based Learning | UTAustinX on edX | Course About Video

https://www.youtube.com/watch?v=PQy5DBUj3Pg

STEM CPD

STEM as a Connected Discipline



Approach underpinned by Constructivist Pedagogy

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