Pedagogical sequence associated with the box

« Cybersecurity in school »

Theme: **Computers /peripherials**

Ages: 8/10 and 10/12 years old

Duration: 1h30' (2 sessions of 45 minutes)

Storyline overview: A ransomware attack locks Maple Grove Middle School's systems. The Cyber Sleuths—Zara, Toby, Lin, and David—investigate. They find a rogue device hidden in a janitor's closet. The team shuts it down to stop the attack. They then work to decrypt the locked files. The hacker is traced to a local IP address. A former student is caught seeking revenge. The team is celebrated as heroes for saving the school.

General guidance: Encourage them to communicate with each other to find solutions and take notes. Circulate among the groups to observe their methods and intervene if necessary.

Emphasise the importance of taking your time to solve the puzzles and not saying the answer aloud to avoid disrupting the other groups' thinking.

Once all groups have worked through the puzzles, go over the challenges one by one with them, asking pupils to explain their solution method to the entire class. Complete the puzzles and provide the correct solution if they haven't found it.

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Session n°1 – Anathomy of a computer

Learning Objectives: Computers (for 8-10 year olds)

After learning about computers, students will be able to:

1. **Identify the four main types of computers (desktop, laptop, tablet, smartphone) and describe one common use for each.**
2. **Categorize common computer peripherals (e.g., keyboard, mouse, monitor, printer, speakers) as either input or output devices based on their function.**
3. **Explain at least two different ways computers help people in their daily lives at school, at home, or in the community.**

The Amazing World of Computers!

Have you ever played a video game, typed homework, or watched a cartoon on a screen? Then you've used a computer! Let's take a quick trip into their awesome world.

A Super-Quick History

A long, long time ago (about 80 years!), the first computers were gigantic. They were as big as your entire classroom or even a whole house! Can you imagine? They were much slower than your phone and could only do simple math. Over time, smart people made them smaller, faster, and smarter. Today, you can hold a powerful computer right in your hand—it's called a smartphone!

Different Computers for Different Jobs

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Not all computers look the same. They come in different shapes and sizes for different jobs!

Desktop Computer: This is the classic computer. It usually has a separate screen (the monitor), a keyboard, and a mouse. It's great for doing homework, creating art, and playing games at a desk.

Laptop: A laptop is like an all-in-one computer. The screen, keyboard, and computer brain are all in one flat package. You can fold it up and take it anywhere—to school, the library, or on the couch!

Tablet: A tablet is a thin, flat screen that you control by touching it. It's perfect for reading books, watching videos, and playing games. It's like a super-powered notebook.

Smartphone: This is the tiny computer in your pocket! It can make calls, send messages, take photos, and run millions of fun apps.

Monitor/Screen: This is the computer's face. It shows you everything that's happening, from your game to your homework document.

Number of participants: (Individual, pair or small group activity.)

You could adapt different options for the groups: heterogeneous or mixed-ability groups, assigning specific roles to pupils (e.g. one writes, one solves, one presents)

Don't hesitate to move between groups to offer support or facilitate discussion.

LESSON PREPARATION

Prior knowledge and skills:

For this lesson, pupils should already be able to:

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Level 1 (8/10 years old)

1. Identify Common Technology: Recognize and name common digital devices like laptops, tablets, smartphones, and desktop computers.
2. Use Basic Hardware: Confidently use a computer's keyboard and mouse/trackpad for simple tasks like typing their name and clicking icons.
3. Understand Basic Concepts: Know what "turning on" and "shutting down" a computer means and the basic purpose of a screen/monitor.
4. Recognize Common Peripherals: Identify common accessories like headphones, a printer, and a webcam and have a simple idea of their use (e.g., "headphones are for sound").
5. Follow Digital Instructions: Listen to and follow simple step-by-step instructions for a computer-based activity.

Level 2 (10/12 years old)

1. Digital Basics: Understand that computers and the internet are used to send and receive information (like emails and messages) globally.
2. Online Accounts & Security: Have a basic concept of a password-protected account (like a school login) and why keeping passwords private is important.

Materials and classroom setup (online/offline): digital tablet or computer (number to be defined according to your abilities and number of pupils). One sheet of paper and one pencil per pupil.

INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject

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8 – 10 years old 10 – 12 years old	Introduce the day's topic and cover in detail the concept(s) that will be covered in this session. Make sure to adapt the presentation to your class group (age and specific characteristics). ***8 – 10 years old*** The key to introducing computers and peripherals to 8-10-year-olds is to frame it as **fun, purposeful, and empowering**. Here are some engaging ideas to kick off the lesson. **Activity 1: "Computer Detective"** Goal: To identify common computer peripherals in the immediate environment. Instructions: 1. Look around your classroom, computer lab, or even think about your home. 2. Find 5 different devices that can connect to a computer (like a desktop, laptop, or tablet). 3. Write down the name of each device you find. 4. For each device, write one sentence about what it helps the computer do. Example: Device: Printer

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	What it does: It helps the computer put words and pictures onto paper. ***10 – 12 years old*** **Activity : "Input or Output?" Sorting Race** Goal: To understand the basic difference between input and output devices. Instructions: 1. The teacher will call out the name of a device (or show a picture). 2. As a class, you must decide: Is it an Input device (sends information to the computer) or an Output device (sends information from the computer to you)? 3. If it's an Input device, put your hands on your head. 4. If it's an Output device, put your hands in the air! Examples you send typing to the computer-keyboard it shows you information-monitor you send clicks and movement-mouse you hear sound from them-speakers it sends pictures to the computer-webcam it gives you a physical paper-printer

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PUTTING IT INTO PRACTICE

Level 1	Activities
8 – 10 years old	**1. What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuths to solve the problem **2.** Today we're going to find out what the 'insides' of a computer look like, turning into little detectives. We'll start with the game 'Who Am I?': I'll read out a description, and you'll have to find the matching picture on the table. If you've found the right pair, keep the cards and become the new game leader. Now, let's have a quick look around: if we didn't have a mouse, how could we use the computer? **3. What the pupil(s) do:** • Listen to the instructions before attempting to solve the puzzle.

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	• The pupils cut out the 15 picture cards and place them face up on the table so that everyone can see them. In turn, they listen carefully to the description read out by the facilitator and identify the picture of the computer component that matches the riddle. If they answer correctly, they claim the pair (the picture and the riddle) as a point and become the new 'Game Master' for the next round. At the end, they count the pairs they have collected to determine the winner.

Level 2	Activities
10 – 12 years old	1. **What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuths to solve the problem. • Today we're continuing with 'The Anatomy of a Computer' and we'll be exploring more advanced components, such as the processor, RAM, hard drive and router. We'll be playing 'Who Am I?' again, but this time the presenter will read out more complex descriptions, and you'll need to match the correct image to the clue. Please note: if you get it wrong, it's the next person's turn, and they'll have a go at answering the same riddle. Finally, let's take a look at a

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	real computer in the classroom and identify together the components we've learnt about. • Read carefully the instructions. **2. What the pupil(s) do:** • Listen to the instructions before attempting to solve the enigma. • The pupils cut out the 15 picture cards and lay them face up on the table, then choose a game leader to hold the riddle cards. In turn, they listen to the description read aloud and identify the corresponding picture, claiming the pair as a point if they answer correctly. In the memory game, they turn over two cards at a time, face down, and try to match the picture with the riddle, whilst remembering the positions of the cards. At the end, the pupils count the pairs they have collected, discuss what other computer components they know, and can draw or stick on pictures of them.

Conclusion Level 1 8-10 years old	At the end, open the discussion: • What did we learn about computers and peripherials? • Where could we use computers and peripherials everyday life Don't forget to congratulate the children for their involvement and success thanks to their teamwork…

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Conclusion Level 2 10-12 years old	At the end, open the discussion: • What did we learn about computers and peripherials? • Where could we use computers and peripherials everyday life Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
To go further…	***8 – 10 years old*** Design and draw your own computer peripheral, labeling its parts and explaining what new task it can do or what common task it makes easier.

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Pedagogical sequence associated with the box

« Cybersecurity in school »

Theme: **Chasing the rogue router**

Ages: 8/10 and 10/12 years old

Duration: 2' (2 sessions of 60 minutes)

Number of participants: (Individual, pair or small group activity.)

You could adapt different options for the groups: heterogeneous or mixed-ability groups, assigning specific roles to pupils (e.g. one writes, one solves, one presents)

Don't hesitate to move between groups to offer support or facilitate discussion.

Materials and classroom setup (online/offline): digital tablet or computer (number to be defined according to your abilities and number of pupils). One sheet of paper and one pencil per pupil.

Storyline overview: A ransomware attack locks Maple Grove Middle School's systems. The Cyber Sleuths—Zara, Toby, Lin, and David—investigate. They find a rogue device hidden in a janitor's closet. The team shuts it down to stop the attack. They then work to decrypt the locked files. The hacker is traced to a local IP address. A former student is caught seeking revenge. The team is celebrated as heroes for saving the school.

> ***General guidance:*** Encourage them to communicate with each other to find solutions and take notes. Circulate among the groups to observe their methods and intervene if necessary.

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Emphasise the importance of taking your time to solve the puzzles and not saying the answer aloud to avoid disrupting the other groups' thinking.

Once all groups have worked through the puzzles, go over the challenges one by one with them, asking pupils to explain their solution method to the entire class. Complete the puzzles and provide the correct solution if they haven't found it.

Session n°2 – Introduction to Maze navigation

Learning Objectives: (for 8-10 year olds)

After learning about find the way in a maze, pupils will be able to:

1. Estimation & Calculation: Predicting and comparing the number of steps in different routes to find the shortest and longest path.

2. Spatial Awareness: Using directions (left, right, up, down) to navigate and read a maze map.

3. Geometry & Symmetry: Identifying and creating symmetrical paths by reflecting designs across a mirror line.4. Logic and Organization:

4. Plan an efficient route through a maze using a simple strategy, such as the "follow one wall" rule, and explain our plan step-by-step.

Learning Objectives: (for 10-12 year olds)

After learning about maze navigation, pupils will be able to:

1. Coordinate Mapping; Using (x,y) coordinates to plot points on a grid.

2. Algorithm Design: Creating step-by-step movement instructions with commands like `move_forward()`.

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3. **Pattern Recognition: Identifying symmetry and using loops to write efficient code.**
4. **Debugging: Testing sequences, finding errors, and revising the code to solve the maze.**

The maze is a timeless symbol that connects culture, mathematics, and practical science.

History & Culture: Mazes evolved from ancient, single-path labyrinths (for spiritual journeys) to the multicursal puzzle mazes of the Renaissance (for entertainment and intellectual challenge).

Mathematical Structure: In mathematics, a maze is a graph—a network of points (vertices) and connecting paths (edges). This allows for the application of systematic solving algorithms, such as the "wall follower" method or more complex, optimal strategies like Breadth-First Search (BFS).

Real-World Applications: The principles of maze-solving are fundamental to modern technology. They power GPS navigation, direct data across computer networks and enable robots to map and navigate unknown environments.

In essence, the maze is a profound model for the human endeavor to find efficient paths and order within complex systems.

LESSON PREPARATION

Prior knowledge and skills:

For this lesson, pupils should already be able to:

Level 1 (8/10 years old)

1. Directional Language: Using left, right, up, and down to describe movement.
2. Counting & Comparison: Counting sequences and comparing quantities or distances.

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3. Visual Tracking: Following a path with their eyes from start to finish.
4. Pattern & Shape Recognition: Identifying basic shapes and simple repeating sequences.

Level 2 (10/12 years old)

The same as 8/10 years old pupils.

1. Coordinates: Reading and plotting points on an (x, y) grid.
2. Sequential Logic: Creating and following step-by-step instructions where order matters.
3. Basic Commands: Understanding coding actions like `move_forward()` and that computers follow instructions precisely.
4. Decomposition: Breaking a complex problem into smaller, manageable steps.

INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject
8 – 10 years old 10 – 12 years old	Introduce the day's topic and cover in detail the concept(s) that will be covered in this session. Make sure to adapt the presentation to your class group (age and specific characteristics). ***8 – 10 years old*** Introduce navigation on maze in a fun, purposeful, and empowering way to pupils. Here are some engaging ideas to kick off the lesson. Activity: Human Maze Mat

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	Objective: To physically experience and describe the math of mazes using direction, estimation, and steps. Time: 10-15 minutes What You Need:Painter's tape or chalk (to draw on floor), a small object as the "goal" (e.g., a stuffed animal, a trophy). Instructions: 1. Create the Maze: Use tape or chalk on the floor to create a simple 4x4 or 5x5 grid of squares. Design a very simple path with one entrance and one exit, placing the "goal" at the end. Add a few dead ends. 2. Become the Navigator: Choose one pupil to be the "Robot." The rest of the class are the "Programmers." 3. Estimate and Plan: Ask the Programmers: "How many steps will it take our Robot to reach the goal?" Take a few guesses. This introduces estimation. Show the Robot the start. Ask the Programmers: "What is our first instruction? Should the Robot go UP, DOWN, LEFT, or RIGHT?" This introduces direction. 4. Navigate and Count: The Robot can only move one square at a time, following the class's instructions. After each move, the class counts the total number of steps aloud (e.g., "1 step... 2 steps..."). This practices sequential counting.

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If the Robot hits a dead end, the class must give instructions to backtrack, reinforcing direction and problem-solving.

5. Compare and Discuss:

Once the goal is reached, compare the final number of steps with the initial estimates. Ask: "Was our path the shortest one? Can anyone see a shorter route?" This introduces comparing routes (shorter/longer).

10 – 12 years old

Activity: Program Your Partner

Objective: To experience the core concepts of coding—precise instructions, sequences, and debugging—by "programming" a human through a physical maze.

Time: 10-15 minutes

What You Need:

Tape or chalk to create a grid on the floor (e.g., a 5x5 grid).

Sheets of paper to represent obstacles.

A small object as the "treasure" or goal.

Instructions:

1. Set Up the Maze: Create a simple grid on the floor. Place the "treasure" in one square and use sheets of paper to block off several other squares, creating walls and a clear path to the goal.

2. Define the "Code Library": Introduce the only commands the "robot" can understand:

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	* `STEP_FORWARD()` * `TURN_LEFT()` * `TURN_RIGHT()` (Optional, for advanced) `PICK_UP()` for the treasure. Emphasize: The robot is very literal and can ONLY follow these exact commands. 3. Assign Roles: The Programmer: One pupilt who stands at the edge of the grid. They must write down (or remember) the full sequence of commands to get the Robot to the treasure. The Robot: One pupil who starts at the designated "Start" square. They must face a specific initial direction (e.g., North). They cannot move or think for themselves; they can only execute the commands the Programmer gives them, one by one. 4. Run the Program: The Programmer calls out their first command (e.g., `STEP_FORWARD()`). The Robot executes only that command. The Programmer continues giving commands one at a time. 5. Inevitable Debugging: The Robot will likely walk into a wall or face the wrong direction. This is the key learning moment! Stop the program! The class must help debug. Ask: "What was the bug? Was the command wrong? Is the Robot facing the wrong way? What sequence of TURN commands will fix it?"

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	The Programmer must revise their code and continue. Debrief Questions: "What was the hardest part about giving instructions?" "Why did we have to be so specific about turns?" "How is this like how a computer follows code?"

PUTTING IT INTO PRACTICE

Level 1	Activities
8 – 10 years old	**4. What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuth to solve the problem • Today we're going to become cyber detectives and we need to find the hacked computer, starting with the signal emitted by an unknown router. But first, we need to find our way around the school, so let's identify the coordinates of the different classrooms on this map. Look at the axes: the horizontal axis has letters and the vertical axis has numbers — each cell has a coordinate such as F4 or B6. Then, we'll use a method involving

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	points and coordinates (x; y) to trace the signal's path and discover where the hacked router is." • **What the pupil(s) do:** • Listen to the instructions before attempting to solve the puzzle. • Discuss with each other before determining their answer choice. • Pupils analyse the sequence of symbols with dots and work out, by trial and error, which direction (↑, ↓, → or ←) corresponds to each symbol. • They fill in the blanks with the arrows associated with each element in the code, thereby rewriting the received signal. • Draw the path taken by the signal on the grid, starting from the indicated position and following each arrow in order. In the 'Upside down' step, they rewrite a new signal using arrows and trace the path to find out where the signal was received. • Together with their classmates, they check whether the resulting path leads to the pirate router and the computer they are looking for.

Level 2	Activities

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10 – 12 years old	3. **What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuth to solve the problem. • Today we're becoming data specialists and helping the headteacher sort things out following the cyberattack that jumbled up the class information. We'll match each class to the correct chart, comparing the number of boys and girls, trends in average marks, and the number of pupils per sport. Look carefully at the tables and charts: each chart hides a story that we need to match with the correct data. Finally, we'll tally up the marks from the English assessment and choose the most suitable chart to represent them. • **What the pupil(s) do:** • Listen to the instructions before attempting to solve the enigma.. • Discuss with each other before deciding on their answer. • Follow the instructions . • Pupils study the school map and identify what is in the indicated cells (for example, what value the cell F4

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	contains) and what the coordinates are of the cells that make up the cupboard. • They trace a path through the cells on the map to get from B6 to F3 and note down the coordinates of each point along the route. In the next step, they use the coordinate system with points (value on the horizontal axis; value on the vertical axis) to locate rooms such as (2,1) or (6,4) and to plot paths from (2,7) to (2,4) and from (5,7) to (7,3), without moving from one room to another. • They analyse the signal emitted by the hacked router and, based on the coordinates they have discovered, conclude that it is located at point (1,6), i.e. in the cupboard. • Finally, they check with their colleagues whether the route and the coordinates they have identified are correct.

Conclusion Level 1 8-10 years old	At the end, open the discussion: • What did we learn about navigation on maze? • Where could we use this type of navigation in everyday life?

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	• Did you encounter any difficulties solving these exercices and if so, what were they? What ideas or approaches might help? Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
Conclusion Level 2 10-12 years old	At the end, open the discussion: • What did we learn about encoding and decoding with in maze? • Where could we use this type of navigation in everyday life • Did you encounter any difficulties solving the enigma, and if so, what were they? What ideas or approaches might help? Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
To go further...	***8 – 10 years old***

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	Activity: The 60-Second Maze Challenge! Objective: Apply estimation, directional, and strategic skills under a fun time constraint. Time: 10-15 minutes What You Need: A copy of a medium-complexity maze for each pair of students, a timer, and a pencil. Instructions: 1. Pair Up & Estimate: Students work in pairs. Before starting the timer, they must first estimate and write down the number of steps it will take to solve the maze. They must also decide on their main strategy (e.g., "We will follow the left wall"). 2. The Challenge: Start the timer for 60 seconds. One partner is the "Navigator" who gives verbal directions only (e.g., "Go right, down, down, left..."). The other partner is the "Tracer" who follows the instructions and draws the path with a pencil. 3. Switch and Compare: When the timer beeps, they must stop immediately. If they didn't finish, that's part of the challenge! They now switch roles, get a fresh copy of the same maze, and try again with a new 60-second countdown. 4. Debrief: After both attempts, pairs compare their two routes. Ask: "Which route got you further? Why?" "How did your actual step count compare to your estimate?" "Did your 'follow one wall' strategy work, or did you have to change it?"

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	This quick activity boosts engagement, makes estimation tangible, practices clear directional communication, and tests the effectiveness of simple logic strategies in a dynamic, collaborative way.
	
	10 – 12 years old
	
	Activity Code the "Super Step" & Debug a Disaster
	
	Elevate basic sequential coding by creating efficient functions and applying logical debugging skills.
	
	1. **The Setup:** Provide a pre-written code solution for a different maze that is **full of bugs** (e.g., one wrong turn, an extra forward movement that hits a wall, a missing step).
	2. **The Task:** Students act as "Code Inspectors." Their job is to:
	   - **Trace** the faulty code on the maze grid using their finger or a pencil.
	   - **Identify** the exact step where the code fails.
	   - **Diagnose** the error (e.g., "It says `turn_left()` but it should be `turn_right()`.").
	   - **Correct** the code so it successfully solves the maze.

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Pedagogical sequence associated with the box

« Cybersecurity in school »

Theme: **What Database is?**

Ages: 8/10 and 10/12 years old

Duration: 1h30' (2 sessions of 45 minutes)

10-12 years old 45' Hands on activity

Number of participants: (Individual, pair or small group activity.)

You could adapt different options for the groups: heterogeneous or mixed-ability groups, assigning specific roles to pupils (e.g. one writes, one solves, one presents)

Don't hesitate to move between groups to offer support or facilitate discussion.

Materials and classroom setup (online/offline): digital tablet or computer (number to be defined according to your abilities and number of pupils). One sheet of paper and one pencil per pupil.

Storyline overview: A ransomware attack locks Maple Grove Middle School's systems. The Cyber Sleuths—Zara, Toby, Lin, and David—investigate. They find a rogue device hidden in a janitor's closet. The team shuts it down to stop the attack. They then work to decrypt the locked files. The hacker is traced to a local IP address. A former student is caught seeking revenge. The team is celebrated as heroes for saving the school.

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General guidance: Encourage them to communicate with each other to find solutions and take notes. Circulate among the groups to observe their methods and intervene if necessary.

Emphasise the importance of taking your time to solve the puzzles and not saying the answer aloud to avoid disrupting the other groups' thinking.

Once all groups have worked through the puzzles, go over the challenges one by one with them, asking pupils to explain their solution method to the entire class. Complete the puzzles and provide the correct solution if they haven't found it.

Session n°4 – Introduction to Secret Messages (Encoding & Decoding)

Learning Objectives: Database (for 8-10 year olds)

After learning about database, students will be able to:

1. Define a database in their own words as a digital, organized collection of information, similar to a library's catalog or a super-powered notebook.

2. Identify at least three real-world examples of databases they encounter in their daily lives (e.g., a school login, a video game save file, an online search, a library system).

3. Create a simple, physical database by designing a table or set of cards that organizes information into records (rows) and attributes (columns), such as a list of their favorite video games or books.

4. Explain the basic purpose of a "query" as a question you ask a database, and demonstrate this by sorting or filtering their physical database to answer a specific

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question (e.g., "Find all the fantasy books")

Learning Objectives: Database (for 10-12 year olds)

After learning about database, students will be able to:

By the end of this lesson, students will be able to:

1. Explain the core function of a database by comparing it to a dynamic, digital filing system designed for efficient storage, retrieval, and updating of information, unlike a static list.

2. Differentiate between a field, record, and table by correctly labeling these components in a sample dataset (e.g., a `Name` is a field, all the info for `Student #12` is a record, and the entire `Class Roster` is a table).

3. Construct a simple query using a visual or block-based interface (like in SQL Designer or a similar tool) to sort, filter, and select specific data from a sample database table.

4. Compare and contrast a relational database (organized, connected tables) with a simple document store (flexible, all-in-one profiles) and identify a best-use scenario for each (e.g., school library system vs. a player's game save file).

5. Create a concept map illustrating how a common application they use (like a social media app or game) relies on a database to manage key features such as user profiles, posts, and friendships.

The Awesome Adventure of Databases: From Secret Codes to Super Apps!

Have you ever kept a secret diary? Or made a list of all your video game characters and their powers? Guess what? You were using a database! A database is just a super-organized collection of information. Let's go on an adventure to see how they work and where they came from!

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The Old-School Database

Long before computers, people needed to remember important stuff.

Clay Tablet Notebooks: Imagine your school notebook was made of clay! In ancient times, people used a sharp stick to write lists of their sheep, food, and treasures on wet clay tablets. Once the clay dried, the list was permanent. This was the very first database!

Library Card Catalogs: Have you ever seen those small drawers of cards in an old library? Each card had information about one book—its title, author, and a secret code telling you where to find it. That was a database made of paper!

Punched Card Puzzles: In the 1890s, a smart man named Herman Hollerith invented a machine to help count everyone in the United States. He used cards with holes punched in them, like a secret code. The machine could read the holes and add up the information super fast! This was a huge step toward computer databases.

Meet the Database Family

Just like there are different types of video games, there are different types of databases for different jobs.

1. The Super-Organized Table (Relational Databases)

This is the classic, super-neat database. Imagine it as a bunch of spreadsheets or tables.

How it works: One table could be for all your friends (Name, Birthday, Favorite Color). Another table could be for their pets (Pet Name, Type of Animal, Friend's Name).

The Magic Connector: The real magic is that these tables can be connected. You can easily find out what pet your friend Sarah has by connecting the tables using her name! This is the kind of database that banks and schools use. It uses a special language called SQL (say it: "S-Q-L") to find information, like a search command for data.

2. The Cool & Flexible New Crew (NoSQL Databases)

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This group is like the free-spirited artists of the database world. They don't always use tables, and they're great for modern apps and games.

The File Folder (Document Store): This database stores information in a flexible file, like a profile for your favorite game character. It holds all the details—name, level, weapons, and spells—in one big document. Great for when data doesn't all look the same!

The Super-Fast Locker (Key-Value Store): This is the simplest and fastest database. Imagine a giant wall of lockers. Each locker has a unique number (the "key"). Inside the locker is one single thing, like your player's high score (the "value"). You can find and change that score blazingly fast!

The Friendship Mapper (Graph Database): This one is all about connections! It maps out how things are linked, like a giant web. It's perfect for social media because it can quickly show how you are connected to your friends, and your friends' friends.

The "Secret Code" That Never Changes

Even though databases look different now, they all still do the same four basic things. We call this CRUD, a funny word that helps us remember:

Create: Adding new information. (Writing a new entry in your diary).

Read: Finding and looking at information. (Reading an old entry).

Update: Changing information. (Correcting a spelling mistake).

Delete: Erasing information. (Tearing out a page you don't want anymore).

This "CRUD" secret code worked for clay tablets, and it still works for the most powerful computers today!

So, What's the Big Deal?

Databases are the hidden superheroes behind almost everything you do!

When you log into a game, a database checks your username and password.

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When you watch a video on YouTube, a database finds and plays it for you.

When you search for a funny cat video, a database finds all the best ones.

They are the amazing, invisible organizers of our world, making sure all our digital stuff is safe, sorted, and ready when we need it. The next time you save your game or look up a fact online, remember the awesome adventure of the database

LESSON PREPARATION

Prior knowledge and skills:

For this lesson, pupils should already be able to:

Level 1 (8/10 years old)

1. Organizing Information: You know how you can make a chart to list your friends and their birthdays? A database is like a super-powered, digital chart that can hold and organize millions of pieces of information.

2. Sorting & Categories: Remember sorting your toys into groups like cars, action figures, and LEGOs? A database can instantly sort and find any group of information you ask for, like "all players on level 5."

3. Searching: When you use the search bar on YouTube to find a specific video, you're asking a database to look through its huge collection and show you the best matches.

4. Usernames & Passwords: Your username and password are like a special key that a database uses to find your personal account and unlock all your saved games and information.

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5. Game Inventories: The inventory in your favorite game, which shows your items and how many you have, is a mini-database that keeps track of all your stuff.

Level 2 (10/12 years old)

1. Organizing Information: A database is a structured, digital system for storing information in tables, using rows for individual records and columns for specific categories, making it easy to manage huge amounts of data.

2. Sorting & Filtering: It's a tool that lets you instantly sort, filter, and find specific information from a massive collection, like pulling a list of all students in the school who are in band and play the trumpet.

3. Search Function: A database is the engine behind a search bar; it's what processes your query to sift through millions of records, like finding all videos on a platform tagged with "gaming" and "funny."

4. User Accounts: It securely manages user accounts by using your unique username as a primary identifier and your password as a verified key, allowing it to retrieve and protect your personal data.

5. Dynamic Data: It's a live storage system for dynamic information, like a game's inventory that constantly updates your items, stats, and world progress, keeping it all synchronized.

INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject
	Introduce the day's topic and cover in detail the concept(s) that will be covered in this session. Make

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8 – 10 years old 10 – 12 years old	sure to adapt the presentation to your class group (age and specific characteristics). ***8 – 10 years old*** The key to introducing computers and peripherals to 8-10-year-olds is to frame it as **fun, purposeful, and empowering**. Here are some engaging ideas to kick off the lesson. **Activity:The Class "Favorites" Database Table** Goal: To understand that a database is an organized table of information where you can search and sort. 1. Create the Table: As a group, create a large table on the whiteboard or a big piece of paper. Label the columns: "Student Name," "Favorite Color," "Favorite Animal," "Favorite Video Game." 2. Input the Data: Have each student come up and add their own "record" (a row) by filling in their information. 3. Query the Data: Now, act as the "search engine." Ask the class questions that require sorting and filtering the data, such as: "Find all records WHERE Favorite Color is 'Blue'." (Students whose favorite color is blue stand up). "SORT the table by Favorite Animal alphabetically." (As a group, physically rearrange the order of the rows on the board).

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	"How many students have a Favorite Video Game that is 'Minecraft'?" (They count the records). They Learn: Databases store data in rows and columns, and we can ask questions (queries) to find patterns and specific information. ***10 – 12 years old*** **Activity : Database Schema Design Challenge** Goal: To understand that databases require planned structure (a schema) and that different structures are better for different tasks. 1. The Scenario: Present the class with a challenge: "We need a database to run a School Club Fair . What information do we need to track to help students find clubs?" 2. Design the Schema: In small groups, students must design a table structure on large paper. They must decide: What Tables do we need? (e.g., `Clubs`, `Students`) What Fields (columns) go in each table? (e.g., `Clubs` table: Club_Name, Room_Number, Teacher_In_Charge, Meeting_Day. `Students` table: Student_ID, Student_Name, Grade). How do the tables connect? (e.g., How do we record which students signed up for which clubs? They might

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	invent a `Sign-Ups` table that connects Student_ID to Club_Name). 3. The Pitch: Each group presents their schema. The class discusses the pros and cons: "Is it better to put the meeting day in the `Clubs` table or a separate `Schedule` table? Why?" They Learn:Databases don't just store data; they require thoughtful design (data modeling) to handle relationships and ensure efficiency.

PUTTING IT INTO PRACTICE

Level 1	Activities
8 – 10 years old	**5. What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuth to solve the problem • Look carefully at the game.. Today we're becoming data specialists and helping the headteacher sort things out following the cyberattack that jumbled up the class information.

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	We'll match each class to the correct chart, comparing the number of boys and girls, trends in average marks, and the number of pupils per sport. Look carefully at the tables and charts: each chart hides a story that we need to match with the correct data. Finally, we'll tally up the marks from the English assessment and choose the most suitable chart to represent them. 6. ″**What the pupil(s) do:** • Listen to the instructions before attempting to solve the puzzle. • Discuss with each other before determining their answer choice. • Pupils analyse the tables showing the number of boys and girls per class and match each class (A, B, C) with the corresponding pie chart, comparing the proportions of girls and boys. • They study the graphs showing the change in the class average over the terms and match them with the data in the table, tracking the trend for each class. • Match the bar charts showing the number of pupils per sport (running, swimming, football) with the values in the table. In the 'Restoring order' step, they count each mark from the English assessment, complete the

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	frequency table and choose the most appropriate diagram to represent the marks. T • They discuss with their classmates which type of diagram is most suitable in this context and justify their choice.

Level 2	Activities
10 – 12 years old	**4. What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuth to solve the problem. • Read carefully the instructions. • Today we are continuing our data recovery exercise, but at a more advanced level: we will be working with four classes (A, B, C and D) and more complex graphical representations. • We will match each class to the correct charts, comparing the number of girls and boys, the trend in average marks by term, and the number of pupils per sport. Next, we'll help Radu complete his school profile by carefully examining the table of average marks and the radar chart.

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	• Finally, we'll compare two different representations of the same profile and discuss which version is clearer and why. • **What the pupil(s) do:** • Listen to the instructions before attempting to solve the enigma. • Follow the instructions . • Pupils analyse the table showing the number of girls and boys in classes A, B, C and D and match each class with the corresponding pie chart, comparing the proportions • . They study the graphs showing the change in average marks by term and match them with the data in the table, noting the trend for each class (increase, decrease, fluctuation). • They match the bar charts showing the number of pupils per sport, checking the figures for each class. In the 'Identifying missing data' step, they complete the table with Radu's and the class's averages and read the radar chart to identify in which subjects Radu is above or below the class average. • They compare the radar chart with the stacked bar chart, discuss with their classmates which version they prefer, and justify their choice based on the clarity of the information provided.

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Conclusion Level 1 8-10 years old	At the end, open the discussion: • What did we learn about database?? • Where could we use database everyday life? • Did you encounter any difficulties solving these exercices and if so, what were they? What ideas or approaches might help? Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
Conclusion Level 2 10-12 years old	At the end, open the discussion: • What did we learn about database? • Where could we use database in everyday life • Did you encounter any difficulties solving the enigma, and if so, what were they? What ideas or approaches might help? Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
To go further...	***8 – 10 years old***

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	Activity: "Database Detective" Goal: Apply database query skills to solve a real-world mystery using a pre-made dataset. Setup: 1. Create a simple "Classroom Library" database as a large poster with 10-12 book entries. Include columns: **Title, Author, Genre, Number of Pages, Color Code** (spine color). 2. Prepare 5 "Case Cards" with mysteries to solve: - "Find all mystery books with blue spines" - "Find books shorter than 100 pages that are NOT fantasy" - "Find books by Author X OR with green covers" Execution: 1. Divide students into detective teams of 2-3. 2. Give each team a different Case Card and highlighters. 3. Teams must search the database poster, highlighting exactly the records that solve their mystery. 4. Teams present their findings, explaining their "search strategy." They Learn: - Combining multiple search criteria - Understanding inclusive (OR) vs. exclusive (AND) searching - Presenting data findings clearly - That databases help solve practical problems

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	10 – 12 years old **Activity: "Database Architect: Build a Streaming Service"** Goal: Design a multi-table database schema and execute complex queries for a realistic application. Setup: 1. Introduce the challenge: "Design the database for a new streaming service called 'StreamKid'." 2. Provide teams with three colored paper templates representing different tables: Users Table (Blue): User_ID, Username, Subscription_Type (Free/Premium), Signup_Date Shows Table (Green): Show_ID, Title, Genre, Age_Rating, Release_Year Viewing History Table (Yellow): User_ID, Show_ID, Date_Watched, Minutes_Watched Execution: 1. Schema Design: Teams populate their tables with sample data (create 5 users, 8 shows, and multiple viewing history records). 2. Relationship Mapping: Using string or drawn arrows, teams must connect related data across tables (e.g., connect User #3 to all shows they watched). 3. Business Analytics: Teams receive challenge cards requiring multi-table queries: "Which genres are most popular with Premium users?" "Find users who binge-watched (>120 min) any show in the last week"

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	"Recommend a new show for User #4 based on their viewing history" They Learn: How multiple tables relate through keys (User_ID, Show_ID) Designing schemas for real-world applications Extracting business intelligence from connected data The concept of data-driven recommendations Extension: Teams propose and design a fourth table to enhance the service (e.g., Ratings, Friends, or Recommendations) and explain how it connects to existing tables.

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Pedagogical sequence associated with the box

« Cybersecurity in school »

Theme: ENCODING AND DECODING A SECRET MESSAGE

Cracking the Code: Your Superpower for the Digital World!

Have you ever wondered how video games, cartoons, or robot toys work? The secret superpower behind all of them is called CODING!

What is Coding?

Imagine you want to tell a robot how to make a peanut butter and jelly sandwich. You couldn't just say "make a sandwich!" You'd have to give it very clear instructions:

1. Pick up the bread.
2. Open the jar of peanut butter.
3. Use the knife to spread the peanut butter on one slice.
4. Do the same with the jelly!
5. Put the two slices together.

Coding is just like that! It's the way we give computers and machines very clear, step-by-step instructions to make them do amazing things. We write these instructions in special languages that computers can understand.

Ages: 8/10 and 10/12 years old

Duration: 1h30' (2 sessions of 45 minutes)

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Storyline overview: A ransomware attack locks Maple Grove Middle School's systems. The Cyber Sleuths—Zara, Toby, Lin, and David—investigate. They find a rogue device hidden in a janitor's closet. The team shuts it down to stop the attack. They then work to decrypt the locked files. The hacker is traced to a local IP address. A former student is caught seeking revenge. The team is celebrated as heroes for saving the school.

General guidance: Encourage them to communicate with each other to find solutions and take notes. Circulate among the groups to observe their methods and intervene if necessary.

Emphasise the importance of taking your time to solve the puzzles and not saying the answer aloud to avoid disrupting the other groups' thinking.

Once all groups have worked through the puzzles, go over the challenges one by one with them, asking pupils to explain their solution method to the entire class. Complete the puzzles and provide the correct solution if they haven't found it.

Session n°4 – Introduction to Secret Messages (Encoding & Decoding)

This lesson focuses on… encoding and decoding.

At the end of this lesson, pupils should be able to:

- **Understand what the words"encode" and "decode" mean**
- **Use a simple key to read a secret message (decode)**
- **Use a simple key to write a secret message (encode).**
- **Understand why using a secret code is useful and what makes a code easy or hard to crack.**

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Quick Trip Through Time: The History of Coding

Coding hasn't always been done on colourful screens!

Long, Long Ago:People used codes to send secret messages! One of the oldest codes was used by a Roman emperor named Julius Caesar. He would shift every letter in his message by a few places in the alphabet. This is called the Caesar Cipher! Let's try it with a shift of 1:

* Your Word: CAT
* Secret Code: D B U (C becomes D, A becomes B, T becomes U!)

Only people who knew the "shift" rule could read it!

Not-So-Long Ago:The first real computers were enormous, as big as a room! People used to give them instructions by flipping switches or punching holes in cards. It was very slow and tricky.

Today: Now, we have amazing programming languages that use words we can almost understand, like `if`, `then`, and `move`. This makes it much easier for us to create games, apps, and websites!

Different Types of Coding (Coding Languages!)

Just like people speak English, Spanish, or Mandarin, computers understand different "languages" too. Each one is good for different tasks!

Scratch & Blockly: This is where many kids start! You snap colourful blocks together like digital LEGOs to make characters move, jump, and sing. It’s fun and easy to learn.

Python: This is a very popular language for beginners who are ready to type. It’s named after Monty Python, not the snake! It’s used to build websites, analyze data, and even program robots.

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JavaScript:This is the magic behind most websites. It makes things move, pop up, and react when you click on them. If a website feels alive, JavaScript is probably working hard.

The Secret Computer Code: ASCII

Before computers could show letters, they only understood numbers. So, smart people invented a secret code called ASCII (say: ASK-ee).

Think of it like a giant cheat sheet. It gives every letter, number, and symbol (like ! or &) its own special number.

The letter A is number 65.

The letter a is number 97.

The number 1 is number 49.

This is called decimal, which is the normal way we count with numbers from 0 to 9.

But... computers don't think like us!

Deep down, computers only understand two things: ON and OFF, like a light switch. We write "ON" as 1 and "OFF" as 0. This is called binary.

So, the decimal number for A (65) gets translated into a binary number for the computer: 01000001.

So, when you type an A on your keyboard, the computer secretly sees 01000001!

Thanks to ASCII, every computer uses the same code, so when you send a message to a friend, their computer knows to show an A and not a bunch of gibberish

Coding is All Around You!

You don't have to look far to see coding in action. It's everywhere in the real world!

The Games You Play: Every jump, every level, every score is controlled by code.

The Cartoons You Watch: Animators use code to create special effects and make characters move smoothly.

Smartphones & Tablets: All your favourite apps—for learning, watching videos, or talking to family—are made with code.

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Cars & Traffic Lights: Code helps cars run safely and controls traffic lights to keep cars moving.

Smart Toys: Talking dolls, remote-controlled cars, and cool robots all have a little computer inside them running on code.

So, the next time you play a game or watch a cartoon, remember: a coder used their superpower to make it happen. And that's a superpower you can learn too!

Number of participants: (Individual, pair or small group activity.)

You could adapt different options for the groups: heterogeneous or mixed-ability groups, assigning specific roles to pupils (e.g. one writes, one solves, one presents)

Don't hesitate to move between groups to offer support or facilitate discussion.

LESSON PREPARATION

Prior knowledge and skills:

For this lesson, pupils should already be able to:

Level 1 (8/10 years old)

- **Place Value Understanding:** Confidently understand place value in our base-10 (decimal) system (e.g., knowing that in the number 123, the '1' represents 100).
- **Basic Pattern Recognition**: Identify and continue simple number and shape patterns.

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- **On/Off & Two-State Concepts: Grasp**: the concept that some things have only two clear states, like a light switch (on/off), a true/false question, or a coin (heads/tails).
- **Fundamental Computing Awareness**: Know that computers use electricity and are built from millions of tiny switches that can only be "on" or "off."
- **Sequential Ordering:** Follow and create a simple sequence of steps or codes (like an arrow maze or a very basic instruction list).

Level 2 (10/12 years old)

- The same as 8/10 years old pupils.
- **Problem-Solving & Perseverance:** The activity of decoding is essentially a puzzle. Students need a basic "growth mindset" to be able to try, get stuck, and try again without immediately giving up.
- **Basic Collaboration Skills:** Many coding activities are done in pairs ("You encode a message for your partner to decode"). They should be able to work with a peer, share materials, and discuss ideas quietly.
- **Attention to Detail:** Decoding requires careful looking. A student who often rushes or makes careless errors will find it more challenging but will benefit greatly from the practice this lesson provides.

Materials and classroom setup (online/offline): digital tablet or computer (number to be defined according to your abilities and number of pupils). One sheet of paper and one pencil per pupil.

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INSTRUCTIONS FOR THE LESSON

Level 1 and 2	Introduction to the subject
8 – 10 years old 10 – 12 years old	Introduce the day's topic and cover in detail the concept(s) that will be covered in this session. Make sure to adapt the presentation to your class group (age and specific characteristics). ***8 – 10 years old*** The key to introducing encoding and decoding to 8-10-year-olds is to frame it as **fun, purposeful, and empowering**. Here are some engaging ideas to kick off the lesson. **The mystery message** Start with a question. "Have you ever wondered how a computer thinks? Does it use the ABCs like we do?" Explanation: "Computers are actually pretty simple on the inside. They only understand two things: ON and OFF. We use numbers to represent this: 1 for ON and 0 for OFF. This ON/OFF language is called Binary Code." Analogy: Use a simple light switch. "When the switch is ON (1), the light is on. When it's OFF (0), the light is off. Imagine a computer has millions of tiny, tiny light switches inside it!"

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	Introduce the word "Bit": "Each single 0 or 1 is called a 'bit'. It's a short word for Bi..nary Digi..t." Say: "We can't give a computer just one bit (one switch). We need a bunch of them together to make letters. For this game, we'll use a special 8-bit pattern for each letter." Demonstrate: Pick a simple letter, like the first letter of your name. "Let's find 'M'. Its code is `01001101`." "To decode it, we look at each 0 and 1, one at a time, from left to right. It's like a secret recipe!" **The spy mission** 1. "Good morning, agents. Your mission, should you choose to accept it, is to join the CSS—Classroom Secret Service." 2. "All good spies need to know how to send messages that their enemies cannot read. This is called **ENCODING**." (Write the word on the board). 3. "They also need to be able to understand the secret messages they receive. This is called **DECODING**." (Write the word next to it). 4. "Your training begins today. Your first objective: learn to use a binary code."

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10 – 12 years old

The real world connection

1. Start with a question: "Who has ever had to type a password to get onto a computer or a tablet?"
2. "That password is a kind of secret code—a **key** that unlocks your account. The computer **decodes** your password to see if it's the right one."
3. "When you send a text message, the phone **encodes** it into signals to send it, and your friend's phone **decodes** those signals back into words."
4. "Today, we're going to learn the basic idea of how that works by creating our own simple codes."

The "Cyber Security" Challenge

1.Start with a question: "When you log into a game or social media, your password gets sent over the internet. What's to stop a hacker from just reading it as it travels?"

2.Explain simply: "The answer is encoding—but a super powerful kind called **encryption**. Your password is scrambled into a secret code before it's sent. Only the website you're sending it to has the key to unscramble (or decrypt) it."

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	3.The Challenge: "Today, we're going to learn the fundamental principles that all encryption is built on. We're going to learn how to crack simple codes and think like a cybersecurity expert."

PUTTING IT INTO PRACTICE

Level 1	Activities
8 – 10 years old	**7. What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuth to decode the message. • Today we're going to become experts in coding and learn how to represent numbers in the binary system, using only the digits 0 and 1. We'll start with five playing cards bearing the numbers 16, 8, 4, 2 and 1, and you'll need to form various numbers as the sum of these values, turning over any cards you don't use. Next, we'll decipher the alphabet: each letter corresponds to a number and its binary representation, which we'll denote using lit circles (1) and unlit circles (0). Finally, using everything you've learnt, you'll find and decipher

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	the password hidden in the image to unlock your school files. • **What the pupil(s) do:** • The pupils cut out the 5 cards (16, 8, 4, 2, 1) and arrange them in descending order, then practise converting the numbers to binary, always starting with the largest number and turning over the cards they are not using. • They write the required numbers (7, 18, 4, 0, 15, 43, 63, 20, 35) in binary and complete the table showing the correspondence between letters, numbers and the binary code. • They identify the letters represented by lit and unlit circles, then colour in the circles to represent the letters G and S. In the final step, they analyse the image with squares and symbols, apply binary decoding to find and decipher the hidden password that protects their school files. • Check with their classmates whether the password they have obtained is correct and discuss how binary code is used in electronics and computing. • Write down their answers on their sheet, click on the correct answer. • After two attempts without a correct answer, they ask the teacher for an explanation.

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Level 2	Activities
10 – 12 years old	**5. What the teacher says:** *(When the story gets to the riddle, give the mission explanations.)* • Help Cybersleuth to decode the message. • Today we're moving on to a more advanced level of binary code: we'll be working with eight playing cards, from 128 down to 1, and we'll discover how larger numbers are represented using only the digits 0 and 1. • We'll learn that the associations between numbers and characters are known as the ASCII code and that each letter has its own binary representation. Next, you'll identify the letters represented by lit and unlit circles and colour in the circles to spell out the required letters. • Finally, you'll use everything you've learnt to find and decipher the password hidden in the image, which protects the school's files. • **What the pupil(s) do:** • The pupils cut out the 8 cards (128, 64, 32, 16, 8, 4, 2, 1) and arrange them in descending order, then practise converting the numbers to binary, always starting with the largest number and turning over the unused cards.

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	• They write the required numbers in binary (7, 18, 4, 0, 154, 88, 75, 20, 35) and complete the table showing the correspondence between letters, numbers and the ASCII binary code. • They identify the letters represented by the eight lit and unlit circles and colour the circles to represent the required letters. In the final step, they analyse the image with the symbol grid, apply 8-bit binary decoding to find and decipher the hidden password that protects the school files. • Check the password you have obtained with your classmates and discuss the differences between 5-bit binary representation (Level 1) and 8-bit binary representation (Level 2), as well as the usefulness of the ASCII code in computers.Write the message on Genially. • After two attempts without a correct answer, they ask the teacher for an explanation.

Conclusion Level 1 8-10 years old	At the end, open the discussion: • What did we learn about encoding and decoding? • Where could we use this type of encoding/decoding in everyday life

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	• Did you encounter any difficulties solving these exercices and if so, what were they? What ideas or approaches might help? Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
Conclusion Level 2 10-12 years old	At the end, open the discussion: • What did we learn about encoding and decoding ? • Where could we use this type of calculation in everyday life • Did you encounter any difficulties solving the enigma, and if so, what were they? What ideas or approaches might help? Don't forget to congratulate the children for their involvement and success thanks to their teamwork…
To go further...	***8 – 10 years old*** **Binary Code Bracelets** Students create a unique bracelet using two different colored beads to represent the binary digits 0 and 1. They use a provided key to spell out their initials in binary, stringing the beads in the correct order to represent each letter's code. ***10 – 12 years old***

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	• **Make their own decoder.** They watch the video and create their decoder. • **Working in pairs.** On student encode a message , the other decode it.

RECOMMENDATIONS FOR UNIVERSAL ACCESSIBILITY

How can this lesson be adapted to suit as many pupils as possible, including those with learning difficulties?

Adapting these activities for a diverse range of learners, including those with learning difficulties, is key to ensuring everyone feels challenged and successful. The core strategies are **scaffolding**, **varied modalities**, and **choice**.

Core Principles for Adaptation

1. **Break it Down:** Make each step smaller and more explicit.
2. **Multi-sensory:** Engage more than just reading and writing. Use sight, sound, touch, and movement.
3. **Provide Support:** Offer tools and references to reduce cognitive load.
4. **Offer Choice:** Let students choose how they want to engage with the activity (e.g., drawing vs. writing).

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