TINKER

Framework and Toolkit

Learning Scenarios

T I N K E R

AN AUTHENTIC LEARNING & GENDER INCLUSIVE FRAMEWORK FOR TEACHING INFORMATICS IN SCHOOLS ACROSS EUROPE

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Collection of learning scenarios for upper primary and lower secondary education

To effectively integrate informatics education across the curriculum while promoting an authentic and gender-inclusive learning environment, we have developed a comprehensive Toolkit containing 108 engaging and age-appropriate learning scenarios. These scenarios are designed to support the development of key informatics competencies in upper primary and lower secondary students, while ensuring alignment with the national curricula of each partner country.

Drawing upon collaborative efforts with teachers from each partner country, the Toolkit emphasises adaptability and flexibility. Teachers can seamlessly integrate these scenarios into their existing national curricula by:

- **Tailoring learning objectives**: Aligning the scenarios with specific learning outcomes relevant to their students' needs and the unique context of their classrooms, while ensuring alignment with national curriculum standards.
- **Adapting activities**: Modifying the scenarios to suit different learning styles, pace, and available resources, while ensuring an inclusive and equitable learning experience for all students, regardless of gender.

The following sections provide a detailed overview of the developed learning scenarios, categorised by educational level (upper primary/lower secondary) and partner country (Cyprus, Greece, Croatia, Ireland, Italy, the Netherlands).

Upper Primary Education

Croatia

Upper Primary Education

Croatia

Learning Scenario 1 - Algorithms on social media

Learning Scenario Information	
Title	Algorithms on social media
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Informatics, Language classes, Civil education
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the concept of an algorithm and explain how they work on social media platforms, ● Explain how social media algorithms select and prioritise content based on user interactions ● Critically think about how algorithms influence their online experience and develop skills to recognise algorithm-driven content, ● Understand that the algorithm is not deciding what students "should" like; it's simply showing them more of what it has "learned" they already like.

Scenario Description	
Setting	You're preparing a lesson for your students on how technology shapes their everyday lives. One of your objectives is to help them understand how social media platforms influence the content they see and how algorithms work in the background. You know that many of your students spend some time on social media platforms. You've noticed that some students assume they are in full control of what they see on their feeds, while others may not realise that algorithms are actively shaping their online experience. The problem: Students are unaware of how algorithms can create echo chambers by showing them only content like what they've already liked. You want to engage them in an activity to help them critically think about this issue and see how it applies to their digital lives. What should you do? You need to design an activity that simulates how algorithms work and helps students experience first-hand how social media feeds are personalised based on their interactions.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Whiteboard for brainstorming ● Markers
Activity	**Activity 1 - What Shapes Your Feed?** **Duration:** 10 minutes 1. **Goal:** Help students understand that their actions influence the content they see online. 2. **How it works:** ○ Ask students to think about their favourite social media platform. ○ Pose questions like: "Why do you think you see certain posts or videos and not others?" and "What do you think happens if you keep liking a particular type of post?" ○ Record their responses on the board to set the foundation for discussing algorithms. **Activity 2 – The Algorithm Game** **Duration:** 25 minutes

	This activity is designed to simulate how social media platforms personalise feeds using algorithms. This hands-on activity helps students understand the mechanics behind recommendation systems and their impact on the content users encounter.
	Preparation:
	1. **Create Content Cards:**
	    o Prepare cards (you can print prepared or use small posts, print your own, etc…), each labelled with different topics: sports, music, gaming, food, travel, technology, fashion, animals,...
	    o Ensure there is a mix of topics to represent the diverse content found online.
	2. **Distribute Content Stacks:**
	    o Set up the mock social media feed (on bigger paper, white board, smart board, power point...), display a variety of postcards created (e.g., sports, music, animals, art). Ask each student to “like” three types of posts they find most interesting, and record their preferences using sticky notes, markers, or tally marks.
	    o Then, simulate the role of an algorithm by adjusting the feed based on the most popular choices, placing and adding frequently liked posts/themes (e.g., animal videos) in more prominent spots. Reduce or reposition less popular content to show how algorithms prioritise based on user engagement. This activity illustrates how social media platforms personalise feeds by showing more of what users interact with most.
	3. **Reflection on Echo Chambers:**
	    o Ask students to look at the new stack (feed) and reflect on what’s changed.
	    o Discuss how their choices influenced the content they now see.
	
	Activity 3 – Discussion – Echo Chambers and diversity
	Duration: 10 minutes
	The goal is to encourage critical thinking about the impact of algorithm-driven content.
	● Divide students into small groups and ask them to discuss:
	    o What might they miss out if they only see content similar to what they like?
	    o How could this affect their understanding of the world?
	    o Ask each group to write down two strategies for ensuring they see diverse perspectives on social media-
	● Groups share their key points with the class.

Teachers and students' Roles	**Teachers**: Explain the purpose of the activity, provide instructions, and ensure inclusivity in participation. Assist students during the activity and clarify any confusion. Encourage critical thinking and connect the activity to real-world algorithmic behaviours. Highlight key takeaways about algorithms, personalisation, and digital literacy. **Students**: Choose and "like" content, observe changes in their personalised "feeds". Share and compare experiences with peers during reflections. Analyse how the algorithm influenced their "feed" and consider its real-world implications. Reflect on how to diversify their digital habits to avoid echo chambers.
Evaluation/ Assessment	● Assess students' ability to articulate how their choices influenced their "feed." ● Evaluate participation in discussions about echo chambers and their impacts. ● Groups can present their findings on how their personalised "feeds" differed and discuss strategies to challenge algorithm biases in real-life scenarios.
TINKER Framework Integration	
How is the activity authentic learning?	The activity directly relates to a phenomenon students encounter daily - social media algorithms shaping their feeds. This aligns with authentic learning principles by addressing a real-world issue that impacts their digital lives. Students simulate how algorithms filter content, mimicking the actual processes used by platforms like Instagram, TikTok, and YouTube. By analysing how their choices create "echo chambers," students critically evaluate the broader implications of personalisation in technology. The discussion expands beyond individual feeds to societal implications, such as misinformation, polarisation, and bias.
How is gender inclusiveness ensured?	The topics (e.g., sports, gaming, travel, food, …) are broad and not stereotypically aligned with any gender. This ensures all students find something relatable to engage with. Students choose their preferences independently, avoiding assumptions about their interests based on gender.
Considerations for level progression	As students progress, the complexity of the concepts should increase. Younger students focus on basic identification of algorithms, while older students analyse and critique the ethical implications of algorithmic design. Advanced students can use simple coding tools like Scratch to create a Scratch project where they input user preferences, and the program recommends new content based on predefined "rules" or "algorithms" (e.g., if the user likes videos tagged with "nature," suggest more nature videos).

Learning Scenario 2 - Creating an Interactive Digital Manual for Future Students

Learning Scenario Information	
Title	Creating an Interactive Digital Manual for Future Students
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Design and Development
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the principles of interactive design and user engagement in digital content creation. ● Develop a simple digital storybook using multimedia (text, images, sounds, videos, and animations) and interactive elements. ● Learn how to design with the user experience in mind, focusing on accessibility, usability, and user interaction. ● Apply collaborative skills in creating a project, working in teams to create a story that is engaging and accessible for younger students. ● Explore how design choices, such as layout, navigation, and interactivity, impact the user's experience.
Scenario Description	
Setting	Your school is about to welcome a new group of students, and you give your students a task to design and develop a digital manual that will help them navigate their new environment. This manual will be used by future students before they even step foot in the school, giving them a clear and engaging introduction to school life. It will include important information like how to get around the school, what resources are available, and what the daily routines look like.

	As the teacher, your role is to guide the students through the research, design, and development of the digital manual, helping them consider what future students need to know and how to present that information in an engaging and accessible way: ● Guide your students to gather relevant information for the manual. What do future students need to know? What will help them feel comfortable in the new school environment? ● Teach your students about user-friendly design principles—how can the manual be easy to navigate? What layout will work best? ● Discuss accessibility features, such as large text, colour contrasts, and the inclusion of alternative text for images or audio clips. How can the manual be made useful for all students, including those with visual or hearing impairments? ● Divide the class into smaller teams, assigning different tasks such as writing content, designing layout, creating multimedia, and testing the manual for usability.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers

Activity	**Activity 1: Introduction to User-Friendly Design Principles** **Duration:** 10 minutes 1. Begin by showing examples of good and bad user interface (UI) designs (HERE). Discuss features like clear navigation, readable fonts, intuitive layout, and visual contrast. Explain the concept of user-centred design and why it's important in creating content for others to interact with. Encourage students to brainstorm key features that would make the manual easy to use for a new student. **Activity 2 – Researching Content for the Digital Manual** **Duration:** 10 minutes 1. In small groups, have students research essential topics for the digital manual, such as how to get to school, library, daily routines, and school culture. Each group will focus on a specific area (e.g., getting around the school, important locations, daily schedules). After researching, they will present their findings to the class. **Activity 3 - Collaborative Development of the Manual** **Duration**: 25 minutes 1. Divide students into teams based on their strengths and assign roles: content writers, designers, multimedia creators (images, videos, animations), and testers. Each group will work on a section of the manual. ○ **Content Writers: Google Docs** or **Microsoft Word** ○ **Designers (Layout and Visual Elements): Canva** ○ **Multimedia Creators: iMovie** *2.* Let the students present the Manual.
Teachers and students' Roles	**Teachers**: The teacher's role is to facilitate the activities, provide guidance on user-centred design, and ensure that all students understand the importance of accessibility in digital content creation. The teacher should also monitor group progress and offer support, especially in the research and design phases, ensuring all students contribute to the project. **Students**: Students are responsible for researching content, designing the digital manual, and applying multimedia elements like images, text, and video. They will collaborate in teams, applying their understanding of accessibility and usability to create a manual that will effectively guide future students. Students are also responsible for testing their manual and offering constructive feedback to improve its usability.

Evaluation/ Assessment	Students will be evaluated based on their participation in group discussions, the quality and creativity of their contributions to the manual, and their ability to apply principles of user-friendly design and accessibility. Teachers can assess the digital manual's usability by observing how well it caters to the needs of future students, including ease of navigation, clarity of information, and inclusion of accessible features. Additionally, the collaborative nature of the project will be assessed based on each student's ability to work effectively in teams and contribute to the overall project.
TINKER Framework Integration	
How is the activity authentic learning?	This activity is authentic because it simulates a real-world task: designing an interactive digital product for an actual audience, future students. By engaging in this project, students are applying digital design and development skills to solve a practical problem, giving them ownership of the process. Additionally, students learn to consider and address the needs of others—both in terms of content and accessibility—emulating real-world collaborative work in the design and tech industries.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured by encouraging all students to participate equally in team discussions and decisions. By focusing on collaborative group work, the activity creates space for both male and female voices to be heard in the creation of the manual. Teachers can foster an inclusive environment by ensuring that all students feel confident sharing their ideas and that the content of the manual reflects a variety of perspectives, ensuring no gender is marginalised.
Considerations for level progression	Initially, students can start with simple tasks, such as researching and drafting content, to ensure they understand the fundamentals of the digital manual. As they progress, they can take on more advanced tasks like designing layouts, creating multimedia, and implementing interactivity in their sections. To further challenge students, they can be encouraged to explore advanced design concepts such as accessibility, usability testing, and user-centred design. By progressively layering responsibilities, students will build confidence in both their technical and collaborative abilities. In terms of scaffolding, the complexity of the tools used (e.g., moving from Canva to more advanced design software like Adobe XD) can also be increased as students gain proficiency.

Learning Scenario 3 - Designing a Digital Time Capsule for the Future

Learning Scenario Information	
Title	Designing a Digital Time Capsule for the Future
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Develop skills in creating multimedia content using digital tools. ● Understand how to creatively combine images, text, and sound to convey a message or story. ● Collaborate effectively in teams to produce a digital project that reflects diverse perspectives and experiences. ● Appreciate the value of inclusivity and representation in digital creations.
Scenario Description	
Setting	You want to teach your class about digital creativity and want to create a digital time capsule to showcase what life is like for students today. This time capsule will be opened 50 years from now. The time capsule will include stories, artwork, videos, music, and any other digital creations that represent your school and its community. The challenge is to make sure everyone's voice is included, so the time capsule shows the diverse experiences of all students—different interests, hobbies, cultures, and perspectives. Not everyone in your class has the same level of confidence with technology. Some students love drawing, while others enjoy writing or performing music, but they're

	unsure how to turn their ideas into a digital format. Others are worried that their contributions won't be valued or included. What should you do? Your task is to guide your students through the process of designing and creating content for the digital time capsule. You will: ● Help them brainstorm ideas about what to include, making sure every student feels represented. ● Show them how to use digital tools to turn their ideas into creative projects—such as using a drawing app for digital artwork, video editing software for short films, or audio tools to record songs or interviews. ● Organise the final content into a cohesive digital time capsule, ensuring it is accessible and enjoyable for a wide audience.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Brainstorming and Representation** **Duration:** 10 minutes 1. Facilitate a class discussion, asking questions like "What represents life today for you as a student?" and "How can we include everyone's unique experiences?" **Activity 2 – Exploring Digital Tools** **Duration:** 10 minutes 1. Demonstrate simple tools like Canva for artwork, iMovie for video editing, or Audacity for audio recording. Provide examples of how to use these tools creatively. Ask students about the tools they use to create digital content. **Activity 3 - Collaborative Content Creation** **Duration**: 25 minutes 1. Assign students to groups based on their interests (e.g., writers, artists, musicians). Provide guidance as they work on their projects. 2. Students should create a draft of their contribution to the time capsule (e.g., a group video, a digital collage, or a podcast). *3.* Invite groups to briefly present their creations, encouraging feedback on inclusivity and representation.

Teachers and students' Roles	**Teachers**: Facilitate brainstorming and ensure that all students' voices and ideas are heard and valued. Introduce and demonstrate user-friendly digital tools for multimedia content creation, catering to varying skill levels. Guide collaborative work by assigning students to teams based on interests and providing ongoing support. Encourage inclusive representation in the digital content and oversee the organisation of the time capsule. **Students**: Actively contribute ideas during brainstorming, ensuring their unique perspectives are shared. Engage with digital tools, experimenting with different forms of multimedia creation. Collaborate effectively within groups to create content, leveraging individual strengths and skills. Present their work, provide feedback to peers, and refine their contributions to ensure the final product reflects inclusivity and diversity.
Evaluation/ Assessment	To assess students' work on creating a digital time capsule, the following elements can be considered: 1. **Creativity**: Evaluate how students use multimedia (images, text, sound) to creatively express diverse perspectives. 2. **Technical Skills**: Assess how effectively students use digital tools for content creation (e.g., video editing, audio recording). 3. **Collaboration**: Measure how well students work in teams, share ideas, and ensure equal participation from all team members. 4. **Inclusivity**: Check whether the final product reflects a diverse range of voices, ensuring all students feel represented. 5. **Final Presentation**: Evaluate the cohesiveness, structure, and accessibility of the final time capsule, ensuring it's engaging and easy to navigate for a wide audience. - peer review as an option to foster teamwork.
TINKER Framework Integration	
How is the activity authentic learning?	This activity is an example of authentic learning because it engages students in real-world tasks such as creating digital content and collaborating on a project that reflects diverse perspectives. Students will use digital tools to create multimedia content, mirroring activities found in fields like media production and digital design. It fosters inclusivity by ensuring all voices are represented, which aligns with real-world values of teamwork and diversity. The project encourages problem-solving, critical thinking, and creativity, skills that are vital for professional environments. Overall, the task

	connects classroom learning to real-life applications, giving students a sense of purpose and impact beyond school.
How is gender inclusiveness ensured?	Gender inclusiveness in this activity is ensured through multiple approaches. First, students are encouraged to reflect diverse experiences in their contributions to the digital time capsule. The activity fosters an environment where all students' voices and perspectives are valued, making sure no gender is excluded or underrepresented in the creation process. By using a variety of media (artwork, music, videos, etc.), students can express themselves in ways that align with their strengths and interests, regardless of gender. Additionally, students will be guided in ensuring that the final project is accessible and inclusive for all, including gender-neutral language, and non-stereotypical representations. This helps create a time capsule that represents the entire student body equally.
Considerations for level progression	Considerations for level progression in this activity would involve scaffolding skills based on students' prior knowledge and digital literacy levels. For younger or less experienced students, the focus would be on basic multimedia creation, such as using simple drawing tools or video apps to create content. As students progress, they can incorporate more complex tools, such as video editing software or audio recording apps, and move toward developing more sophisticated digital projects. For more advanced students, the challenge could be in refining the integration of multiple media types, ensuring accessibility, and addressing deeper aspects of design and user experience. Teachers can adjust the complexity by offering guidance, encouraging self-directed learning, and incorporating peer feedback, ensuring all students progress at their own pace while meeting the overall project goals. This ensures that students of varying digital proficiency can fully participate and grow in their skills.

Learning Scenario 4 - Digital footprints

Learning Scenario Information	
Title	Digital footprints
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Responsibility and Empowerment
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the environmental impact of technology, including energy use, e-waste, and resource consumption. ● Recognise how their digital activities contribute to environmental issues, like carbon footprints. ● Identify responsible practices for using technology, such as recycling e-waste, reducing unnecessary data storage, and promoting energy-efficient devices. ● Create a plan to reduce their digital footprint and encourage environmentally responsible use of technology within their community. ● Develop awareness of gender inclusion when considering environmental responsibilities, ensuring that all voices are heard when creating solutions for sustainable practices.
Scenario Description	
Setting	You want to teach your students about responsibility to the environment and you give them tasks to reduce their environmental impact. They should think of creative and responsible ways to use technology without harming the environment. This might involve finding ways to recycle old devices, reduce unnecessary digital storage, or even encourage classmates to make environmentally-conscious choices when using technology. What should you do? As the teacher, your role is to guide your students in exploring the relationship between technology and the environment.

	● Help students understand how digital activities—like using devices, storing data, or sending emails—contribute to energy use and e-waste. ● Encourage them to think critically about their daily use of technology and how they can reduce their environmental impact. ● Lead a discussion about digital responsibility and the importance of sustainability in tech use. ● Support students as they come up with solutions to reduce their own digital footprints, such as switching off unused devices, choosing energy-efficient gadgets, and recycling e-waste properly. ● Make sure all students' ideas are heard, and encourage equal participation in suggesting solutions, ensuring that both male and female voices are included in the conversation.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers

Activity	**Activity 1: Understanding the Environmental Impact of Technology** **Duration:** 10 minutes 1. Start with a short presentation or video highlighting how digital activities—such as using devices, storing data, and sending emails—contribute to energy consumption and e-waste. Discuss examples of how cloud storage, streaming services, and device manufacturing contribute to carbon footprints. **Activity 2 – Impact of Digital Footprints** **Duration:** 15 minutes 1. Have students use a carbon footprint calculator (HERE) to estimate their personal digital footprints based on their device usage, emails, and online activities. Afterward, facilitate a discussion about their results and how they can reduce their impact. **Activity 3 - Brainstorming Sustainable Technology Practices** **Duration**: 20 minutes 1. In groups, students will brainstorm responsible practices for using technology in ways that minimise environmental harm. Suggestions might include recycling old devices, reducing cloud storage use, turning off unused devices, or choosing energy-efficient gadgets. Each group will create a short presentation to share their solutions with the class. 2. Students will individually create a personal action plan to reduce their digital footprint, such as committing to turn off devices when not in use, limiting email storage, or organising a school-wide e-waste recycling initiative. Additional activity: In groups, students can create campaigns for digital sustainability.

Teachers and students' Roles	**Teachers**: The teacher's role is to facilitate discussion, provide resources, and guide students through activities that make the connection between technology use and environmental impact. The teacher should ensure equal participation in group discussions and encourage students to come up with creative, realistic solutions to reduce their digital footprint. **Students**: Students will actively engage in discussions, collaborate in groups, and reflect on their own technology use. They will critically evaluate their habits, brainstorm solutions, and create actionable plans to reduce their environmental impact. Students should also be encouraged to consider gender inclusivity, ensuring everyone's ideas are heard and valued.
Evaluation/ Assessment	Evaluation will focus on both the process and the product. Teachers can assess students' understanding of the environmental impacts of technology through participation in the group discussion and the quality of their contributions during brainstorming sessions. The students' ability to apply what they've learned can be evaluated based on their action plans for reducing their digital footprint. Teachers can also assess how well students consider inclusivity in their solutions, ensuring all voices are heard in group activities and discussions.
TINKER Framework Integration	
How is the activity authentic learning?	This activity is rooted in authentic learning as it connects students' real-world technology usage with environmental responsibility. By engaging students in hands-on activities that address actual problems in their community—like reducing e-waste and energy consumption—they gain practical skills and knowledge they can apply beyond the classroom. The collaborative nature of the project reflects real-world teamwork, and the action plans empower students to take personal responsibility for their environmental impact, promoting long-term change.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured by encouraging equal participation from all students in the discussions and activities. The teacher can create a safe and welcoming environment where everyone feels confident contributing their ideas, regardless of gender. In group brainstorming and problem-solving, the teacher can make sure both

	male and female students are equally represented, fostering an inclusive approach to problem-solving.
Considerations for level progression	As students advance in their understanding of environmental responsibility, the complexity of the tasks can increase. In earlier stages, students might focus on understanding basic environmental impacts of technology and discussing simple solutions. At higher levels, students can explore more complex topics like the ethics of technology use, corporate responsibility, or the global impact of e-waste. The activities can be adjusted to require deeper research or involve creating digital campaigns to raise awareness in their communities.

Learning Scenario 5 - Redesigning school app

Learning Scenario Information	
Title	Redesigning school app
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Human – Computer Interaction
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the concept of user interfaces (UI) and how they affect the way humans interact with computers. ● Identify key features that make a user interface user-friendly, intuitive, and accessible. ● Redesign an existing app or website interface to improve usability, ensuring it is clear, easy to navigate, and inclusive for all users.
Scenario Description	
Setting	Your school uses an app that helps parents and students keep track of homework, grades, and announcements (like e-Dnevnik in Croatia). However, some students and parents are finding the app hard to use. It's confusing to navigate, the text is too small, and the buttons are hard to find. Some students also feel that the app isn't friendly to everyone—it assumes everyone can read quickly and understand its icons. What's the problem? The app's current design isn't user-friendly for everyone. Some students need larger text, others find the colours hard to distinguish, and many are confused about where to click to access important information. The app needs to be

	redesigned to meet the diverse needs of its users, including students, teachers, and parents. What should you do now? You will guide your students through the process of redesigning the app's interface. Start by explaining how user interface (UI) design works and what makes an app easy to use. Help them consider the needs of various users, making sure that the final design is inclusive and accessible for all.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Introduction to User Interfaces** **Duration:** 10 minutes 1. Begin with a brief explanation of what a user interface is and its role in technology. 2. Show examples of good and poor UI design using screenshots or live apps, highlighting features like navigation, readability, and accessibility. **Activity 2 – User Analysis and Pain Points** **Duration:** 10 minutes 1. Divide students into small groups and give each group a user profile (e.g., a parent who isn't tech-savvy, a student with visual impairments, or a teacher using the app on a mobile phone). 2. Guide students to list challenges that these users might face while using the app. **Activity 3 - Redesign Brainstorming** **Duration**: 15 minutes 1. Provide templates for app interfaces (printed or digital mock-ups). 2. Encourage students to focus on accessibility (e.g., larger text, clear buttons) and inclusivity (e.g., colour contrast, intuitive navigation). **Activity 4 - Presentation and Feedback - peer review** **Duration**: 10 minutes **1.** Invite each group to present their redesigned interface to the class. ***2.*** Facilitate a class discussion on which features make the most impact and how to incorporate feedback.

Teachers and students' Roles	**Teachers**: Introduces the concept of user interfaces (UI) and their significance in everyday technology use. Leads discussions on user experiences, assigns user profiles, and provides design templates or tools for the activity. Encourages collaboration, ensures inclusivity in group work, and prompts critical thinking about design improvements. Oversees presentations and fosters constructive feedback to help students refine their designs. **Students**: Share personal experiences with app usability and actively discuss challenges in user interfaces. Work in teams to analyse user needs and brainstorm redesign ideas tailored to specific user profiles. Create annotated mock-ups of improved UI designs with a focus on accessibility and inclusivity.
Evaluation/ Assessment	The evaluation focuses on assessing students' understanding of user interface concepts and their ability to identify and address usability issues. Their mock-up designs are reviewed for creativity, practicality, and inclusivity, with particular attention to accessibility features such as readable text and intuitive navigation. Collaboration within teams is observed, ensuring effective participation and integration of diverse perspectives. Presentation skills are assessed based on how clearly students explain their design choices and respond to feedback. Inclusivity is a key evaluation point, with designs checked for features accommodating diverse user needs. Reflective write-ups or peer reviews can also be used to gauge individual contributions and learning outcomes.
TINKER Framework Integration	
How is the activity authentic learning?	The activity embodies authentic learning by situating students in a real-world scenario where they address practical challenges with a school app used by diverse users. It emphasises problem-solving skills as students redesign the user interface to improve usability and inclusivity, simulating the kind of tasks performed by UI/UX designers in the tech industry. The activity requires collaboration, mimicking workplace dynamics, and demands critical thinking about user needs, accessibility, and aesthetics. Students apply theoretical knowledge about user interfaces to a meaningful task, making learning relevant and engaging. Presenting their designs to the class mirrors professional environments, reinforcing communication and iterative design processes. Through this, students see the direct impact of their work on creating accessible technology, deepening their understanding of inclusivity and digital design.

How is gender inclusiveness ensured?	Inclusiveness is ensured in this activity by integrating principles that consider diverse perspectives and encourage equal participation. The activity prompts students to analyse how design choices, like colour schemes, iconography, and navigation styles, can be welcoming to all genders. Students work collaboratively in mixed-gender teams to share ideas and ensure diverse viewpoints are reflected in their designs. The redesign process emphasises neutral language, avoiding stereotypes, and creating interfaces that represent all users fairly. Furthermore, the activity consciously avoids assigning stereotypical roles (e.g., boys for technical tasks and girls for aesthetics), fostering an environment where every student contributes equally based on interest and skill, rather than gender assumptions. Teachers act as facilitators, highlighting inclusivity as a core design value and promoting discussions that encourage awareness of gender equity in technology.
Considerations for level progression	To ensure progression, activities can start with **basic UI concepts**, like readability and navigation, and move to **evaluating real apps for usability**. At the **intermediate level**, students apply this knowledge by redesigning specific features using simple tools while learning accessibility basics. For **advanced levels**, tasks expand to full workflow redesigns, usability testing, and exploring inclusivity in depth using tools like Figma. At the **expert level**, students can implement their designs using coding and collaborate with real stakeholders, focusing on ethical implications like data privacy. This progression ensures gradual skill-building while engaging students with increasing complexity and real-world relevance.

Learning Scenario 6 - School IT Equipment

Learning Scenario Information	
Title	School IT Equipment
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Computing Systems
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify basic components of a school IT system: computers, software, and network. ● Understand how these components work together (to help students and teachers use technology for learning). ● Think critically about how to make technology work better (for their school).
Scenario Description	
Setting	Some classrooms already have computers, but they often freese or take a long time to start up. Other classrooms have tablets, but the internet connection is slow and students sometimes can't open the educational games or videos they need for their lessons. This is a great opportunity for you to give your students an assignment and check their understanding of the Computing Systems lesson. The problem: Think about how the computers and tablets can work better for everyone, make sure that all students, teachers, and classrooms have fast and reliable technology that they can use for learning. What should you do? As the teacher, you will guide your students in discussing these issues, helping them come up with ideas to make the school's technology better and easier to use for everyone.

	● Hardware: What kinds of computers or tablets should the school use to help students and teachers? How do we make sure the computers and tablets can work together? ● Software: What types of software or apps will help students learn? Are there programmes that teachers need for managing their lessons? ● Network: The school's internet is slow. How can we improve it so that everyone can use the internet at the same time without it getting stuck? As the teacher, you will guide your students in discussing these issues, presenting them key components of computing systems – hardware, software and network.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Identify the Components** **Duration:** 10 minutes 1. **Class Discussion:** Start with a brief class discussion on the main components of an IT system. Ask students what they think makes up a computer system in a school and write their responses on the board (e.g., computers, software, internet, etc.). 2. **Group Work:** Divide students into small groups. Provide each group with a set of cards labelled "Hardware," "Software," and "Network." Ask each group to write down examples of each on their cards. For example: ○ **Hardware:** Computers, tablets, printers, projectors. ○ **Software:** Educational apps, word processors, learning management systems. ○ **Network:** Wi-Fi, internet cables, school servers. 3. After 5 minutes, have each group share their examples with the class. Discuss any missing components or items that may need further clarification. **Activity 2 – Problem Solving the School's Tech Issues** **Duration:** 35 minutes 1. **Present the Problem:** Highlight some tech challenges like slow internet, old computers and incompatible devices. Mention some simple solutions. 2. **Group Problem Solving:** Divide the class into small groups and assign each group one problem to solve: ○ **Slow Internet:** How can the school improve internet speed? What changes can be made to make the internet work better for everyone?

	○ **Old Computers:** How can the school make old computers faster or decide which new devices should be purchased? ○ **Incompatible Devices:** What software or apps should the school use to ensure devices work together smoothly? 3. **Group Design:** In the same groups, students will design the ideal classroom tech setup that would solve all the problems discussed. They should consider: ○ **Hardware:** What kind of computers or tablets should be used? ○ **Software:** What apps or programmes are essential for both students and teachers? ○ **Network:** How can the school improve the internet and Wi-Fi setup? 4. **Sketching:** Have students draw or list their ideas for an ideal classroom setup on a large sheet of paper or whiteboard. *5.* **Presentation:** Each group will share their design with the class, explaining the reasoning behind their choices.
Teachers and students' Roles	**Teachers**: The teacher leads the initial discussions to ensure students understand the key concepts (hardware, software, and network). They guide the conversation by asking thought-provoking questions and offering clarifications when needed. The teacher divides students into groups for activities, ensuring that each group is focused on a specific aspect of the problem (e.g., improving the internet speed, selecting devices, or solving compatibility issues). Teachers ensure students have access to necessary materials (like paper, markers, or digital tools) and are available to offer guidance on how to tackle the challenges. They provide technical or conceptual support where needed, especially when students work on problem-solving tasks. Throughout the activities, teachers encourage students to think critically, especially during the problem-solving activity. They challenge students to consider the real-world impact of their designs and ideas. **Students**: In all activities, students actively engage by contributing to discussions, brainstorming ideas, and working on their projects. For example, when identifying components in Activity 1, students are responsible for providing examples and contributing to the group's ideas. In the group work sessions, students are required to use critical thinking to come up with practical solutions to technology-related issues. They apply their understanding of hardware, software, and networks to improve the school's technology systems. At the end of the lesson, students should reflect on how the components of an IT system interact and apply this understanding to real-world situations, particularly in their own school environment.

Evaluation/ Assessment	**Formative Assessment (Throughout the Activities):** ● **Observations:** Teachers can assess students' participation and engagement during discussions and group work. ● **Questioning:** Teachers can use open-ended questions to check students' understanding during discussions. ● **Group Work Review:** Teachers can circulate among groups, asking guiding questions and providing feedback to ensure that students are making progress. This also allows the teacher to address any misconceptions before they affect the students' final designs. **Summative Assessment** ● Presentation evaluation (rubrics)
TINKER Framework Integration	
How is the activity authentic learning?	The students are tasked with solving real issues faced by the school, such as slow internet connections, outdated hardware, and poor compatibility between devices. These are common problems in many educational institutions, making the task both relevant and practical. The students engage in a scenario where they must consider how technology impacts learning in the classroom, just as IT professionals, educators, and school administrators do in their real jobs. Students are expected to critically assess the current IT system, identify problems, and brainstorm practical solutions. The collaborative, team-based approach mirrors real-life problem-solving situations, where diverse perspectives and skills come together to address a challenge. This not only builds technical skills but also fosters critical thinking and creativity, as students need to design a system that will work for everyone—students, teachers, and staff. The students apply their knowledge of hardware, software, and network systems to come up with real-world solutions. By designing and presenting their ideas for improving the school's technology, they gain experience applying theoretical concepts in a practical context.
How is gender inclusiveness ensured?	The problems presented in the scenario (e.g., improving technology for all students, teachers, and classrooms) do not cater to one specific gender or group. The focus is on inclusivity, ensuring that every member of the school community has equal access to efficient and reliable technology. This encourages students to think about technology solutions from a broader perspective, considering the needs of everyone, irrespective of gender or background.

Considerations for level progression	At this level, students are just starting to grasp the basic components of an IT system. Focus should be on recognising simple elements like computers, tablets, software, and the internet. Older students should be able to engage in more complex tasks like designing a basic network infrastructure or comparing the pros and cons of various devices. They can also be expected to propose solutions that involve more sophisticated technology, such as cloud storage integration or security measures for safe internet use. Critical thinking should be encouraged, where students identify and solve problems from a user-experience perspective.

Learning Scenario 7 - School website

Learning Scenario Information	
Title	School website
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Networks and Communication
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the components of a computing system, including hardware, software, and networks. ● Apply user-centred design principles to create a system (in this case, a website) that is inclusive, accessible, and functional for a diverse user base. ● Analyse and address real-world issues such as accessibility, and fairness when creating digital solutions. ● Collaborate in teams to design, plan, and create a website that meets the needs of all students, promoting inclusivity and equal access to information.
Scenario Description	
Setting	Your school is planning to launch a new website. The problem: The current website design doesn't consider the different needs of all students. Some students have visual impairments, while others may struggle with navigation due to a complicated interface. Some students, especially girls, feel underrepresented in the content, and the language used is not always welcoming. What should you do?

	You are tasked with guiding your students through the process of designing and planning a new, improved website. They will need to consider factors like: ● Accessibility: How can you make sure students with visual or hearing impairments can easily use the website? ● Inclusivity: How can you make sure the website content and design feel welcoming and inviting? ● User experience: How can you ensure that the website is easy to navigate for all students, no matter their level of digital literacy?
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Understanding the Users** **Duration:** 10 minutes Present your students accessible website examples to inspire them (e.g., https://blog.hubspot.com/website/accessible-website-examples) 1. **Discussion**: Start by discussing the current issues with the website (e.g., students with visual impairments, complicated navigation, gender bias). 2. **Group Activity**: Divide students into small groups and assign each group one of the user problems (e.g., visual impairment, navigation, inclusivity). Ask them to brainstorm how they would feel if they were that user, and what problems they might encounter. 3. **Reflection**: After 5 minutes, have each group share their thoughts. This discussion will help students understand the importance of designing a website that is accessible to everyone. **Activity 2 – Accessibility Challenges** **Duration:** 10 minutes 1. **Introduction to Accessibility Tools**: Show students how accessibility features (e.g., screen readers, voice controls, high-contrast settings) work. You can demonstrate using online tools or apps designed for people with disabilities (e.g., the built-in screen reader on a computer or mobile device). 2. **Group Discussion**: After the activity, discuss how these accessibility features can be integrated into the design of the new school website. Encourage students to think about font size, colour contrast, and other visual elements that can be made more accessible.

	Activity 3 - Inclusive Design **Duration**: 10 minutes 1. **Introduction to Inclusivity**: Briefly explain and talk about how to ensure that visual content and layout do not reinforce gender stereotypes. 2. **Group Brainstorming**: Have students work in small groups to discuss how they would make a website feel welcoming and inviting to all. They can think about the language used on the website, the images shown, and the tone of the content. **Activity 4 - Prototyping and Planning the Website** **Duration**: 15 minutes **1.** Planning the Structure: Have students work in teams to design a rough layout for the new website. Provide them with large sheets of paper, markers, or a digital tool like Canva to sketch the main elements (e.g., homepage, navigation bar, colour scheme). **2.** **Focus Areas**: As they design, students should pay attention to: o Accessibility: High contrast colours, clear fonts, and text descriptions for images. o Inclusivity: Neutral language, balanced representation of genders in images. o User Experience: Simple navigation, intuitive layout. ***3.*** **Presentation**: Once they finish, each group will present their website prototype to the class, explaining how it addresses the key issues discussed earlier.
Teachers and students' Roles	**Teachers**: Facilitate the discussion and guide students to think critically about inclusivity and accessibility. Demonstrate the accessibility tools and guide students through the hands-on activity. Explain inclusivity concepts and help guide students in brainstorming. Support students as they design and guide the teams to ensure their prototypes align with accessibility and inclusivity principles. **Students**: Engage in the discussion, think about the needs of diverse users, and share ideas for improvements. Experiment with accessibility tools, identify challenges, and propose solutions for the school website. Think creatively about how to make the website inclusive and share their ideas with the class. Collaborate in teams to create a website prototype that is accessible, inclusive, and easy to navigate.

Evaluation/ Assessment	The evaluation for the activity can focus on multiple aspects. Students will be assessed on their participation and collaboration during group activities, their ability to think critically about inclusivity and accessibility, and the creativity shown in their website prototypes. The technical understanding of components such as hardware, software, and networks will also be evaluated, alongside their communication skills when presenting their prototypes. Finally, students will be encouraged to reflect on their work through self-assessment and peer feedback, considering how their design addresses real-world issues like accessibility and gender inclusivity. These assessments will ensure that students understand both the technical and social implications of their work.
TINKER Framework Integration	
How is the activity authentic learning?	The activity is grounded in authentic learning because it connects to real-world issues, such as designing a website that is accessible, inclusive, and user-friendly. Students work collaboratively to address challenges faced by diverse users, including those with disabilities and gender-related concerns, which mirrors the work of web designers and developers in the professional world. The design process emphasises empathy, critical thinking, and problem-solving, as students consider how to make a digital product that works for everyone. By applying user-centred design principles, students not only engage in technical skills like understanding computing systems but also develop an awareness of the social and ethical implications of technology, making the learning process highly relevant and applicable to their everyday lives.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured in this activity by making sure that the website design and content are neutral and welcoming for all. Students are encouraged to consider the language and imagery used on the site to avoid reinforcing gender stereotypes. They are asked to identify areas where gender representation may be unequal or where certain groups, especially girls or underrepresented genders, feel excluded or marginalised. By working as a team to create a website that ensures equal representation, students promote inclusivity not just in terms of content but also in the design, ensuring it's easy to navigate for all students. This approach fosters a more equitable learning environment and raises awareness about the importance of gender inclusivity in digital spaces.
Considerations for level progression	For older students (13-14 years old), the tasks can be more complex, incorporating tools and more advanced thinking. This age group can handle creating interactive mock-ups using design software, engaging in deeper discussions around the ethics of design (including gender inclusivity and accessibility), and implementing some of the principles they've learned into practical, real-world digital projects. Students can use

	wireframes or prototyping software to create actual design proposals, and they can incorporate feedback from peers to refine their designs. Additionally, they can learn to use simple code for web design (e.g., HTML, CSS), focusing on making websites accessible through these methods.

Learning Scenario 8 - Spotting the Scammer

Learning Scenario Information	
Title	Spotting the Scammer
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Recognise common types of online scams (e.g., phishing emails, fake websites, suspicious links). ● Identify warning signs of fraudulent activity on the internet. ● Apply strategies to protect personal information online. ● Develop skills to critically evaluate online content and verify its authenticity.
Scenario Description	
Setting	Online scams are becoming more creative, and it's easy to fall for them if you don't know what to look out for. Your students need to learn how to protect themselves and others while navigating the internet. What should you do? As the teacher, your task is to:

	● Teach students how to identify suspicious emails, links, and advertisements. ● Explain the importance of not sharing personal information online unless it's with a trusted source. ● Introduce tools like website checkers and trusted online safety resources. ● Lead a class activity where students analyse examples of fake and real online communications to identify key differences.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Recognise the Red Flags** **Duration:** 10 minutes Understand what modelling and simulation are, and explore real-world applications. 1. Begin with a brief teacher-led presentation highlighting key features of scams, such as suspicious URLs, generic greetings, and urgent or threatening language. 2. Show examples of phishing emails or fake advertisements and ask students to point out red flags and advanced phishing tactics. 3. Introduce tools like browser security checks, safe website indicators, and password managers. 4. Use a question-and-answer format to engage students and gauge understanding. **Activity 2 – Scam Spotting Challenge** **Duration:** 15 minutes 1. Provide students with printed or digital examples of emails, texts, or pop-up ads (a mix of real and fake). 2. In small groups, students analyse each example and determine if it's legitimate or a scam, noting their reasoning. **3.** Have each group share their findings with the class and discuss any disagreements or unclear cases. **Activity 3 - Create a Digital Safety Poster** **Duration**: 20 minutes 1. In pairs or small groups, students design a digital or physical poster that explains how to recognise scams and stay safe online. 2. Encourage them to include tips, visuals, and examples learned from earlier activities.

	3. Display their posters in the classroom or school website for awareness.
Teachers and students' Roles	**Teachers**: The teacher's role is to guide the students through understanding the risks and tactics used in online scams. They will provide an introductory lesson on common online scams and lead discussions on identifying warning signs such as suspicious links, email addresses, or unusual messages. The teacher will then facilitate group activities where students analyse real-world examples of online communications to practice recognising scams. Additionally, the teacher introduces online safety tools, such as website checkers, and emphasises the importance of not sharing personal information without verifying the trustworthiness of a source. Throughout the class, the teacher encourages critical thinking and ensures that students understand the importance of protecting their personal data online. **Students**: Students are active participants in learning to identify online scams. They engage with the content by analysing examples of real and fake communications, discussing their reasoning within small groups. Through the Scam Spotting Challenge, they practice spotting red flags in emails, websites, and advertisements. In addition, students reflect on and share their experiences with online safety, applying strategies to safeguard personal information. Lastly, they work collaboratively to create a digital safety poster, demonstrating their understanding of how to protect themselves and others in the digital world. By the end of the lesson, students should feel confident in their ability to critically assess online content for authenticity and security.
Evaluation/ Assessment	Evaluation and assessment of this activity can be based on multiple components. First, students will be evaluated on their participation and ability to identify common signs of online scams during group activities, such as spotting phishing emails and fake websites. Teachers can assess how well students apply the strategies taught for protecting personal information, through group discussions and hands-on exercises. Students will also be evaluated on their critical thinking skills as they analyse real-life examples of online scams and communicate their findings with peers. Their final product, the digital safety poster, will serve as both a creative and informative assessment, showcasing their understanding of online safety principles. Lastly, informal assessments can be made through questioning and observation during the Scam Spotting Challenge to gauge students' ability to independently evaluate online content.

TINKER Framework Integration	
How is the activity authentic learning?	The activity is grounded in authentic learning because it simulates real-world challenges that students will face in their digital lives, particularly regarding online safety and scams. It encourages students to apply critical thinking skills and real-world knowledge to identify and avoid potential dangers online, which is a key part of digital literacy. The task of analysing fake and real communications mirrors actual tasks they may need to perform in everyday internet use, such as identifying phishing attempts or suspicious links. Furthermore, creating a digital safety poster allows students to communicate their findings creatively while reinforcing their learning through practical application. The hands-on activities, such as the Scam Spotting Challenge, emphasise the relevance of the topic to students' personal experiences, making the learning process both engaging and meaningful.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured in the activity by ensuring that all students, regardless of gender, are equally engaged in the learning process. The examples of online scams and frauds used in the activity are not gender-specific and avoid stereotypical assumptions about who might be targeted by such scams. This neutrality ensures that both male and female students, as well as those from other gender identities, feel equally represented and involved in the discussions. Additionally, students are encouraged to collaborate in mixed-gender groups, allowing for diverse perspectives to emerge and promoting an inclusive environment.
Considerations for level progression	At the initial level, students can start by recognising common scams like phishing emails and suspicious links. As they advance, they can be introduced to more sophisticated types of fraud, such as fake websites and social engineering tactics, and learn to use verification tools like website checkers. Further, students can practice applying strategies to protect personal information, such as using strong passwords or two-factor authentication, and recognising the importance of privacy settings on social media. Finally, students can engage in collaborative activities where they analyse complex real-world examples of scams, discuss how scams adapt to changing technology, and propose solutions to protect others.

Learning Scenario 9 - Traffic control simulator

Learning Scenario Information	
Title	Traffic control simulator

Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Modelling and Simulation
Content domain (Integrated Subjects)	Informatics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand basic concepts of modelling and simulation, including what a model is and why simulations are used. ● Identify real-world scenarios where modelling and simulation can be applied (e.g., traffic systems, weather patterns, simple games). ● Create a simple traffic light model using logical flow and conditions to represent a functioning traffic light at an intersection. ● Run and evaluate simulations to understand how changing traffic light timings impacts the flow of vehicles. ● Collaborate in groups to solve a problem using models and discuss their findings with peers.
Scenario Description	
Setting	You're preparing a lesson on the importance of efficient traffic management as part of a real-world problem-solving using models and simulations. Imagine this: it's a Monday morning, and traffic is worse than usual in your city. It gets you thinking: How could this situation be improved with better traffic control measures? The problem: Traffic congestion causes delays, increases the risk of accidents, and affects air quality. Your students often encounter these issues first-hand when traveling to school or other activities. However, they may not understand how real-world systems like traffic management use models and simulations to make better decisions. You want to engage your students in understanding how traffic control works and how decisions like timing traffic lights or responding to lane closures can improve the

	flow of traffic. You decide to use an interactive activity to help them explore the impact of these decisions and come up with possible solutions.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Introduction** **Duration:** 10 minutes Understand what modelling and simulation are, and explore real-world applications. 1. Start with a short video showcasing traffic congestion and traffic control systems to grab students' attention. 2. Facilitate a class discussion about traffic congestion, why efficient traffic control is essential, and the consequences of poorly timed traffic lights or road closures. 3. Introduce key concepts: ○ **Model**: A simplified version of a real-world system. ○ **Simulation**: An experiment conducted using a model to predict outcomes. 4. Briefly explain how traffic simulations help city planners reduce congestion and accidents. **Activity 2 – Explore Traffic Simulations** **Duration:** 15 minutes Apply concepts by analysing a predefined traffic scenario. 1. Present a scenario using the online tool Traffic Simulation. 2. Example: A lane closure on a straight road (example simulation). 3. Demonstrate how to interact with the simulation and analyse results. 4. Ask students to predict the outcome of the simulation, such as how a lane closure might affect traffic flow. 5. Run the simulation and compare the actual results to students' predictions. **Activity 3 - Group Work – Traffic Analysis** **Duration**: 20 minutes 1. Divide the class into small groups (3–4 students).

	2. Assign each group a variation of the scenario (e.g., timing adjustments, additional traffic signals). 3. Encourage groups to manipulate the model, make predictions, and analyse how changes impact traffic flow. 4. Ask groups to discuss their findings and prepare to share insights with the class. 5. Each group presents its scenario, predictions, outcomes, and suggested solutions for improving traffic flow. 6. Discuss as a class how modelling and simulation provide valuable insights for real-world problems. *7.* Conclude by connecting traffic modelling to other systems, such as weather prediction or game design.
Teachers and students' Roles	**Teachers**: acts as a guide and facilitator, introducing key concepts like modelling and simulation and explaining their applications in traffic systems. They create traffic scenarios, provide instructions for using simulation tools, and monitor group collaboration to ensure inclusivity. **Students**: take on active roles as learners and investigators, engaging with simulations, predicting outcomes, and analysing results in groups. They collaborate to explore problems, share findings, and present their observations to peers. Together, this dynamic fosters hands-on learning, critical thinking, and teamwork, connecting the activity to real-world issues like traffic management.
Evaluation/ Assessment	Assessment for this activity can be summarised as follows: Teachers evaluate students on their participation and engagement during discussions and group work, observing their collaboration and problem-solving abilities. They assess understanding of modelling and simulation concepts through students' explanations and predictions. The functionality and logical structure of the traffic light models created are examined for creativity and effectiveness. Group dynamics are monitored to ensure equitable contribution, and presentations are assessed for clarity, depth of explanation, and reflective insights on the learning process.
TINKER Framework Integration	

How is the activity authentic learning?	This activity exemplifies authentic learning by immersing students in solving a real-world problem—traffic management—using tools and processes that mirror professional practices. By engaging with traffic simulation software, students explore how models and simulations are used in fields such as urban planning and transportation engineering. The collaborative group work reflects real-world teamwork, where individuals must analyse data, test hypotheses, and propose solutions. Moreover, students actively create and test traffic light models, connecting their learning to tangible impacts like reducing congestion and improving safety.
How is gender inclusiveness ensured?	Emphasis on collaboration allows students to engage in tasks based on their strengths, whether analytical, creative, or technical, fostering mutual respect and diverse skill application. Additionally, language and interactions during the activity are framed to be neutral and inclusive, encouraging all students to feel valued and supported in expressing their ideas. This approach ensures that every student, regardless of gender, has an active and respected role in the learning process.
Considerations for level progression	Level progression in this activity ensures that students build their understanding of modelling and simulation incrementally. At the **beginner level**, they focus on simple concepts like single traffic lights or one-lane roads, observing traffic flow and understanding basic principles. At the **intermediate level**, complexity increases with variables like multiple intersections and events such as road closures, enabling students to explore cause-effect relationships. For an **advanced level**, students design their own traffic models, incorporating dynamic factors like weather or traffic density, and testing optimisation strategies. **Extensions** include coding tasks, where students program simplified traffic systems using tools like Scratch or Python. This progression keeps activities engaging and appropriately challenging as students' skills grow.

Learning Scenario 10 - Smart home

Learning Scenario Information	
Title	Smart home
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Apply basic programming concepts (loops, conditionals, and sequences) to design and implement a simple interactive program. ● Collaborate in diverse teams to create a solution that reflects the needs of different users, ensuring inclusivity. ● Demonstrate how technology can make everyday tasks easier or more accessible for a wide range of people.
Scenario Description	
Setting	Your students are tasked with helping a family that has just moved into a smart home. The home is equipped with advanced technology, but the devices need to be programmed to suit the diverse needs of the family members. The problem: Different family members have unique needs. In this activity, students will: ● Collaborate in small teams to brainstorm ideas for a smart home feature that caters to these needs. ● Design and program a prototype using beginner-friendly programming tools like Scratch or Make Code. ● They will focus on inclusivity and ensuring the solution works for everyone in the family. ● Test and refine their program to ensure functionality and ease of use. ● Present their solution, explaining how it addresses the diverse needs of the family and what programming techniques they used to make it work.

(Digital) Tools	• Internet-connected devices (Computer/Laptop or Tablets) • Projector/ Video platform for .ppt • Papers for brainstorming • Markers

Activity	**Activity 1: Introduction to the Smart Home Challenge**
	Duration: 10 minutes
	• Begin by explaining the concept of a smart home and its various devices (e.g., voice assistants, lighting systems, smart thermostats, security systems). Highlight that these devices can be programmed to meet the specific needs of different family members (e.g., children, elderly, people with disabilities).
	• Present a scenario of a family member with diverse needs. Discuss with students how each person might have different requirements for their smart home system.
	• Divide the class into small teams. Each team will brainstorm and choose one specific family member's needs to focus on when designing a smart home feature.
	
	Activity 2 – Design the Smart Home Feature
	Duration: 15 minutes
	The goal is to have students apply basic programming concepts (loops, conditionals, and sequences) to design a smart home feature that reflects the needs of the family member they chose.
	• **Brainstorming:** In their teams, students brainstorm ideas for a feature that could help their chosen family member. For example, they could design a voice-activated light system for the elderly person.
	• **Basic Programming Concepts:** Introduce basic programming concepts, such as:
	  ○ **Loops:** Repeating actions (e.g., a loop to check if the light should stay on).
	  ○ **Conditionals:** Decision-making (e.g., if the temperature is too high, turn on the air conditioning).
	  ○ **Sequences:** Step-by-step actions (e.g., turn on the light, then start the fan).
	• **Design:** Using a beginner-friendly tool like **Scratch** or **MakeCode**, students create a flowchart or pseudocode that outlines the sequence of actions their program should perform to meet the family member's needs.
	
	Activity 3 – Programming
	Duration: 15 minutes

	Students will implement their design by creating a simple interactive program using Scratch or MakeCode. 1. Students will use **Scratch** or **MakeCode** to program a basic version of their smart home feature. They can use blocks to program loops, conditionals, and sequences based on their design. 2. **Example in Scratch:** A simple program where a sprite (representing a device like a light) turns on/off based on the user's input or specific conditions (e.g., if the user clicks a button, the light turns on). 3. **Test and Refine:** Once the prototype is created, students will test it. They will ask themselves, "Does it meet the needs of the family member? Is it accessible? Can anyone use it?" **Activity 4: Present the Smart Home Solution** **Duration:** 5 minutes per team (total 10-15 minutes for presentations) Each team will present their smart home feature to the class. They should explain: ● Which family member their solution is for and why. ● How the feature addresses their needs (e.g., accessibility, ease of use). ● The programming techniques they used (loops, conditionals, sequences).
Teachers and students' Roles	**Teachers**: Guide the discussion, ensure understanding of the family members' diverse needs, and explain the importance of inclusivity in technology design. Explain the programming concepts (loops, conditionals, sequences) and offer guidance as teams design their solutions. Provide support for students as they create and test their prototypes. Encourage them to think about user feedback and inclusivity. Facilitate the presentation session, encouraging students to explain how they used programming concepts and the rationale behind their design decisions. **Students**: Participate in the discussion, listen to the scenarios, and decide which family member's needs to focus on for the next activities. Collaborate in teams to brainstorm ideas and design their solution using basic programming concepts. Program the smart home feature and refine it to ensure it works for their selected family member's needs.

Evaluation/ Assessment	Students can be assessed on the following: ● **Collaboration:** How well did they work together as a team? ● **Inclusivity:** Did the solution address the diverse needs of the family members? ● **Programming Skills:** How well did they apply basic programming concepts (loops, conditionals, sequences) to their solution? ● **Presentation:** How clearly did they explain their solution and the programming concepts used?
TINKER Framework Integration	
How is the activity authentic learning?	In this scenario, students are tasked with designing a smart home feature to address the diverse needs of a family. The problem is based on real-life challenges that involve inclusivity and accessibility, which are critical aspects of modern technology. In the real world, designers and developers work to create technologies that serve a wide range of users, including those with disabilities or other unique needs. Students are encouraged to work in teams to brainstorm, design, and implement their solutions. Collaboration is a core aspect of authentic learning, as many real-world tasks require individuals to work together, share ideas, and solve problems collectively. In this activity, students must combine their strengths and skills (e.g., creativity, technical knowledge, and problem-solving) to come up with an inclusive solution for their smart home feature, just like a real design team would do in industry.
How is gender inclusiveness ensured?	The activity is designed to encourage **collaborative teamwork** among all students, regardless of gender. By working in groups, students are expected to share their ideas and contribute equally to the development of the smart home prototype. Teachers should highlight that **technology is for everyone**, irrespective of gender, and encourage students to consider how their design could serve different users (e.g., parents, children, elderly people) with varied backgrounds, abilities, and needs. This helps students realise the importance of designing for **inclusivity** in the real world.
Considerations for level progression	As students advance, ensure the complexity of the tasks builds on previous learning, introducing them gradually to **more complex algorithms** and **concepts**.

Cyprus

Cyprus

Learning Scenario 1 - Building an Interactive Quiz Game on Scratch

Learning Scenario Information	
Title	Building an Interactive Quiz Game on Scratch
Age Level	10-11 years old
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Technology, Mathematics, Language, Social Studies
Learning Objectives	Upon completing this activity, the students should be able to: ● Design and program a quiz game using visual programming. ● Use variables and conditionals to manage scoring and feedback. ● Debug and improve their game by testing.
Scenario Description	
Setting	You have assigned your students the role of a teacher and you have tasked them with creating an interactive quiz game for their classmates to test their knowledge on the topic they learnt in their last lesson (e.g., math problems, historical events, or environmental issues). This game will have questions, options for answers, and a scoring system to track performance. You want to guide them on how to create this interactive project using Scratch.
(Digital) Tools	● Scratch (https://scratch.mit.edu/) ● Computers or tablets with internet access ● Topic-related resources for creating quiz questions
Activity	**Step 1 (7 minutes): Introduction**

	● Show an example of a quiz game in Scratch (you can watch the video "How to Make a Quiz on Scratch!" or "How To Make A QUIZ GAME in SCRATCH 2024" for instructions to create an example for your students). ● Discuss its elements: questions, options, scoring system, and feedback. ● Ask students to choose a topic they already learnt in your last lesson for their game. For example: ○ Math: Multiplication and division questions. ○ History: Facts about a historical figure or event. ○ Environmental Science: Questions about recycling or climate change. **Step 2 (10 minutes): Design the Game** ● Divide students into mixed-gender groups of 3. ● Ask students to plan their game layout: ○ Create at least 3–5 multiple-choice questions. ○ Sketch how the questions and answers will appear on the screen. ○ Include visuals or sprites (characters/images) that relate to their topic. **Step 3 (20 minutes): Design the Game in Scratch** ● Guide students to follow these steps: 1. Choose a sprite for the quizmaster (e.g., a teacher, a robot, or an animal). 2. Create a question using the "Say" block (e.g., "What is 5 x 7?"). 3. Use buttons or key presses for multiple-choice answers. *Example:* "Press A for 35, B for 25, C for 30." 4. Add "If...then" blocks to check answers and provide feedback. *Example:* a. If answer = "A", say "Correct!" and add 1 to the score. b. If answer ≠ "A", say "Try again!" 5. Use variables to keep track of the score and display it on the screen. 6. Add a "Thank you for playing!" message when all questions are answered. **Step 4 (8 minutes): Testing and Debugging** ● Ask each group to play each other's groups quiz games. ● Ask them to provide constructive feedback: ○ Were the instructions clear? ○ Did the scoring system work? ○ Were the questions engaging and accurate?
Teachers and students' Roles	**Teachers**: ● Demonstrate how to use Scratch blocks for the quiz game. ● Provide support during programming and testing phases.

	• Encourage creativity in question design and game aesthetics. **Students**: • Plan and build their game, collaborating in small groups. • Test their game for functionality and user experience. • Share their games with peers for feedback.

Evaluation/ Assessment	• Observe students' ability to use Scratch to create algorithms (e.g., using conditionals and variables).
	• Assess the functionality and creativity of the games.
	• Use a simple rubric with criteria like:
	    ○ Clarity of questions.
	    ○ Effective use of programming blocks.
	    ○ Accuracy of scoring system.

TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students take the role of the teacher and have to think logically to design the game flow. They create a game on a topic they enjoy and by performing a peer testing it mirrors real-world software development.
How is gender inclusiveness ensured?	The activity encourages equal participation by ensuring all students take active roles in the design and development of their games, and they create games that reflect their unique interests based on the lessons they learnt.
Considerations for level progression	For younger or less experienced students, provide pre-built sprites and blocks on Scratch for students to modify. For older or more advanced students, challenge students to include timed responses (e.g., answering within 10 seconds), levels of difficulty and a leader-board for high scores.

Learning Scenario 2 - Building Circuits with Everyday Items

Learning Scenario Information	
Title	Building Circuits with Everyday Items
Age Level	10-12 years old
Duration	30 minutes
Informatics topic areas	Design and Development
Content domain (Integrated Subjects)	Science, Technology, Engineering
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify the components of a simple electrical circuit. ● Construct a basic circuit using everyday items. ● Explain how electricity flows and why the circuit works or fails.
Scenario Description	
Setting	You've noticed students struggle to grasp how circuits work from textbook examples. To make learning more interactive, you decide to have them build circuits using items from around the classroom. You want to ensure students understand the flow of electricity and how components interact.
(Digital) Tools	● Aluminium foil, batteries, small light bulbs, tape
Activity	**Step 1 (10 minutes): Electrical Circuits** ● Begin with a short discussion on circuits. Show diagrams of simple circuits with a battery, wires, and a bulb. **Step 2 (20 minutes): Construct a basic circuit using everyday items.** ● Divide students into mixed-gender pairs and give them the materials. ● Challenge them to build a circuit that lights the bulb. ● Encourage them to explore and troubleshoot if it doesn't work.

Teachers and students' Roles	**Teachers**: ● Demonstrate how to use the materials to create a circuit. ● Facilitate troubleshooting and ask guiding questions to help students understand issues. ● Encourage collaborative problem-solving. **Students**: ● Work in pairs to design and build circuits with given materials. ● Use the simulation tool to replicate and test their design. ● Explain their circuit design and analyse its effectiveness.
Evaluation/ Assessment	● Observe students during the activity for participation and problem-solving. ● Assess completed circuits for functionality. ● Use a checklist to evaluate understanding of key concepts (e.g., circuit components, flow of electricity).
TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students connect concepts to practical situations by building and testing circuits. Students troubleshoot issues, mimicking challenges faced by engineers. Pair work encourages communication and shared learning.
How is gender inclusiveness ensured?	The activity encourages equal participation by ensuring all students take active roles in building and testing circuits and avoiding gendered assumptions about who might excel in hands-on tasks.
Considerations for level progression	For younger or less experienced students, provide diagrams or step-by-step instructions for building the circuit. For older or more advanced students, challenge them to add a switch or additional components to the circuit.

Learning Scenario 3 - Conserving Water Resources in Cyprus

Learning Scenario Information	
Title	Conserving Water Resources in Cyprus
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Responsibility and Empowerment, Digital Creativity
Content domain (Integrated Subjects)	Science, Technology, Environmental Studies
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify sources of water wastage in daily life and propose solutions. ● Design and build a simple water-saving tool or prototype. ● Collaborate with peers to brainstorm and evaluate ideas. ● Present and justify their water-saving solution to others.
Scenario Description	
Setting	Water scarcity is a critical issue in Cyprus, where communities often face droughts. Your school's principal has noticed that students and staff waste significant amounts of water daily, particularly in bathrooms and the canteen. As their teacher, you want to help students understand the importance of water conservation and empower them to create practical solutions for this local problem.
(Digital) Tools	● Cardboard, plastic bottles, tape, straws, markers, and scissors ● Short video or infographic on water-saving technologies ● Worksheets for brainstorming and planning

Activity	**Step 1 (10 minutes): Introduction and Problem-Solving Brainstorm** ● Begin with a discussion about the water scarcity challenges in Cyprus. Use visuals like images or a short video to illustrate the impact of droughts and water wastage in Cyprus. ● Highlighting diverse innovators in environmental and engineering fields. ● Ask students: “Where do we waste water the most in our daily lives?” Record their answers on the board. ● Present them with the task/challenge: “Your mission is to design a tool or system that helps save water and encourages others to use water wisely.” (e.g., a water saver tracker). ● Divide students into mixed-gender groups by assigning rotating roles (e.g., presenter, designer, builder, campaign creator) ● Students work in their groups to identify specific water-wasting behaviours they want to address (e.g., leaking taps, excessive water use in gardens). ● Provide guiding questions: ○ *What problems will your tool or system solve?* ○ *How can your design make people more aware of water conservation?* ○ *Will your design require technology, mechanics, or both?* ● Ask groups to write their ideas on a brainstorming worksheet. **Step 2 (30 minutes): Design and Development Phase** ● The goal is to create a **visual system** where students track their daily water usage (e.g., water used during brushing teeth, washing hands, and showering).. ● Provide students with material such as cardboard, markers, ruler, and a visual representation (such as a water droplet or faucet). Otherwise, you can use excel or Google sheets. ● Create a chart that allows students to record their daily water usage, broken down by activity. Each day, students can add a symbol or colour to indicate how much water they used. ● After the first week of tracking, students can **set water-saving goals** for the upcoming week. E.g., "Reduce shower time by 1 minute." Every week students will monitor their progress and reflect on it. **Step 3 (5 minutes): Presentation and Reflection** ● Each group presents their prototype and digital campaign to the class, explaining: ● *What problem it solves* ● *How it works* ● *Why their campaign is important for raising awareness about water conservation in Cyprus*

Teachers and students' Roles	**Teachers**: ● Guide discussions, facilitate brainstorming, support students during the design and campaign creation processes, and encourage active participation from all group members. **Students**: ● Work collaboratively in groups, engage in problem-solving, design and build a prototype, and present their solutions.
Evaluation/ Assessment	● Observe group participation and collaboration during brainstorming and design activities. ● Assess prototypes based on creativity, practicality, and relevance to the water-saving challenge.
TINKER Framework Integration	
How is the activity authentic learning?	This activity addresses a real-world problem, making it meaningful and relevant. Students work on practical solutions that could be applied in their community and use physical material to produce their designs.
How is gender inclusiveness ensured?	The activity ensures all students actively participate by assigning rotating roles (e.g., presenter, designer, builder, campaign creator) and highlighting diverse innovators in environmental and engineering fields. It also avoids assigning gender-stereotypical tasks (e.g., boys handling tools, girls doing digital design).
Considerations for level progression	For younger or less experienced students, provide simple prototypes. For older or more advanced students, incorporate programming with Arduino or other microcontrollers to create automated water-saving tools and design sophisticated campaigns with animations or interactive elements in Canva.

Learning Scenario 4 - Design a Sturdy 3D Bridge

Learning Scenario Information	
Title	Design a Sturdy 3D Bridge
Age Level	11-12 years old

Duration	45 minutes
Informatics topic areas	Modelling and Simulation
Content domain (Integrated Subjects)	Engineering, Mathematics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Apply basic engineering principles to design a 3D structure. ● Test the strength of their design using a simulation tool. ● Work on improvements to enhance their design's stability.
Scenario Description	
Setting	You are helping students explore how engineers design strong structures. Your school has set up a "Future Engineers" challenge where students must design and test bridges that can support weights using limited materials. You want to help your students understand the importance of structure stability and efficiency.
(Digital) Tools	● Tinkercad https://www.tinkercad.com/ (or similar 3D design software) ● Simple materials: straws, tape, and paper for prototypes ● A scale or small weights for strength testing
Activity	**Step 1 (15 minutes): Design a 3D structure using physical material** ● Begin by showing images of different bridges (e.g., suspension, beam, arch). Discuss what makes them stable. ● Divide students into small mixed-gender groups and give them the challenge: design a bridge using only straws and tape that can support a small book (or another item). ● Allow students to brainstorm and sketch their designs before building. ● Ask students to perform strength testing to ensure their bridge is stable enough. **Step 2 (30 minutes): Design a 3D structure using a simulation tool.** ● After building their physical models, introduce Tinkercad. ● Guide students in creating digital versions of their designs. ● Teach them how to use the software's basic simulation features to test weight distribution.

	• Ask each group to adjust their digital design based on test results and prepare a short explanation of their improvements.
Teachers and students' Roles	**Teachers**: • Provide guidance on the engineering principles behind bridge stability. • Assist with the use of Tinkercad and troubleshooting technical issues. • Facilitate discussions about improvements and group reflections. **Students**: • Collaborate in groups to brainstorm, design, and build a physical and digital bridge. • Test their designs and identify weaknesses in structure. • Present their findings and suggest potential improvements.
Evaluation/ Assessment	• Evaluate the functionality of physical and digital designs (e.g., does it hold the weight?). • Observe teamwork and problem-solving strategies during the activity. • Use a rubric to assess creativity, design accuracy, and improvement explanations.
TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students connect their learning to real-world engineering practices by designing and testing bridges. Students critically evaluate their designs and suggest practical improvements, while the hands-on building and simulations keep students engaged.
How is gender inclusiveness ensured?	The activity encourages equal participation by rotating leadership roles within groups to ensure balanced participation. It presents diverse examples of engineers and their bridges as role models and avoids assigning tasks based on stereotypes (e.g., boys handling physical tools).
Considerations for level progression	For younger or less experienced students, provide pre-made templates in Tinkercad for students to adjust and test. For older or more advanced students, challenge them to calculate materials' cost-efficiency or experiment with different bridge designs.

Learning Scenario 5 - Designing a Recycling Robot

Learning Scenario Information	
Title	Designing a Recycling Robot
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Algorithms, Programming
Content domain (Integrated Subjects)	Science, Technology, Engineering, Mathematics (STEM)
Learning Objectives	Upon completing this activity, the students should be able to: ● Design a solution for a real-world recycling problem using robotics. ● Program a robot to perform sorting tasks based on predefined conditions. ● Collaborate with peers to build and test a robotic prototype.
Scenario Description	
Setting	You are teaching a class that has been discussing environmental sustainability and recycling. You want to help students create a project that addresses the issue of sorting recyclable materials and you want to guide the students in your class to build a robot capable of sorting materials into categories like paper, plastic, and metal.
(Digital) Tools	● Robotics kits (LEGO Spike, WeDo, or Arduino kits) ● Sensors (e.g., colour or weight sensors) ● A computer with programming software ● Worksheets for planning and sketching designs
Activity	**Step 1 (10 minutes): Introduction and Brainstorming** ● Start with a brief discussion on recycling and its importance for the environment. Discuss environmental issues, including waste management and the importance of recycling, using a short video or infographic. Show examples of robots used in

	recycling plants to inspire students, inviting questions. Highlight diverse role models in robotics, such as female or non-binary engineers working in recycling technologies. Use inclusive language like "they" or "students" instead of "he/she." ● Present the students with a task/challenge: "Design and build a robot to sort recyclable materials into separate bins (paper, plastic, and metal)." ● Divide students into mixed-gender teams with assigned roles (e.g., designer, programmer, tester, documenter). ● Provide a worksheet with guiding questions, such as: ○ *What type of materials will the robot sort?* ○ *How will the robot detect different materials (e.g., weight, size, or colour)?* ○ *How will the robot move and place materials in the correct bins?* ● Teams create a rough sketch or prototype using provided tools. **Step 2 (35 minutes): Building and programming the Robot** ● Provide teams with LEGO kits, sensors, and other components (Instead of LEGO kits, you can collect reusable materials with your students e.g., cardboards, plastic bottles, CDs, rubber bunds, etc.). ● Students should work together in their teams to assemble their robots based on their designs, incorporating wheels and pulleys for movement. ● Students should use the computer with programming software (e.g., Scratch, LEGO Mindstorms, or similar) to program the robot to follow a predefined path, detect recyclable materials (e.g., using sensors), and sort them into bins. ● Students will test the robot in a simulated environment with materials representing recyclables. ● Assist students with coding basics and troubleshooting, gradually reducing support as students gain confidence. ● Ensure all team members actively participate and rotate roles to prevent stereotypes about programming or mechanical tasks. ● Each team will present their robots to the class and share its experience. - *"Have you faced any difficulties?"* - *"What worked? What didn't work?"*
Teachers and students' Roles	**Teachers**: ● Facilitate brainstorming, ensure equal participation, and provide coding and troubleshooting support. **Students**: ● Collaborate in teams, assign roles equitably, and share responsibilities for designing, building, and testing the robot.

Evaluation/ Assessment	• Observe teamwork and engagement during the activity. • Evaluate robot designs for functionality and creativity. • Assess presentations where students explain their design and programming decisions.
TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students solve a real-world recycling problem, applying robotics and programming skills.
How is gender inclusiveness ensured?	The activity encourages equal participation by rotating roles to avoid reinforcing gender stereotypes; diverse role models in robotics can be introduced to inspire all students.
Considerations for level progression	For younger or less experienced students, provide step-by-step guides and pre-programmed templates. For older or more advanced students, encourage adding features like automated bin placement or material detection algorithms.

Learning Scenario 6 - Designing a School Cafeteria Payment System

Learning Scenario Information	
Title	Designing a School Cafeteria Payment System
Age Level	11-12 years old
Duration	35 minutes
Informatics topic areas	Human-Computer Interaction, Computing Systems

Content domain (Integrated Subjects)	Technology, Mathematics, Economics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify features of user-friendly systems. ● Design a prototype system for account creation and card-based payments. ● Evaluate and improve their design based on usability principles.
Scenario Description	
Setting	Your school cafeteria wants to modernise its payment process by introducing a card system for students to pay for their meals. The system must allow students to create accounts, check balances, and pay easily. You want to guide your students to design a user-friendly solution that works for everyone in the school.
(Digital) Tools	● Canva (https://www.canva.com/) for interface design ● Paper and markers for initial sketches ● Computers or tablets
Activity	**Step 1 (10 minutes): Introduction** ● Begin with a discussion about existing payment systems students are familiar with (e.g., online shopping, prepaid cards). ● Highlight key features of effective systems, such as simplicity, security, and accessibility. **Step 2 (10 minutes): Design Phase** ● Divide students into mixed-gender groups to design different components of the cafeteria system, ensuring that each member's contributions are equally valued and that leadership roles are rotated fairly. ● Ask each team to brainstorm and sketch the design of the system interface they were assigned on paper first. For example: ○ A login page for accounts. ○ An account log. ○ A balance check feature. ○ A payment page. ● Once ready, ask students to digitise their design using Canva.

	TIP: While developing the cafeteria payment system, you should ensure modelling inclusive language. For example, the guidelines given to your students must include gender-neutral terms, like “they” instead of “he/she,” and avoid assuming the gender of users of the system. Similarly, students should ensure that the database user interfaces also use gender-neutral terms, such as "users" or "students," instead of "he" or "she." **Step 3 (15 minutes): Peer Review** ● Each group presents their prototypes to the class. ● Other groups provide feedback based on ease of use, clarity, and inclusivity.
Teachers and students’ Roles	**Teachers**: ● Explain system design basics and guide group discussions. ● Provide examples of intuitive user interfaces. **Students**: ● Collaborate on prototypes, focusing on real-world usability and inclusion ● Present and refine designs based on peer feedback
Evaluation/ Assessment	● Assess prototypes for usability, clarity and inclusion of required features ● Use a checklist or rubric focusing on ease of navigation, completeness, and creativity
TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students reflect real-world challenges of designing systems for diverse user groups, incorporates problem-solving skills and real-life applications in school environments.
How is gender inclusiveness ensured?	The activity encourages equal participation by rotating roles to ensure equal participation and encourages students to consider diverse user needs (e.g., gender inclusive language).
Considerations for level progression	For younger or less experienced students, provide a predefined set of features they must include, or predeveloped elements on Canva to support their design. For older or more advanced students, ask them to integrate advanced features like parental controls or multilingual support.

Learning Scenario 7 - Designing a Smart Night Light

Learning Scenario Information	
Title	Designing a Smart Night Light
Age Level	11-12 years old
Duration	45 minutes
Informatics topic areas	Digital Creativity, Programming
Content domain (Integrated Subjects)	Design and Technology, Science
Learning Objectives	Upon completing this activity, the students should be able to: ● Design a simple circuit using LEDs, batteries, and switches. ● Apply creative problem-solving to develop a practical solution for a common problem. ● Justify the design choices considering inclusivity and usability. ● Collaborate effectively within a team setting.
Scenario Description	
Setting	You and your students are discussing how technology can improve daily life. One student mentions the difficulty of finding their way in the dark without waking others. You see this as an opportunity to explore how to combine creative thinking and technology to solve a real-life problem: designing a smart night light.
(Digital) Tools	● LEDs, batteries, switches, wires ● Recycled materials for casing (cardboard, plastic, etc.) ● Art supplies for decoration (markers, tape, glue) ● Tablets or computers for inspiration (optional)
Activity	**Step 1 (15 minutes): Introduction and design phase** ● Gather students and briefly discuss “smart home design solutions”. Introduce the problem: “Imagine waking up at night and struggling to see without disturbing others. How could a smart night light help?”

- Ask students to share personal examples or stories where they needed light at night and how a smart solution (using sensors or digital controls) could help in such situations..
- Show an interactive demonstration of a basic digital simulation of a LED circuit on a coding platform like Tinkercad or Scratch.
- Explain the goal: *“Today, you’ll design and build a smart night light to solve this problem. Your design should be creative, practical, and easy to use for anyone. You’ll also program the light to turn on and off based on certain conditions using block-based coding.*
  Explain how programming can control the night light, like turning it on/off based on conditions such as light levels or motion (e.g., using a digital light sensor or motion sensor in the simulation).”
- Discuss inclusivity: *“Consider who might use this smart night light—a child, an elderly person, or someone with difficulty moving. How can your design help them?”*
- Divide students into mixed-gender groups ensuring diverse participation in each group.
- Distribute design templates (paper with a blank sketch area) and pencils.
- Explain design criteria:
  - The smart light should turn on/off under specific programmed conditions (e.g., motion detection, light level).
  - The casing should be visually appealing.
  - The design should be easy to use for everyone, and the programming should be intuitive (e.g., automatic light when movement is detected)..
- Groups discuss ideas and sketch their night light designs. Prompt them with questions such as:
  - *How will the light turn on and off?*
  - *What materials will you use for the casing?*
  - *How will your design reflect inclusivity?*
- Walk around to provide feedback and help clarify any technical questions.

Step 2 (30 minutes): Building Phase

- Guide students through a simple coding task in Scratch where they create a digital version of their night light. Students can use block-based coding to simulate the light turning on/off based on triggers like pressing a key (to simulate movement) or changing the brightness of the screen. For example, students can use the “if-else” block to simulate the light turning on when a character in Scratch senses movement or changes in brightness.

	● Otherwise, using **Tinkercad**, students can simulate wiring an LED to a virtual microcontroller (like an Arduino) and use block-based programming to code when the LED turns on and off (e.g., when a virtual button is pressed or a sensor is triggered). ● Groups will work together to **sketch their designs and simulate the smart night light**. Each team should: - Design the casing (visually appealing and practical). -Code how the night light works using either Scratch, Tinkercad, or another coding platform. -Discuss and implement **inclusive features** such as automatic light activation (motion detection) or easy access buttons. Following the activity the class will have a reflecting discussion. - *"How does the programming reflect real-world functionality?"* - *"How have you made the design user-friendly for everyone?"*
Teachers and students' Roles	**Teachers**: ● Introduce the problem and provide design inspiration. ● Monitor group work, offering guidance and troubleshooting support. ● Facilitate discussion during presentations. **Students**: ● Collaborate to brainstorm, design, and build the night light. ● Take turns handling materials and presenting their work. ● Reflect on their design and consider improvements during the showcase.
Evaluation/ Assessment	● Observe teamwork and participation during the activity. ● Assess the functionality of the circuit and the creativity of the design. ● Use a short rubric evaluating inclusivity, problem-solving, and presentation skills.
TINKER Framework Integration	
How is the activity authentic learning?	The activity addresses a real-world problem (lighting needs) while encouraging collaboration and problem-solving in a meaningful context. It also engages students in creating a tangible product with practical use.

How is gender inclusiveness ensured?	The activity uses gender-neutral examples and highlights diverse innovators, ensures balanced roles within teams and encourages all students to participate in both technical and creative aspects.
Considerations for level progression	For younger or less experienced students, provide pre-assembled circuits. For older or more advanced students, ask them to incorporate sensors or basic programming to automate the light.

Learning Scenario 8 - Designing an Algorithm to Navigate a Physical Maze

Learning Scenario Information	
Title	Designing an Algorithm to Navigate a Physical Maze
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Mathematics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Design a step-by-step algorithm to navigate a maze in a physical space. ● Apply loops and conditionals in their algorithms to solve the maze efficiently. ● Evaluate and debug their algorithm based on its performance during testing.
Scenario Description	
Setting	You are excited to teach your students about algorithms this year. However, many of them find the concept abstract and challenging to connect to their daily lives. You want to engage them in a hands-on activity where they design algorithms without the use of computers, allowing them to see how algorithms apply to everyday tasks.
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Markers ● Classroom with space cleared for a physical maze, such as desks/chairs or tape on the floor, forming a simple maze with obstacles.
Activity	**Step 1 (10 minutes): Introduction to Algorithms Using Real-Life Examples** ● Explain to the students what an algorithm is with the following real-world example. ● Creating a sandwich is a classic example of an algorithm. Present students with the video "Program your teacher to make a Jam Sandwich." (3'44'') and discuss. Then, ask

	them to explain the process step by step and write the steps on the interactive whiteboard. Here's a simple step-by-step breakdown: ○ Gather Ingredients: Bread, fillings (like ham, cheese, or vegetables), and condiments (like mustard or mayonnaise). ○ Lay Out Bread: Place two slices of bread on a clean surface. ○ Add Condiments: Spread condiments on one or both slices of bread. ○ Layer Fillings: Add your chosen fillings evenly on one slice. ○ Top with Second Slice: Place the second slice of bread on top of the fillings. ● Explain that **each step must be followed in sequence** to achieve the desired outcome and provide the below definition: ***An algorithm*** *is a systematic, step-by-step procedure or set of rules designed to perform a specific task or solve a problem. Algorithms are not limited to computer science; they are present in many everyday activities, guiding us through routine tasks efficiently and effectively.* *Recipes are structured algorithms that guide you through cooking. For example, baking cookies involves specific steps like mixing ingredients, shaping dough, and baking at a certain temperature for a defined time.* **Step 2 (10 minutes): Understanding Maze Navigation** ● Show a simple map of a maze on the whiteboard. Explain that just like following the sandwich-making steps, solving a maze requires a clear sequence of instructions, or an algorithm, to navigate from start to finish. ● Introduce the terms *loops* and *conditionals*: ○ **Loops**: Explain that loops are used when a set of steps needs to be repeated (e.g., "Move forward until you reach a wall"). ○ **Conditionals**: Discuss how conditionals help the algorithm make decisions based on specific conditions (e.g., "If you encounter a wall, turn left"). ● Walk the students through the basic maze on the whiteboard. Have them suggest directions (e.g., "Turn right", "Move forward three steps"), and discuss how this resembles programming a robot to follow commands. **Step 3 (20 minutes): Designing and Testing Algorithms in a Physical Maze** ● Arrange the chairs and desks or tape on the floor to form a simple maze in the classroom. The maze should have a start point, an endpoint, and several obstacles or turns to make the path challenging but achievable within the time limit. ● Divide students into mixed-gender pairs or small groups. One student or more students in each pair will act as the "programmer(s)", and one student will be the "robot". The "robot" will be blindfolded to simulate the idea that they must rely solely on the algorithm to navigate the maze.

	• The "programmer(s)" will create a step-by-step set of instructions (an algorithm) to guide the blindfolded "robot" through the maze. These instructions must be specific and clear (e.g., "Take three steps forward, turn right, move forward until you reach the wall").
	• Once the algorithm is written, the "robot" will follow the programmers' instructions, moving through the maze step by step. The "robot" must only move based on what the programmer says, and the programmer(s) must communicate their instructions clearly.
	• If the robot encounters an obstacle or follows the instructions incorrectly, the team will stop, evaluate the mistake, and the programmer(s) will revise the algorithm (debugging) to fix any errors.
	• If the "robot" makes an incorrect move (e.g., bumping into a wall or missing a turn), the programmer must identify where the mistake occurred and adjust the instructions. This simulates real-world debugging, where errors in code must be found and corrected for a programme to run correctly.
	• Throughout the activity, give structured questions on key issues they need to consider. As students become more comfortable, gradually, the help is removed. Some examples of questions are:
	  ○ *What steps are you giving the robot to help it move through the maze?*
	  ○ *What went wrong when the robot hit an obstacle? How can you fix it?*
	  ○ *How can you make your instructions easier for the robot to follow?*
	
	Step 4 (5 minutes): Group Reflection and Discussion
	• Bring the class together to reflect on the activity. Ask each group to share and compare their algorithms, and describe the challenges they faced while guiding their "robot" through the maze. Encourage them to talk about how they used loops or conditionals to improve the efficiency of their instructions.
	• **Prompts for Discussion:**
	  ○ *"What steps in your algorithm worked best to guide your robot through the maze?"*
	  ○ *"How did you use loops to repeat actions, and did it make your algorithm more efficient?"*
	  ○ *"What conditionals did you use to handle obstacles? Did they work as expected?"*
	  ○ *"How did you improve or debug your algorithm when the robot made a mistake?"*

Teachers and students' Roles	**Teachers**: Guide the students through the initial examples and assist them in understanding algorithms, loops, and conditionals. Supervise the maze activity. While working, pose additional reflective questions to reveal their thinking and push them to progress, finding their solutions when challenges arise. Encourage students to reflect on errors and adjustments. **Students**: Act as programmers and robots. As programmers, they create and test algorithms, and as robots, they follow the instructions exactly to highlight the importance of precise commands.
Evaluation/ Assessment	• Evaluate each group's ability to design a clear, functional algorithm that successfully navigates the maze. Assess their use of loops and conditionals, as well as their debugging strategies. • Observe student participation during the maze activity, paying attention to how they create and refine their algorithms.
TINKER Framework Integration	
How is the activity authentic learning?	The activity uses real-world problem-solving through hands-on activities. Students design and test algorithms in a tangible environment, making the abstract concept of algorithm design more concrete. Almost all principles of authentic learning are applied in this activity setting including authentic context and task, multiple perspectives, collaboration, reflection, scaffolding and authentic assessment.
How is gender inclusiveness ensured?	The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, ensuring all students contribute as both programmers and robots.
Considerations for level progression	Depends on the age of your class, the level, the previous knowledge and experience of students, the teacher can adapt the lesson accordingly: For younger or less experienced students, simplify the maze and focus more on the basic structure of step-by-step instructions. For older or more advanced students, more complex mazes or additional algorithmic concepts such as functions or nested conditionals can be introduced to deepen understanding.

Learning Scenario 9 - Ethical Use of AI in Everyday Life

Learning Scenario Information	
Title	Ethical Use of AI in Everyday Life
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Responsibility and Empowerment
Content domain (Integrated Subjects)	Social Studies, Technology, Citizenship Education
Learning Objectives	Upon completing this activity, the students should be able to: ● Evaluate the ethical implications of using AI in various sectors (e.g., education, healthcare, security). ● Present arguments for and against specific uses of AI, considering fairness and inclusivity. ● Discuss the role of technology in shaping societal values and behaviours.
Scenario Description	
Setting	You are a teacher and have just introduced the concept of artificial intelligence (AI) to your class and how it is used in daily life. Your students are curious to understand both the benefits and risks associated with AI technologies, but there is one big challenge: they need to explore how AI impacts fairness, privacy, and equality. You want to engage your students in a meaningful discussion about the ethical use of AI, ensuring they understand its positive and negative consequences.
(Digital) Tools	● Computers or tablets with internet access ● Presentation software (e.g., Google Slides, PowerPoint) ● Online resources about AI ethics (e.g., articles, videos) ● Debate platform (e.g., Padlet) for sharing arguments

Activity	**Step 1 (10 minutes): Introduction** ● Introduce your students with AI concepts by showing a short video (e.g., AI: Impact on Society) or article (e.g., Is Artificial Intelligence Good for Society?) about AI in society. Discuss the key points of the video/article. ○ For example, in the above article supporters argue AI can help with education, healthcare, creativity, and problem-solving. It also creates new opportunities. However, critics raise concerns about AI's reliability, potential for cheating, and its impact on independent thinking. There's also worry about AI misusing artists' work for image generation. ● Provide an overview of key ethical issues based on the resources: privacy, bias, fairness, and transparency. ● Ask your students to think of examples of AI they use or encounter in their daily lives (e.g., voice assistants, recommendation systems). **Step 2 (30 minutes): Debate: preparation and implementation** ● Divide your class into two mixed-gender groups: one group will argue that AI has a positive impact on society, while the other will argue the negative consequences. ● Ask both teams to do research online without using AI and write down their results and resources. ● Then, provide your students with guidelines for researching their arguments, using provided online resources or an AI chatbot like ChatGPT. ● Encourage students to focus on real-world examples and connect their arguments to ethical issues such as discrimination or job loss due to automation. ○ For example, students can use the following prompts on ChatGPT and prepare for their debate. 1. *Present the 3 strongest arguments [in favour of/against] the statement "specific topic of the debate]."Ensure each argument is well-reasoned and supported by evidence, using examples. Present the arguments so that [your age]-year-old students can grasp them.* 2. *You are an experienced debater. I'll present you with some arguments. Refute each argument, strengthening the opposing view. Enhance the counterarguments with solid reflection questions. Present the arguments so that [your age]-year-old students can grasp them: [Arguments]* ● Allow students to work in pairs within their groups to prepare their key points and evidence. ● Host a debate where each group presents their arguments. Encourage respectful discussion and challenge students to ask questions or counter-arguments from the opposing side. Ensure all students contribute to the discussion.

	Step 3 (5 minutes): Reflection and Class Discussion ● After the debate, facilitate a class-wide discussion where students reflect on the arguments presented. ● Ask questions like: ○ *"What ethical dilemmas did you notice?"* ○ *"How can we ensure that AI technologies are used responsibly?"* ● *Optional:* As a class, create a list of AI usage guidelines that reflect fairness, transparency, and inclusivity.

Teachers and students' Roles	**Teachers**: ● Facilitate the debate, ensuring all students participate equally. ● Provide support during the preparation phase by guiding students to credible resources. ● Encourage critical thinking and respectful discourse throughout the debate. **Students**: ● Research ethical concerns related to AI, focusing on real-world examples. ● Work in pairs within groups to prepare arguments and present their case. ● Actively participate in the debate and the class discussion, expressing their views clearly and respectfully.
Evaluation/ Assessment	● Assess students' engagement and ability to present clear, well-researched arguments during the debate. ● Allow students to provide constructive feedback to their peers on the quality of arguments and use of evidence. ● Evaluate students' ability to reflect on the ethical implications of AI and how they engage with the class discussion.
TINKER Framework Integration	
How is the activity authentic learning?	The activity encourages students to engage with real-world ethical issues surrounding AI, such as privacy and fairness. The debate format allows students to explore different perspectives, empowering them to consider the societal impact of technology. It also encourages students to think critically about technology's role in society, fostering skills they can apply beyond the classroom.
How is gender inclusiveness ensured?	The activity ensures equal participation in group roles and debate preparation and avoids reinforcing gender stereotypes by assigning roles that are based on interest and skill rather than gender.
Considerations for level progression	For younger or less experienced students, provide more structured prompts and resources for the students to guide their research. You can also support them by summarising key points about AI ethics before starting the debate. For older or more advanced students, challenge students to consider more complex ethical dilemmas, such as the balance between AI's benefits for society and potential harm, or the responsibility of developers in creating ethical AI. Encourage them to incorporate more nuanced examples of AI from various sectors.

Learning Scenario 10 - Programming a Ground Robot for Navigation

Learning Scenario Information	
Title	Programming a Ground Robot for Navigation
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Programming, Modelling and Simulation
Content domain (Integrated Subjects)	Technology, Mathematics, Science
Learning Objectives	Upon completing this activity, the students should be able to: ● Plan a sequence of steps to solve a navigation problem. ● Develop and debug simple programs using block-based coding tools. ● Collaborate to solve real-world challenges involving robotics. ● Reflect on how robots are used in real-life applications to improve human efficiency.
Scenario Description	
Setting	A local grocery store has started using delivery robots to bring products to customers, but the robots often get stuck navigating around shelves. You are a teacher tasked with helping students improve the robot's navigation system by designing and programming a solution. Guide the students to design and test navigation paths for a robot, both with physical setups and coding tools.
(Digital) Tools	● Maze layout (paper or tape), arrow cards (directional), small obstacles (e.g., books, toys). ● A programmable ground robot (e.g., Bee-Bot, Blue-Bot, or LEGO Mindstorms, VEXcode VR (there is a free version), block-based coding platform (e.g., Scratch, Blockly). ● Whiteboard or chart paper for planning and reflections.

Activity	**Step 1 (10 minutes): Introduction** ● Begin by explaining the real-world challenge of robots navigating busy environments like stores or warehouses. Diverse examples of robotics engineers can be shared, to highlight contributions from individuals of all genders. ● Provide your students with the scenario/challenge: "Imagine we are engineers working to make delivery robots smarter and more efficient. How can we program a robot to move through a store, avoid obstacles, and deliver items to the right spot?" ● Divide students into mixed-gender teams and provide them with materials to create a physical maze representing the store. Include obstacles like "shelves" or "walls." ● Teams plan the robot's path using arrow cards to represent directions (forward, turn, etc.). ● Ensure rotation in teams' roles to promote participation from all students. ● Each team presents their planned navigation route to the class, explaining how they avoided obstacles and reached the delivery location. **Step 2 (35 minutes): Design Phase** ● Introduce the robot (e.g., Bee-Bot, Blue-Bot, or LEGO Mindstorms, VEXcode VR) and its coding interface (e.g., Scratch, Blockly), explaining that they will now program the robot to navigate the maze they created. ● Demonstrate basic block-based coding commands and how they translate to robot movements. ● Each team writes their program, tests it, and refines it based on the robot's performance in the maze. Encourage students to debug collaboratively when errors arise. ● Wrap up with a class discussion: *How does this activity relate to real-world robotics? Where else are robots used in similar ways?* ***(Optional: Homework activity - 15 minutes)*** ● Following the activity, each student will be encouraged to conduct research on their own about a "famous robot" and make a poster about it. ● The poster should present the robot (who designed it, what are their functions, etc.) ● The next day, all students will show it to the class.
Teachers and students' Roles	**Teachers**: ● Facilitate group discussions and provide technical guidance during programming. ● Ensure that all students in a group participate in all activities equally. ● Offer encouragement and feedback to foster problem-solving and creativity. **Students**: ● Collaborate to design a physical maze and plan navigation steps.

	● Take turns programming, testing, and debugging the robot. ● Reflect on how their solutions could apply to real-world robotics challenges.
Evaluation/ Assessment	● Observe students' participation and collaboration during group activities. ● Evaluate their ability to identify and fix errors in their programs. ● Use a rubric to assess the clarity and accuracy of their navigation plans and the effectiveness of their robot's movement. ● Each group presents their final robot navigation solution and explains how they refined their program.
TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students solve a realistic problem, akin to challenges faced in robotics and logistics industries. Students are also engaged in iterative testing and debugging, key aspects of engineering and programming, while the activity encourages teamwork and collective problem-solving. Finally, the activity concepts from mathematics, technology, and computational thinking.
How is gender inclusiveness ensured?	The activity encourages that roles in each team rotate, ensuring equal participation in planning, coding, and debugging. Moreover diverse examples of robotics engineers are shared, highlighting contributions from individuals of all genders while materials and task descriptions avoid gendered stereotypes, emphasising that anyone can excel in robotics and programming.
Considerations for level progression	For younger or less experienced students, use simpler mazes with fewer obstacles and pre-built programs they can modify and provide step-by-step guidance for block-based coding commands. For older or more advanced students, challenge them to include conditional logic (e.g., "If there is an obstacle, turn right") in their programs and introduce concepts of efficiency by asking students to optimise their robot's path.

Learning Scenario 11 - Saving Sea Turtles: A Campaign for Cyprus' Wildlife

Learning Scenario Information	
Title	Saving Sea Turtles: A Campaign for Cyprus' Wildlife
Age Level	10-12 years old
Duration	45 minutes

Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Science, Geography, Art, Technology, Language Arts
Learning Objectives	Upon completing this activity, the students should be able to: ● Research and summarise key challenges faced by sea turtles in Cyprus, particularly due to climate change. ● Use digital tools to create an engaging multimedia campaign. ● Develop persuasive messages and visuals to inspire conservation efforts. ● Present the campaign and justify creative choices in design and messaging.
Scenario Description	
Setting	In Cyprus, sea turtles like the Loggerhead and Green Turtle are critically endangered due to threats such as climate change, habitat destruction, and pollution. Rising sand temperatures caused by global warming have skewed gender ratios, while coastal development has disrupted nesting sites. Your school has been invited to support these efforts by designing an impactful campaign to inform the public about the importance of protecting sea turtles. You, as a teacher, want to guide your students to create a digital campaign to raise awareness and encourage local actions to protect these turtles and their habitats.
(Digital) Tools	● Canva (https://www.canva.com/) for creating infographics and visuals. ● Tablets or computers with internet access. ● Research materials and websites (e.g., Climate Change Adds to Plight of Endangered Sea Turtles, Terra Cypria). ● *Optional:* Microphones or video-editing tools for recording voiceovers.
Activity	**Step 1 (10 minutes): Introduce the Problem** ● Start with a discussion based on the article, *Climate Change Adds to Plight of Endangered Sea Turtles* in Cyprus, such as: ○ Share key points about how rising sand temperatures are causing a disproportionate number of female hatchlings and how habitat destruction impacts nesting beaches such as Lara and Akamas. ○ Discuss conservation efforts like protecting nests and reducing light pollution. Encourage students to reflect on the direct connection between human actions, climate change, and the survival of these species.

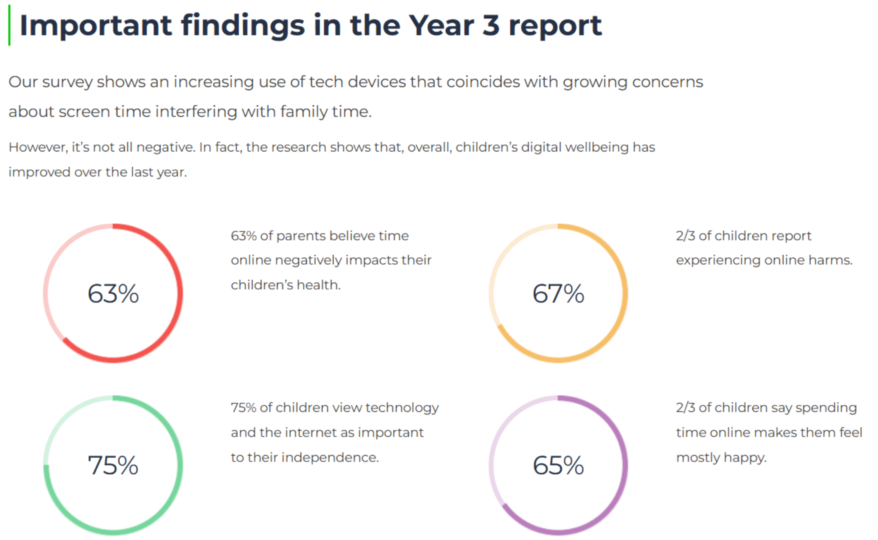
	- Encourage students to reflect on these challenges and share their thoughts: *How does climate change affect the survival of sea turtles?* *What actions could communities in Cyprus take to help?* - Transition to group work by dividing students into mixed-gender teams, assigning each group a specific issue (e.g., temperature shifts, coastal development and tourism impacts, plastic pollution, light pollution), and preparing them for deeper research. **Step 2 (10 minutes): Research and Brainstorm** - Students use online resources and provided materials to research their assigned topic. Encourage them to focus on: *Real-life examples from Cyprus.* *Existing conservation strategies and their effectiveness.* *Diverse conservationists and their work.* - Each group brainstorms ideas for their campaign, deciding on slogans, visuals, and target audiences (e.g., local residents, tourists, government bodies). **Step 3 (25 minutes): Design and Present the Campaign** - Students create their multimedia campaigns using Canva. Their campaigns should include: - A catchy slogan (e.g., "Cool Sands, Balanced Turtles"). - At least one infographic summarising their research findings. - A call-to-action encouraging specific steps like avoiding plastic, reducing light pollution, or donating to conservation efforts. *Optional:* Students can add a short video or audio message to amplify their message. - Each group presents their campaign to the class. They explain their design choices and how they hope to inspire action. - Ask students to reflect on what they learned and brainstorm ways to share the campaigns, such as through school displays, social media, or local community events.
Teachers and students' Roles	**Teachers**: - Provide background information and facilitate discussions. - Support students with research and using digital tools. - Guide group collaboration and offer constructive feedback during presentations. **Students**: - Research and summarise information on their assigned topic. - Collaborate in groups to create a digital campaign. - Present their work and reflect on their learning.

Evaluation/ Assessment	• Assess the accuracy and creativity of the campaigns using a rubric. • Evaluate group collaboration and the effectiveness of the messages. • Observe student engagement during discussions and presentations.
TINKER Framework Integration	
How is the activity authentic learning?	The activity links directly to real-world conservation challenges in Cyprus, while promoting critical thinking and problem-solving related to environmental sustainability. It also encourages students to create work with a tangible purpose and potential community impact.
How is gender inclusiveness ensured?	The activity encourages mixed-gender groups and ensures all students contribute equally to the project, and highlights examples of male and female conservationists to serve as role models.
Considerations for level progression	For younger or less experienced students, provide templates for infographic layouts and pre-selected facts. For older or more advanced students, encourage designing interactive elements or conducting deeper research into local conservation policies.

Learning Scenario 12 - Staying Safe Online

Learning Scenario Information	
Title	Staying Safe Online
Age Level	11-12 years old
Duration	30 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Social Studies, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify common online risks (e.g., phishing, cyberbullying, data breaches). ● Explain strategies to protect personal information and avoid online threats. ● Demonstrate safe online behaviour in a role-playing activity.
Scenario Description	
Setting	One of your students reports receiving suspicious messages online. You want to take this opportunity to discuss this topic with your class and teach your students how to identify online risks and stay safe while using the internet.
(Digital) Tools	● An online global or national article with data on online risks for students (e.g., DQ Institute's 2023 Child Online Safety Index (COSI) report or Children's Wellbeing in a Digital World Index Report 2024) ● Role-play scenario cards or prompts ● Projector or digital whiteboard
Activity	**Step 1 (10 minutes): Identify common online risks** ● Start by showing an engaging online article or infographic with global or national data on online risks for students. For example, the following data from the *Children's Wellbeing in a Digital World Index Report 2024* (**Tip:** You can select specific

information that you want to present students with and also translate the content into your national language)



- Discuss key statistics, such as the percentage of students that are experiencing online harms (67%).
  - *"How do the statistics you've seen compare with your own experiences or what you've heard from friends? Are they surprising to you? Why or why not?"*

- On a shared board (physical or online, e.g. PADLET) ask students to share and discuss risks they are aware of or relate to their personal experience.
  - *"Why do you think certain online risks, such as cyberbullying or exposure to inappropriate content, are more common among students? What makes these risks particularly challenging to avoid?"*

- As a second part of this discussion, highlight key features of effective systems, such as simplicity, security, and accessibility.
  - *"What steps do you think individuals can take to protect themselves from these online risks? Are there specific actions or behaviours that you think are most effective?"*
  - *"How can online platforms balance accessibility and simplicity with the need for security? Are there any examples of platforms that do this well?"*

Step 2 (20 minutes): Design Phase

- Divide students into mixed-gender groups and give each group a role-play scenario (e.g., someone receives a suspicious email, faces cyberbullying, or is asked for

	personal information). Ensure your scenarios include gender-inclusive language and avoid stereotypes. ● Students act out the scenario and decide on the best course of action based on strategies for staying safe online. ● Each group presents their scenario and solution to the class. ● End with a discussion on how to apply these strategies in real life and identify trusted adults or resources for help. - *“Have you ever encountered a similar situation online? How did you handle it at the time?”* - *“What are some specific strategies that you can use in your own life to stay safe online?”* - *“Who are the trusted adults or resources you would turn to if you found yourself in a risky online situation?”* - *“How do you know when it's time to seek help from a trusted adult rather than trying to resolve the issue on your own?”*
Teachers and students’ Roles	**Teachers**: ● Select and share the online article/data and explain its relevance. ● Facilitate discussions and guide students through role-playing. **Students**: ● Engage with the online data, actively participate in group discussions, and demonstrate safe online behaviour during the role-play activity.
Evaluation/ Assessment	● Observe group discussions and role-playing for understanding of online risks and appropriate responses. ● Use a quick class poll or quiz to check comprehension of key strategies. **Example:** 1. If you receive a suspicious email asking for personal information, it is safe to click on the links to investigate further. (false) 2. It’s important to report cyberbullying incidents, even if they seem small or harmless, to a trusted adult or resource. (true) 3. Sharing personal information, such as your address or phone number, with someone you’ve only met online is generally safe if they seem trustworthy. (false)
TINKER Framework Integration	

How is the activity authentic learning?	The activity provides real-world context through global statistics on online risks and practical role-play scenarios.
How is gender inclusiveness ensured?	The activity ensures that the online article/data includes diverse perspectives and examples, and provides scenarios that avoid stereotypical roles. It also encourages equal participation in the role-play activity assigning roles that avoid gender stereotypes
Considerations for level progression	For younger or less experienced students, use simplified scenarios and provide a handout summarising online safety tips. For older or more advanced students, encourage them to create a short guide or a campaign video on online safety to share with younger students or their community.

Learning Scenario 13 - Tracking School Supplies with Data Tools

Learning Scenario Information	
Title	Tracking School Supplies with Data Tools
Age Level	10-12 years old
Duration	40 minutes
Informatics topic areas	Computing Systems, Data and Information
Content domain (Integrated Subjects)	Mathematics, Technology, Social Studies
Learning Objectives	Upon completing this activity, the students should be able to: ● Organise data into meaningful categories. ● Apply basic formulas in spreadsheets to calculate totals. ● Evaluate the accuracy and completeness of data entries. ● Design a simple inventory system to track resources.
Scenario Description	
Setting	You are a teacher managing resources in your classroom. You've noticed supplies like notebooks and pencils often run out unexpectedly, and tracking them is chaotic. You decide to teach your students how to manage inventory using a simple data system.
(Digital) Tools	● Google Sheets or Microsoft Excel ● Projector or interactive whiteboard ● Markers and a large poster board (for unplugged activity) ● Post-its

Activity	**Step 1 (15 minutes): Organise data into meaningful categories.** ● Begin by showing examples of inventory management in real life, such as libraries tracking books or sports teams tracking equipment. Include examples featuring professionals of all genders to demonstrate inclusivity (e.g., a woman managing a library or a man organising school supplies). ● Start the activity with a story: "Our class keeps losing track of books, pencils, and markers and other supplies. I need your help to organise our supplies." ● Divide students into small, mixed-gender groups and assign roles (e.g., recorder, presenter, organiser) to ensure everyone has an equal chance to participate. Rotate roles in future activities to avoid reinforcing stereotypes. ● Groups brainstorm categories for classroom supplies (e.g., "pencil cases", "coloured markers"). Encourage students to validate ideas by ensuring everyone agrees. ● Groups collaborate to categorise real classroom supplies. Each team focuses on categorising different types of supplies (e.g. one team the markers, other the pencil cases, etc.). Rotate tasks like counting and categorising items so all students in all teams practice various roles. **Step 2 (25 minutes): Tracking School Supplies on Google Sheets/Excel** ● Demonstrate how to create a simple table in Google Sheets, including headers (e.g., Item, Quantity). ● Students work in pairs, ensuring mixed-gender pairings, to enter data into the spreadsheet from the unplugged activity. Each pair alternates between typing data and checking for accuracy. ● Teach students to flag low-quantity items. Discuss potential solutions for restocking these supplies and create a plan collaboratively.
Teachers and students' Roles	**Teachers**: ● Facilitate inclusive discussions by encouraging quiet students to share their thoughts. ● Model gender-neutral language when describing tools or assigning roles. ● Provide equal opportunities for all students to engage in both physical and digital tasks. **Students**: ● Take turns in roles like data entry, calculations, and presenting findings. ● Collaborate respectfully, ensuring everyone's input is valued. ● Offer solutions for resource management as a group.
Evaluation/ Assessment	● Observe group interactions to ensure equitable participation. ● Assess data entry accuracy and the ability to use formulas. ● Evaluate students' contributions to solutions during group discussions.

TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students apply skills used in inventory management to solve a practical classroom problem, simulating real-world tasks.
How is gender inclusiveness ensured?	The activity encourages equal participation by using mixed-gender teams for all activities, and rotating roles (e.g., leader, recorder) to ensure equal participation. It also provides equal encouragement and acknowledgment of all contributions, avoiding language or actions that reinforce stereotypes.
Considerations for level progression	For younger or less experienced students, use a pre-filled spreadsheet template to simplify the data entry task. For older or more advanced students, introduce advanced spreadsheet tools, like conditional formatting, to highlight low-stock items automatically.

Learning Scenario 14 - Understanding Data Transmission: how do messages travel through a network

Learning Scenario Information	
Title	Understanding Data Transmission: how do messages travel through a network
Age Level	10-12 years old
Duration	35-45 minutes
Informatics topic areas	Networks and Communication
Content domain (Integrated Subjects)	Technology, Mathematics, Language Arts

Learning Objectives	Upon completing this activity, the students should be able to: ● Explain how data is transmitted in a network using packets. ● Identify key roles in a communication system (sender, receiver, router). ● Simulate a simple network and describe its components.
Scenario Description	
Setting	Imagine you're teaching a class that doesn’t have access to computers today, but you want students to understand how messages travel through a network. You decide to simulate data transmission using a hands-on activity that involves group work and role-playing. You want to ensure students grasp the basic concepts of networks and communication.
(Digital) Tools	● Index cards or paper slips ● Markers or pens ● String or tape to create “network paths” on the floor ● Envelopes to represent “data packets”
Activity	**Step 1 (5 minutes): Introduction** ● Explain the key components of a network: ○ **Sender:** Send the data. ○ **Receiver:** Receive the data. ○ **Router:** Direct the data to the correct path. ● Introduce the concept of **data packets:** small pieces of information that travel through a network. **Step 2 (10 minutes): Set Up the Network** ● Create a simple network in the classroom: ○ Use string or tape to form paths between desks to represent network connections. ○ **Assign roles:** Some students will be routers, some senders, and others receivers. ● Provide each sender with an index card containing a “message” (e.g., "Hello, how are you?"). Use messages and scenarios that reflect diverse interests (e.g., music, sports, space). **Step 3 (20 minutes): Simulate Data Transmission** ● Split each message into “data packets” by writing parts of the message on separate index cards. ● Packets are placed in envelopes and labelled with the sender’s and receiver’s addresses. ● Senders hand the packets to the nearest router.

	● Routers check the address on the packet and pass it along the correct path. ● Receivers reassemble the packets into the original message. ***Tip:*** Rotate roles to ensure equal participation. **Step 4 (Optional - 10 minutes): Introduce Challenges** ● Add obstacles, such as: ○ A “broken” path where packets must be rerouted. ○ Delays (e.g., a router can only pass packets every 10 seconds). ● Discuss how real networks handle these challenges.
Teachers and students’ Roles	**Teachers**: ● Set up and explain the network simulation. ● Monitor the activity and guide students as needed. ● Ask reflective questions, such as “What happens if a packet is lost?” **Students**: ● Role-play as senders, routers, or receivers. ● Work collaboratively to transmit and assemble data. ● Reflect on their roles and share insights during the discussion.
Evaluation/ Assessment	● Observe students’ understanding during the simulation: ○ Did they follow the correct paths? ○ Could receivers successfully assemble the messages? ● Ask students to explain how the simulation relates to real-world networks. ● Use a quick quiz or discussion to assess their grasp of key terms (e.g., packet, router).
TINKER Framework Integration	
How is the activity authentic learning?	The activity helps students mirror how data travels through networks as they work together as components of the system. Students analyse and troubleshoot the network they simulated.
How is gender inclusiveness ensured?	The activity encourages equal participation by rotating roles to ensure equal participation and using messages and scenarios that reflect diverse interests (e.g., music, sports, space).
Considerations for level progression	For younger or less experienced students, use simpler network paths and shorter messages (e.g., “Hi!”). For older or more advanced students, introduce concepts like packet loss, retransmission, or encryption (students must decode messages).

Learning Scenario 15 - Visualising Energy Usage at Home

Learning Scenario Information	
Title	Visualising Energy Usage at Home
Age Level	11-12 years old
Duration	40 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Science, Technology, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: ● Collect data about household energy consumption using observation. ● Organise and categorise the data into tables and graphs by using excel. ● Analyse energy usage patterns and propose energy-saving solutions.
Scenario Description	
Setting	Your school is hosting an environmental awareness week, and your class will contribute by analysing energy consumption patterns at home. You want to help your students understand how their everyday choices impact the environment and guide them in collecting and presenting meaningful data.
(Digital) Tools	● Google Sheets or Microsoft Excel ● Chart paper and markers (for optional unplugged activity) ● Home energy data collection template (simple table for students to fill in) ● Laptops or tablets for digital work
Activity	**Step 1 (10 minutes): Household energy consumption** ● Begin by asking students to think about the devices they use daily at home that require electricity. Write examples on the board. ● Prepare and distribute an energy data collection template and explain how to estimate the daily usage time of each device.

Template example:

Device/Appliance	Purpose	Hours Used per Day	Energy-Saving Idea
Light Bulbs	Lighting	5	Turn off when leaving the room
Refrigerator	Storing food	24	Ensure the door is sealed
Washing Machine	Cleaning clothes		Use only full loads
Television	Entertainment		

- Discuss patterns they might expect, such as higher usage of lights in the evening.

Step 2 (20 minutes): Organise and categorise the data into tables and graphs.

- Students work into mixed-gender pairs or small groups.
- Instruct each student in the group to input the data they collected into a shared Google Sheet.
- Teach them to use basic functions to sum up total hours of usage for each device category. Ask them to produce graphs per household (per student) and then as a team (all households together).
- Show them how to create bar graphs or pie charts to visualise their findings.
- Ask students to:
    - discuss and compare the results of individual graphs and the overall energy consumption of the team
    - Brainstorm solutions to reduce energy waste based on their team's results.

Step 3 (10 minutes): Energy usage patterns and energy-saving solutions.

- Bring the class together to reflect on the activity. Ask each group to share their graphs and compare the results in the plenary.
- Discuss as a class how the data reveals energy usage trends and brainstorm simple ways to save energy, such as turning off unused lights.

Teachers and students' Roles	**Teachers**: ● Introduce the topic and facilitate discussion about energy consumption. ● Guide students in using the data collection template. ● Support students with digital tools and provide troubleshooting help. **Students**: ● Collect data from home and engage in group discussions. ● Use digital tools to input and visualise data. ● Present their findings to peers and contribute to brainstorming sessions.
Evaluation/ Assessment	● Observe students' engagement during the activity. ● Assess the accuracy and organisation of their data collection and visualisation. ● Evaluate the clarity and creativity of their energy-saving proposals through a rubric focusing on presentation and analysis.
TINKER Framework Integration	
How is the activity authentic learning?	● Students connect their learning to their daily lives by analysing energy usage and its impact. ● Students work in groups to compare findings and brainstorm solutions. ● Students reflect on their habits and how they can adopt more sustainable practices.
How is gender inclusiveness ensured?	The activity encourages equal participation by rotating leadership roles within groups. It uses examples and visuals featuring diverse characters and households and avoids assigning traditional roles (e.g., data entry to boys, presentations to girls).
Considerations for level progression	For younger or less experienced students, provide pre-filled templates with example data to practice creating visualisations before inputting their data. For older or more advanced students, introduce more complex analysis, such as calculating costs of energy use or CO_2 emissions.

Greece

Learning Scenario 1 - Acquaintance with the main parts of computers

Learning Scenario Information	
Title	Acquaintance with the main parts of computers
Age Level	10–12 years old
Duration	45 minutes
Informatics topic areas	Computing Systems
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify the main parts of computers. ● Distinguish between hardware and software. ● Perceive the computer as an integrated system.
Scenario Description	
Setting	Biological and other processes are perfectly tuned. What about computers? In this scenario, you can introduce your students to the main parts of computers, without them being formerly acquainted with Informatics principles. You use examples from real-life experiences to help students perceive the computer as an integrated system, perceiving how a computer system is tuned. In a gender-inclusive approach, didactic paradigms will interest all students.
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Pencils, Paper ● Learning Resources, Digital tools (Multimedia)

Activity	**Step 1 (5 minutes): Lesson Foretaste** Students are asked to watch a video (such as the one provided) to get an overall picture of the didactic object. This video will whet the students' appetite for the next steps. https://www.youtube.com/watch?v=Iv8X7aLikLE **Step 2 (5 minutes): Time for a game** Through a "millionaire" game's simulation, the educator is asking students to answer a specific question: How many are the main computer's parts? A. 2 B. 3 C. 4 D. 5 The educator writes the students' answers on the Whiteboard, saying that the answer will be given after the end of the course. **Step 3 (10 minutes): Knowing Hardware** Students are asked to watch a video (such as the one provided) to get acquainted with the hardware. The educator initiates a discussion right afterward. Examples from real-life experiences are used in the discussion phase. The didactic paradigms are drawn from topics that interest all students. The example of the manufacturing parts of a car could be used to introduce hardware. https://www.youtube.com/watch?v=YbARkFqcAWw **Step 4 (10 minutes): Knowing Software** Students are asked to watch a video (such as the one provided) to get acquainted with the software. https://www.youtube.com/watch?v=YbARkFqcAWw The educator initiates a discussion right afterward. Examples from real-life experiences are used in the discussion phase. The didactic paradigms are drawn from topics that interest all students.

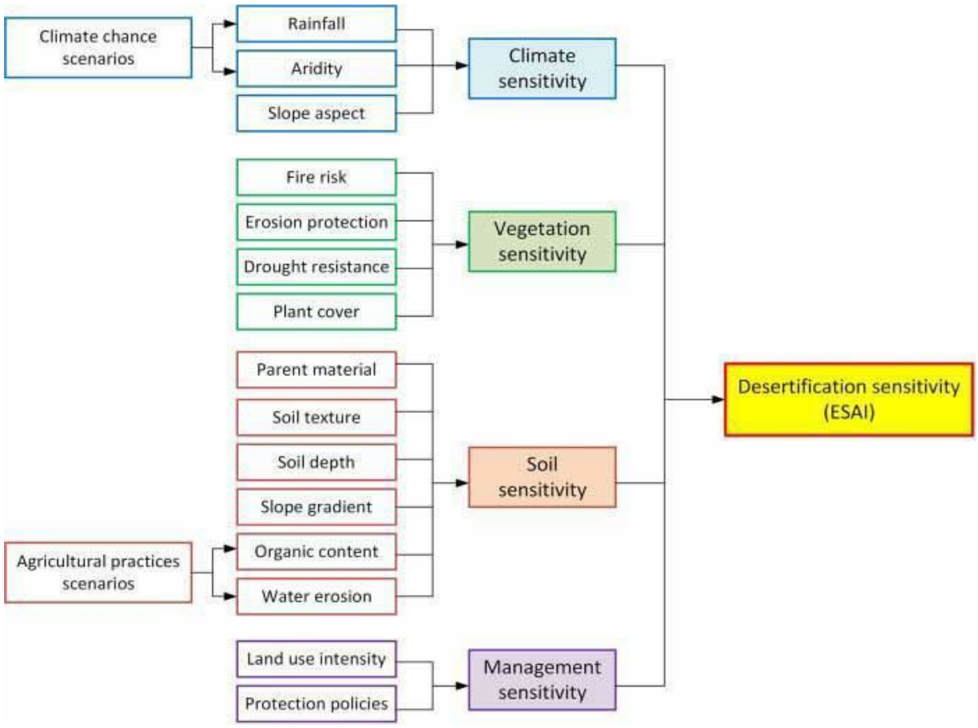
	The videos in steps 3 and 4 explain how a computer is viewed as an integrated system. The educator uses daily-life examples to underline this point. https://www.youtube.com/watch?v=CTmg9-PCmUs Examples like the human body, taxi operation, and industry operation are ideal to accentuate the computer system's integration. **Step 5 (10 minutes): Distinguish between hardware and software** Students are asked to complete a worksheet, such as the one listed below: Write software or hardware at the end of each sentence, according to the term each sentence refers to. **SENTENCES** Manufacture of computer parts Necessary for the computer operation Coordinates the computer's parts It is called "the heart" of computer The educator is initiating a discussion on the worksheet's answers. **Step 6 (5 minutes): Recapitulation** The educator brings up the multiple-choice question posed in the foretaste stage, attempting to recapitulate the main points that trigger the students' assimilation process.
Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator, guiding students to reach vital conclusions. In parallel, the educator acts as an "animator" fostering student engagement. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.

Evaluation/ Assessment	● The answers to the worksheet reveal the extent to which the students have taken in the rudimentary knowledge. ● The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. ● The student's behavioural engagement is assessed through overall participation in the learning process.
TINKER Framework Integration	
How is the activity authentic learning?	Videos are based on real-life experiences. The "taxi" operation video is a representative example, indicating how hardware and software are properly tuned, as an integrated unit. Discussion is also facilitated through daily life paradigms.
How is gender inclusiveness ensured?	1. All students equally participate in the learning process. 2. Discussion is based on daily life experiences that all students are familiar with. 3. Videos and other learning resources are drawn from topics that interest all students.
Considerations for level progression	A collaborative approach can foster teamwork. The worksheet can be handed to groups, and one group can evaluate the other in a peer-to-peer assessment mode. More steps can be added to the learning flow to trigger the student's metacognitive process.

Learning Scenario 2 - Combating desertification and land degradation in the island of Crete / Hellas

Learning Scenario Information	
Title	Combating desertification and land degradation in the island of Crete / Hellas
Age Level	10–12 years old
Duration	45 minutes

Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Geography, Earth Science, Mathematics.
Learning Objectives	Upon completing this activity, the students should be able to: ● Carry out a scientific inquiry. ● Represent and organise data in different ways to reveal new information.
Scenario Description	
Setting	In Greece (Hellas), many regions are constantly losing their ability to regenerate. A classic example is some Aegean islands, where the abandonment of old tried-and-tested techniques (terrace agriculture, crop rotation, alternating grazing, etc.), fires, terrain morphology, rains, and strong winds lead to reduced vegetation cover, reduction of organic material, water scarcity, and floodwaters, resulting in advanced erosion and desertification. However, a significant risk of desertification is also faced in the Peloponnese, western Central Greece, Crete, Evia, Epirus, Thessaly, and Thrace. Recent studies show that 35% of Greece is at high risk. Combating desertification on the island of Crete. Students will use data to explore how the Mediterranean's sea temperature and air temperature on the island of Crete are changing and how those changes are impacting two key issues, Crete soil's fertility and its future desertification.
(Digital) Tools	● Computer/laptop ● Projector/whiteboard ● Markers
Activity	**Step 1 (10 minutes): Introduction to the desertification phenomenon Using Real-Life Examples**

	 Diagram from (**G. Morianou; Kourgialas; et al, 2021**) ● Explain to the students what a desertification phenomenon (see the diagram above) is. ● Explain that the main human actions that intensify the phenomenon of desertification on the Earth's soil are, as follows. The overexploitation and irrational use of natural resources (forests, pastures, crops, groundwater and above-ground water, quarries, mines, tourism, etc.). Fires and overgrazing. Fires deplete the soil, and overgrazing strips it of its already poor vegetation. The abandonment of traditional techniques in agriculture, grazing, forestry, and water harvesting. Inappropriate land use, such as urban-tourist facilities in fertile soils, agriculture in non-fertile ones, grazing in abandoned fields, etc.: ● Introduce the terms: desertification, biodiversity loss, and climate change. **Step 2 (10 minutes): Losing the ability to regenerate: Understanding the danger of living on a "desertificated island".** ● Show maps predicting the future desertification in Crete/ Hellas, from: 1. (Europa, Joint Research Center, 2024 2. (European Drought Observatory, 2024)

	3. (Google Earth Maps, 2024) 4. (Europa, Copernicus, 2024 5. (Eurostat,2024) 6. (Europa, Copernicus / land, 2024). 7. (European Environment Agency, Greece, 2024). ● Introduce the terms soil sensitivity, management sensitivity, vegetation sensitivity, and climate sensitivity. **Step 3 (20 minutes): Implementing new priorities in combating desertification.** ● Arrange the chairs and desks and create three different working areas for students. (This can also be done in the school's garden area if a cordless connection can be applied.) ● Divide students into three mixed-gender pairs or small groups. One group will be entitled “the farmers”, the other “the scientists” and the last “the engineers”. ● Data can be collected (maps, charts) by students from different sources, as we mentioned above. At the beginning of the activity “scientists” will bring data to establish change over time in the Mediterranean climate and especially in Crete’s soil-past, present, and future, in terms of desertification sensitivity. ● The “scientists(s)” in collaboration with the “engineers” will create a step-by-step set of instructions to guide “the farmers” towards combating further desertification of their soil. For example, by measuring one characteristic of their soil e.g. pH, see: (Agro capital / Indexes, 2024) ● Throughout the activity, the teacher also gives structured questions on key issues they need to consider. As students become more comfortable, gradually, the help is removed. Some examples of questions are: ○ *What data are you going to be considered to be relevant to indicate climate change over time?* ○ *What went wrong, and we have had less and less production of this good over the last years? How can you fix it in a long-term period and sustainably?* *See, the latest* ○ *How can you manage to change your production?* **Step 4 (5 minutes): Group Reflection and Discussion** ● Bring the class together to reflect on the activity. Ask each group to share and compare their results and describe the challenges they faced while collecting and interpreting data. ● **Prompts for Discussion:**

	○ *What feasible measures do we have to adopt in combating desertification sensitivity in Crete?* ○ *Do we need to change habits as human beings toward a sustainable environment?* ○ *By doing so, do we need to change our type of agricultural production?* For example, see the Italian case: (National Geographic,2024)
Teachers and students' Roles	**Teachers**: Guide the students through the initial examples and assist them in understanding the change over time -past, present, and future. **Students**: Act as farmers and engineers as well as scientists. As farmers and owners of agricultural businesses, they foresee and test future vegetation, in collaboration with engineers. As scientists, they are using data to understand a phenomenon. Considering the scientists' data, the farmers are assigned to create a plan for an efficient agricultural process, to achieve less extent of desertification in the future.
Evaluation/ Assessment	● Evaluate each group's ability to understand the complexity of the terms surrounding climate change over time and in defining desertification sensitivity. ● Observe student participation during role-play activities, paying attention to how they create and refine their thoughts accordingly.
TINKER Framework Integration	
How is the activity authentic learning?	The activity uses real-world problem-solving through hands-on activities. Data are collected on real-time procedures. Almost all principles of authentic learning are applied in this activity setting including authentic context and task, multiple perspectives, collaboration, reflection, scaffolding, and authentic assessment.
How is gender inclusiveness ensured?	The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, ensuring all students contribute as both "scientists", "engineers", and "farmers".
Considerations for level progression	These scenarios can be improved by practicing them in agricultural fields (for example in greenhouses) in real-time and by measuring and keeping the appropriate indexes (e.g. p.H, soil type, etc.).

Useful resources and links used in this learning scenario:

- https://drought.emergency.copernicus.eu/, European Drought Observatory, accessed at 12/11/2024
- https://edo.jrc.ec.europa.eu/gdo, Global Drought Observatory, accessed at 12/11/2024
- https://wad.jrc.ec.europa.eu, Europa, Joint Research Center, accessed at 12/11/2024
- https://global-surface-water.appspot.com/map, Google Earth Maps, accessed at 14/11/2024.
- https://forest-fire.emergency.copernicus.eu/apps/fire.risk.viewer/, Europa, Copernicus, accessed at 14/11/2024.
- https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Land_cover_statistics , Eurostat, accessed at 14/11/2024.
- https://land.copernicus.eu/en/map-viewer?dataset=a5ee71470be04d66bcff498f94ceb5dc , Europa, Copernicus / Land, accessed at 14/11/2024
- https://www.eea.europa.eu/en/countries/eea-member-countries/greece? , European Environment Agency, Greece, accessed at 18/11/2024.
- https://www.agrocapital.gr/agrotikos-odhgos/3032/plirofories-gia-to-ph-toy-edafoys , Agro capital / Indexes, accessed at 18/11/2024.
- https://www.nationalgeographic.com/environment/article/italy-sicily-agriculture-tropical-climate , National Geographic, accessed at 17/11/2024
- Morianou, G., Kourgialas, N. N., Pisinaras, V., Psarras, G., & Arambatzis, G. (2021). Assessing desertification sensitivity map under climate change and agricultural practices scenarios: the island of Crete case study. *Water Supply*, *21*(6), 2916-2934.
- Toreti, A., Bavera, D., Acosta Navarro, J., Acquafresca, L., Arias-Muñoz, C., Avanzi, F., Barbosa, P., Cremonese, E., De Jager, A., Ferraris, L., Fioravanti, G., Gabellani, S., Grimaldi, S., Hrast Essenfelder, A., Isabellon, M., Maetens, W., Magni, D., Masante, D., Mazzeschi, M., Mccormick, N., Rossi, L. and Salamon, P., Drought in the Mediterranean Region - January 2024**,** Publications Office of the European Union, Luxembourg, 2024, doi:10.2760/384093, JRC137036.

Learning Scenario 3 - Creatively Exploring the Capabilities of a Word Processor

Learning Scenario Information	
Title	Creatively Exploring the Capabilities of a Word Processor
Age Level	10–12 years old
Duration	45 minutes

Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Computer Science, Language, Art
Learning Objectives	Upon completing this activity, the students should be able to: ● Use the basic functions of a copywriter to create aesthetically pleasing documents. ● Embed pictures, shapes, icons, and frames in a document. ● Shape text creatively using styles, fonts, colours, and formats. ● Compose documents using a text editor, adapting them to different audiences and purposes.
Scenario Description	
Setting	You want students to practice using a text editor creatively by formatting text and inserting objects such as pictures, shapes, frames, icons, etc. Students feel that the use of writing is obsolete and the use of a word processor is limited to creating long, formal texts. Try to engage students in activities that combine language skills with technology, allowing students to express themselves creatively by composing documents related to their interests, such as posters, brochures, etc.
(Digital) Tools	● Computer/laptop ● Projector/Interactive Whiteboard ● Sample documents (such as letters, announcements, posters, and invitations) ● Pictures for use in documents ● Word processor software like MS Word
Activity	**Step 1 (10 minutes): Introduction to the Basic Functions of the Copywriter** ● Introduce students to the basic functions of a text editor, such as formatting text (fonts, size, colour), inserting objects (primarily: images, and secondarily: shapes, icons, frames), and creating titles and paragraphs. ● Show examples from professional documents (such as letters) and "artistic" documents (posters, brochures) and discuss how formatting can affect the understanding and appearance of text. ● Prepare them for the next activity goal of creating an "engaging document" that is in their area of interest, like an invitation to a school event. **Step 2 (15 minutes): Create a Standard Document with Formatting and Images**

	● Divide the students into mixed-gender groups and ask the students to start creating a document (for example, a conference invitation). (Note: you can show them your version of the invitation that is in a formal style) ● Explain to them that the document should have: ○ A title with a large font size and style. ○ A short text with a paragraph. ○ Colour formatting in selected places (different colour for title, other for text). ○ An image relevant to the subject of the document. Choose the image among the images provided by the text editor. (Note: mention to them that although it is easy to find and use images from the internet, they should think twice about their right to use the images, due to copyright. However, this is a discussion for another lesson.) ● Encourage students to try different formats (e.g., change text colour, align, create a list) and incorporate other graphics (shapes, icons, frames). **Step 3 (15 minutes): Composition of a Creative Invitation Document** ● Each group will compose an invitation for a real event of their daily lives. They are asked to decide: ○ the event to which the invitation will refer (e.g. Invitation to the school ball, e.g. Invitation to the carnival party, or anything else that meets the interests of the members) ○ the target audience (classmates, parents, friends) ● They then decide on the content of the invitation (title, text, images, icons) and proceed to its composition. *Note: indicate to students that an invitation should be short, easy to read, and contain important information such as the place and time of the event.* ● Ask them to experiment with font colours and sizes so that the result is legible, tasteful, and in line with the invited audience. ● Encourage them to insert images, shapes, icons, and frames into their document in order to add their own artistic touch to their creation, thus having the opportunity to express their own aesthetics, but taking care to maintain the readability and simplicity required by an invitation, avoiding excessive use of the copywriter's tools. *Note: emphasise that although the copywriter has many impressive tools in his quiver, this does not mean that it should be overused. Also, the reader should get basic information about the event through a pleasant and readable invitation.* **Step 4 (5 minutes): Discussion and Presentation** ● Ask each group to present or share their document with the rest of the class and explain their formatting and design choices. ● Ask questions like: ○ What functions of the copywriter did they use, and how did they affect the final result?

	○ How did the choice of fonts and colours affect the look and feel of the document? ○ What difficulties did they face, and how did they overcome them? ○ How could you put your creation to practical use?
Teachers and students' Roles	**Teacher:** The role of the teacher is to guide students in the use of the text editor, give examples, and encourage students to experiment with the different functions. During the activity, he offers help and advice to improve the final document. **Students:** Students work in teams to create a final document using their knowledge of word processing. They experiment with formatting and inserting objects (images, shapes, icons), utilising the word editor's tool to create something aesthetically pleasing according to their preferences that they will use in practice.
Evaluation/ Assessment	● Assess whether and how students work and collaborate on each activity. ● Assess whether the use of the text editor makes it difficult for students. ● Evaluate whether the teams manage to create the final product and whether it is effective (conveys information), creative (uses various kinds of objects), and tasteful (easy to read without exaggeration). ● Self-assessment: Students are encouraged to reflect on their choices and recognise what worked well and what they could improve in their document (add, subtract, change).
TINKER Framework Integration	
How is the activity authentic learning?	The scenario is based on real needs, such as the creation of invitations, posters, and brochures. It promotes collaboration, reflection, and the authentic use of technology to create creative and elegant documents while offering freedom in students' creative choices.
How is gender inclusiveness ensured?	The activities are all implemented in mixed groups, with equal participation of all students at all stages. The project is based on collaboration and does not adopt gender stereotypes, while all students act as content creators expressing their artistic preferences.
Considerations for level progression	● Another topic can be selected, such as creating a poster (e.g. Student Theatre Festival) or creating a brochure (e.g. Rules for Safe Use of the Internet)

	• Students can even add their creations from previous lessons such as creations with digital tools for creating and editing images and graphics (e.g. painting, Inkscape, gimp) • Use tables to better organise content.

Learning Scenario 4 - What is in a drop? - How to be Water wise (in an urban water cycle)

Learning Scenario Information	
Title	What is in a drop? - How to be Water wise (in an urban water cycle)
Age Level	10–12 years old
Duration	45 minutes
Informatics topic areas	Data and Information, Responsibility and Empowerment
Content domain (Integrated Subjects)	Geography, Earth Science, Mathematics/Informatics
Learning Objectives	Upon completing this activity, the students should be able to: • Understand that they can be part of the solution by looking at their water usage and exploring ways that they can be waterwise and live sustainably. • Become aware of how they are using water at their home by conducting a "Home Water Audit" and presenting it using spreadsheets.
Scenario Description	
Setting	You want students to explore the many different available ways to be water-wise. For example, at home, in the garden, at school, etc. Students will be introduced to conducting a water audit for their homes.

	Students will be establishing and embracing a code of practice of becoming much more waterwise.
(Digital) Tools	Online tools: We will be using a variety of tools in these lessons. In preparation, it will be helpful to familiarise yourself on how to create checklists and questionnaires with the following: ● Hot Potatoes Tools in the classroom: ● Computer/Laptop ● Projector/ Whiteboard ● Markers ● Spreadsheets (such as Excel)
Activity	**Step 1 (10 minutes): Introduction to What is in a drop. -** How to be Water-wise. ● Explain to the students what the water cycle phenomenon is with the usage of the following links: **1.** (U.S. Geological Survey's (USGS) Water Science School, 2024) **2.** (Water Science School / The water cycle for schools, 2024) **3.** (Water Science School/diagrams, 2024) **4.** (Wikipedia, 2024) ● Furthermore, explain to the students what the water scarcity and the water crisis are and how we are going to secure water with the usage of the following links: 1. (UNICEF / water scarcity, 2024) 2. (UNICEF / schools, 2024) 3. (Water organisation, 2024) 4. (United Nations /Reports, 2024) **Step 2 (10 minutes): Understanding How to be Water wise - Creating a code of good practices.** ● Introduce the terms: water scarcity, water crisis, and water usage. The following videos can be used for this end: https://www.youtube.com/watch?v=otrpxtAmDAk

https://www.youtube.com/watch?v=JyzvcrZIuf0

There are many ways to be waterwise

At this point, we will strongly recommend that teachers facilitate **brainstorming sessions** where each class formulated questions about how to be waterwise (at home, at school).

The classroom discussions were guided by suggestions for teachers to ask their students:

Questions for brainstorming sessions:

- **What words or images come to mind when you hear water crisis / water usage?**
- **What do we know about the water crisis / water usage?**
- **What do we know about the causes of water crisis / water usage?**
- **What do we know about solutions?**
- **What do we not know?**
- **How can we be wate-rwise at home/at school?**
- **Can we create a code of good practices to be water wise at home/at school?**
- **Can we create a home water audit?**

Method of brainstorming:

The children were encouraged to consider conversations about water usage they may have had with friends or family, and to ponder what questions arose from these encounters.

They were also prompted to think about questions they might have about water usage impacts occurring from local to global scales. Teachers were asked to encourage their students to be curious and open to asking all kinds of questions.

The students wrote their questions on index cards, and once all students had contributed as many questions as they wanted, the index cards were gathered and examined by the class.

Teachers then allowed students to reflect on the kinds of questions asked, and to add additional questions if they liked.

Step 3 (20 minutes): The creation of a Home Water Audit / Water Usage calculator.

- Arrange the chairs and desks and create two different working areas for students.

	• Divide students into two mixed-gender pairs or small groups. One group will be entitled "the water consumers" and the other "the water hunters". Students will be becoming aware of how they are using water at their home by conducting a Home Water Audit. This is a fun way for students to learn about how water is used in the (Urban) Water Cycle. There are three steps to be taken, as follows: **Step 1: Find out how much water your home uses.** Per year (spring, summer / Autumn, winter) Per day **Step 2: Where does your home use water?** Inside the household (e.g. bathroom section-kitchen section-laundry section) Outside the household (e.g. garden – garage) **Step 3: How can your home save water?** Inside the household (e.g. bathroom section-kitchen section-laundry section) Outside the household (e.g. garden – garage) e.g. by using water pools All working groups of children (consumers-hunters) will participate in exploiting these steps. These steps can be constructed by brainstorming sessions, as we are shown above. The final result of this activity will be the formation of a **Water Usage Calculator** (in the form of a Questionnaire / Multiple choice questionnaire), with the help of the following table: **Water Use Table** (It can be used as an index for calculating water usage) This water use table was adopted by (The Australian Environmental Education, 2024)

The Water Use table lists how many litres of water are used for **common household activities each day**.

You can also use this to calculate how much water you use each day and help you find areas to reduce consumption and become Waterwise.

WATER USE	LITRES
Toilet (Single flush cistern)	11 litres
Toilet (Duel Flush)	3 litres for a half flush 6 litres for a full flush
Bath	100 litres
Shower (standard shower head)	20 litres/minute
Shower (low flow shower head)	10 litres/minute
Dishwasher load	12 litres
Washing machine load	90 litres
Brushing teeth with tap running	5 litres/minute
Drinking, cooking, cleaning	10 litres person/day
Hand basin per use	5 litres
Garden sprinkler	15 litres/minute
Garden dripper per hour	15 litres/minute
Car Washing with hose	15 litres/minute
Hosing driveway	15 litres/minute
A dripping tap can waste up to	200 litres of water/day
Leaking or running toilet	500 litres of water/day

One litre = 4,000 drips (roughly)

according to (USGS,2024)

	Throughout the activity, the teacher also gives structured questions on key issues they need to consider. As students become more comfortable, gradually, the help is removed. Some examples of questions are: ○ *What data are you going to consider to be a water hunter?* ○ *What went wrong, and we have had less and less consumable water over the last years? How can you fix it in a long-term period and sustainably?* ○ *How can you manage to change your approach to water's sustainability?* Spreadsheets, such as Excel, can be used to implement the students' water audit. **Step 4 (5 minutes): Group Reflection and Discussion** ● Bring the class together to reflect on the activity. Ask each group to share and compare their results and describe the challenges they faced while collecting and interpreting data. ● Encourage them to talk about how they use data to improve the efficiency of their conclusions. ● **Prompts for Discussion:** *" In which water usage category was the water consumption maximum?"* *" In which category was the consumption minimum?"* *" What is your plan to avoid water waste in the future?"*
Teachers and students' Roles	**Teachers**: Guide the students through the initial examples and assist them in understanding how to be water-wise by formatting a water usage calculator (Questionnaire). **Students**: Act as water consumers as well as water hunters. As water consumers, they are using data to measure water consumption. As water hunters, they are using data to understand how to eliminate water consumption. Both groups of students can act interchangeably.
Evaluation/ Assessment	Evaluate each group's ability to understand the importance of not wasting water.
TINKER Framework Integration	

How is the activity authentic learning?	The activity uses real-world problem-solving through hands-on activities. Data are collected on real-time procedures (e.g. at home) Almost all principles of authentic learning are applied in this activity setting including authentic context and task, multiple perspectives, collaboration, reflection, scaffolding, and authentic assessment.
How is gender inclusiveness ensured?	The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, ensuring all students contribute as both "water consumers", "and "water hunters".
Considerations for level progression	These scenarios can be improved by practicing them in different urban locations e.g. conducting a water usage audit at school or in many different working places e.g. in a farm, in a factory.

Useful links used in this learning scenario:

- https://www.usgs.gov/special-topics/water-science-school , U.S. Geological Survey's (USGS) Water Science School, accessed at 14/11/2024
- https://www.usgs.gov/special-topics/water-science-school/science/water-cycle-diagrams , Water Science School / diagrams, accessed at 14/11/2024
- https://www.usgs.gov/special-topics/water-science-school/science/o-ydrologikos-kyklos-water-cycle-schools-greek#overview , Water Science School / The water cycle for schools, accessed at 14/11/2024
- https://en.wikipedia.org/wiki/Water_cycle , Wikipedia, accessed at 14/11/2024
- https://www.unicef.org/wash/water-scarcity , UNICEF / Water Scarcity, accessed at 15/11/2024
- https://www.unicef.org/stories/11-lessons-water-school , UNICEF / schools, accessed at 15/11/2024
- https://water.org/our-impact/water-crisis/childrens-and-education-crisis/ , Water organization accessed at 15/11/2024
- https://www.unwater.org/publications/un-world-water-development-report-2024 , United Nations /Reports, accessed at 16/11/2024
- https://www.australianenvironmentaleducation.com.au/education-resources/how-to-be-waterwise/ , The Australian Environmental Education, accessed at 17/11/2024
- https://water.usgs.gov/edu/activity-drip.html , USGS, accessed at 17/11/2024

Learning Scenario 5 - The Need for Recycling

Learning Scenario Information	
Title	The Need for Recycling
Age Level	10–12 years old
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Informatics, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: ● Realise the need for recycling. ● Be acquainted with all types of recycling. ● Develop an algorithm for effective recycling.
Scenario Description	
Setting	The World's preservation is at stake. Recycling is an efficient way to save the planet. You want students to realise that the need for recycling is paramount. Through this scenario, students will relish recycling and be empowered to recycle efficiently. In a gender-inclusive approach, all students will learn to love and respect our planet.
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Pencils, Paper ● Learning Resources, Digital tools (Multimedia)

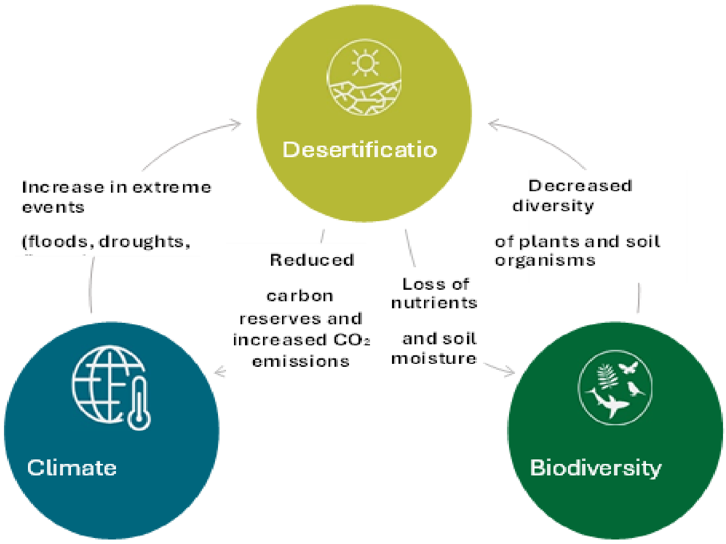
Activity	**Step 1 (5 minutes): Lesson Foretaste** The teacher is carrying a specific object. He/She is asking students where to throw it (as garbage). The teacher observes that the students start to wonder where to throw the object. The teacher underlines that there will be no wonder after the end of the activities. **Step 2 (10 minutes): Knowing Recycling** Students watch a video (such as the one provided) that unveils recycling: (https://www.youtube.com/watch?v=cNPEH0GOhRw) The teacher is initiating a discussion on this video. Through real-life examples, students realise the ultimate need for recycling, and how to recycle efficiently. The teacher mentions that many schools and institutions have different recycling bins according to the recycled materials. Inspired by the video, the teacher accentuates: ● The types of Recycling. ● The entire recycling process. ● The materials that can be recycled. ● The stages for effective recycling. **Step 3 (25 minutes): Developing an algorithm for an effective recycling** Students are divided into mixed-gender groups. Each group is asked to develop its algorithm. The algorithm should focus on the decision to recycle according to the type of the material, and its possible impact on the environment. The teacher asks the groups to construct an algorithm on a separate piece of paper. The teacher monitors their progress, offering support. A constructive discussion follows the group's output, stressing the pros and cons of their designs. The teacher, along with the groups, chooses the best algorithm (the one that is close to the algorithm discussed in the previous step) and develops it on a UML platform. UML software such as Microsoft Visio or UML Pad can also be used. **Step 4 (5 minutes): Recapitulation** The educator brings up the question posed in the foretaste stage, attempting to recapitulate the main points that trigger the students' assimilation process. The teacher uses the following questions to activate the students' reflection. QUESTIONS: 1. What are the steps of effective recycling? 2. How effective recycling is influenced by the type of recycled materials? 3. Why is the need for effective recycling paramount? Finally, the teacher is urging students to recycle effectively.

Teachers and students' Roles	**Teacher:** Assumes the role of facilitator, guiding students to reach vital conclusions. In parallel, the educator acts as an "animator", fostering students' engagement. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	● The groups' algorithms indicate the extent to which students are upskilled to recycle efficiently. ● The quality of the groups' algorithms shows the degree to which students have developed collaborative and Informatics skills. ● The completion of the work assigned to students indicates the extent to which students take on the responsibility to fulfil their obligations. ● The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. ● The student's behavioural engagement is assessed through overall participation in the learning process.
TINKER Framework Integration	
How is the activity authentic learning?	The scenario is drawn from a daily life need. Examples are based on real-life experiences. Discussion is also facilitated through daily life paradigms.
How is gender inclusiveness ensured?	1. All students equally participate in the learning process. 2. Discussion is based on daily life experiences that all students are familiar with. 3. Learning resources are drawn from topics that interest all students.
Considerations for level progression	One group can evaluate another in a peer-to-peer assessment mode. More steps can be added to the learning flow to trigger the student's metacognitive process.

Learning Scenario 6 - The Shape of Change

Learning Scenario Information	
Title	The Shape of Change
Age Level	10–12 years old
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Geography, Earth Science, Mathematics.
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the desertification phenomenon of the Earth ● Make sense of data representations (tables, graphs, maps, etc.) and models.
Scenario Description	
Setting	You want your students to practice making sense of data representations and models in an authentic context. They are learning about climate change in Geography, so you decide to introduce them to the desertification phenomenon of the Earth as a sequence of climate change over time. You will support your students in exploring global and local air temperature data and use a variety of data representations to determine the shape of change over time—past, present, and future.
(Digital) Tools	Online tools: We will be using a variety of tools in these lessons. In preparation, it will be helpful to familiarise yourself with the following resources (Concord, 2024, Codap,2024) Tools in the classroom: ● Computer/Laptop

	• Projector/ Whiteboard • Markers
Activity	**Step 1 (10 minutes): Introduction to desertification Using Real-Life Examples** Society faces many 'wicked' problems, including poverty, food security, access to healthcare, and climate change. Climate change is a 'super-wicked' problem associated with challenges including food security, mass migration and biodiversity loss. Generally speaking, climate change significantly impacts the futures of children. Children's lives are already being affected and the changing climate will continue to **have lifelong effects on their health, wellbeing, opportunities, and experiences**. (**Marks et al. 2021**). • Explain to the students what the desertification phenomenon is with the following real-world examples. The human impact on climate change can be presented, as follows: 1. (UNCCD, 2024) (For just Uzbekistan to become the main cotton producer of the x-USSR). 2. (Earth observatory NASA, 2024). • using United Nations and NASA's maps, and play the following multimedia game: (NASA, 2024) **Step 2 (10 minutes): Understanding the shape of change over time and desertification.** The following table is very important to be understood by both the teachers and the students. **Table: Relationship between desertification, biodiversity loss, and climate change.**

	 *Source:* ECA, based on World Resources Institute, Ecosystems and Human Well-being: Desertification Synthesis,2005, p. 17. ● Explain that the main human actions that intensify the phenomenon of desertification on the Earth's soil are, as follows. The overexploitation and irresponsible use of natural resources (forests, pastures, crops, groundwater and above groundwater, quarries, mines, tourism, etc.). Fires and overgrazing. Fires deplete the soil, and overgrazing strips it of its already poor vegetation. The abandonment of traditional techniques in agriculture, grazing, forestry, and water harvesting. Inappropriate land use, such as urban-tourist facilities in fertile soils, agriculture in non-fertile ones, grazing in abandoned fields, etc.: ● Introduce the terms: desertification, biodiversity loss, and climate change. (Europa, Joint Research Center, 2024) At this point, we will strongly recommend that teachers facilitate **brainstorming sessions** where each class formulated questions about any aspect of climate change. Teachers were asked to think about climate change in its broadest sense when facilitating question brainstorming sessions with their classes. The classroom discussions were guided by suggestions for teachers to ask their students: **<u>Questions for brainstorming sessions:</u>** ● **What words or images come to mind when you hear "climate change"?**

	• **What do we know about climate change?** • **What do we know about the causes of climate change?** • **What do we know about solutions?** • **What don't we know?** • **What are the past, present, and future aspects of climate change?** • **What is something we want to learn about climate change?** **<u>Method of brainstorming:</u>** The children were encouraged to consider conversations about climate change they may have had with friends or family, and to ponder what questions arose from these encounters. They were also prompted to think about questions they might have about climate change impacts occurring from local to global scales. Teachers were asked to emphasise that there were no right or wrong questions, and to encourage their students to be curious and open to asking all kinds of questions. The students wrote their questions on index cards, and once all students had contributed as many questions as they wanted, the index cards were gathered and examined by the class. Teachers then allowed students to reflect on the kinds of questions asked, and to add additional questions if they liked. Students then assigned the questions on index cards into categories of similar questions, so that they could see which were most often asked and compare the wording of similar questions. Up to ten questions were voted “most wanted” by each class**.** Finally, the students were asked to vote for the questions they would most like to be answered by climate researchers (for future implementation projects on the field).) **Step 3 (20 minutes): Designing and foreseen** • Arrange the chairs and desks and create two different working areas for students. (This can also be done in the school's garden area if a cordless connection can be applied.) • Divide students into two mixed-gender pairs or small groups. One group will be entitled “the scientists” and the other “the farmers”. • In the beginning, “scientists” will bring data to establish change over time on the Earth’s climate and soil- past, present, and future. Data will be coming mainly from the following sources (Europa, Joint Research Center, 2024), (Europa, ECA, 2024).

	At the beginning, you can explore the cases presented in COPAD. To be familiarised with the tools and the methods presented there, you have to reference the above-mentioned essays in conjunction with the resources presented in Scenario 2.
	
	● The "scientists (s)" will create a step-by-step set of instructions to guide "the farmers" through this towards a much more sustainable and friendlier to the earth's soil production of goods. Then, the farmers will create a plan for an efficient agriculture process.
	● Throughout the activity, the teacher also gives structured questions on key issues they need to consider. As students become more comfortable, gradually, the help is removed. Some examples of questions are:
	  ○ *What data are you going to consider relevant and an indication of climate change over time?*
	  ○ *What went wrong, and why have we had less and less production of this good over the last years? How can you fix it in a long-term period and sustainably?*
	  ○ *How can you manage to change your production?*
	
	Step 4 (5 minutes): Group Reflection and Discussion
	● Bring the class together to reflect on the activity.
	Ask each group to share and compare their results and describe the challenges they faced while collecting and interpreting data.
	
	● Encourage them to talk about how they use data to improve the efficiency of their conclusions.
	● **Prompts for Discussion:**
	"Which soil and climate parameters should be considered for an effective agricultural process (less subject to change)?"
	"How do you intend to improve your agricultural process in the future?"

Teachers and students' Roles	**Teachers**: Guide the students through the initial examples and assist them in understanding the change over time -past, present, future. **Students**: Act as farmers and as scientists. As farmers and owners of agricultural businesses, they foresee and test future vegetation, in collaboration with scientists. As scientists, they are using data to understand a phenomenon.
Evaluation/ Assessment	● Evaluate each group's ability to understand the importance of Earth's soil sustainability for human goods production. The evaluation point presenting the data concerning climate change will be by the year 2030 (U.N /Agenda 2030, 2024) as well as (U.N /Goal 13, 2024).
TINKER Framework Integration	

How is the activity authentic learning?	The activity uses real-world problem-solving through hands-on activities. Data are collected on real-time procedures. Almost all principles of authentic learning are applied in this activity setting including authentic context and task, multiple perspectives, collaboration, reflection, scaffolding, and authentic assessment.
How is gender inclusiveness ensured?	The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, ensuring all students contribute as “scientists”, and “farmers”. Furthermore, there is a place for cultural differences to be reflected in the “farmers” or “scientists” groups e.g. adapting to extreme weather events.
Considerations for level progression	Generally speaking, young people need to be engaged in programs and initiatives that support their climate literacy. To help prepare young people with enhanced knowledge, skills, and experiences, and to strengthen their agency, ideally, these literacy initiatives would include 1. diverse voices, 2. active dialogue-based science learning, 3. connection to nature, 4. critical thinking skills, and 5. co-created visions of a sustainable future. This scenario can be improved by practicing it in agricultural fields (for example in a nearby greenhouse).

Useful resources and links used in this learning scenario:

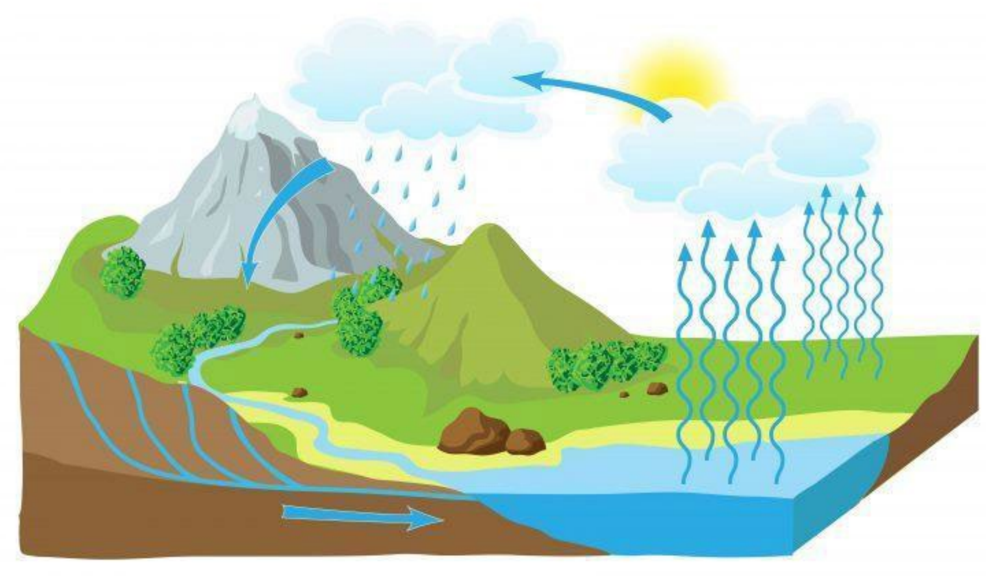
- https://sdgs.un.org/goals/goal13, U.N, Agenda 2030, Goal 13, accessed at 13/11/2024.
- https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf , U.N, Agenda 2030, accessed at 13/11/2024.
- https://op.europa.eu/webpub/eca/special-reports/desertification-33-2018/en/, Europa, ECA, 2024, accessed at 14/11/2024.
- https://op.europa.eu/webpub/eca/special-reports/desertification-33-2018/el/index.html, accessed at 13/11/2024.
- https://www.academia.edu/112087516/Ecosystems_and_Human_Well_Being_Desertification_Synthesis, Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Desertification Synthesis. World Resources Institute, Washington, DC, accessed at 18/11/2024
- https://concord.org/resources/ , CONCORD, accessed at 17/11/2024
- https://www.nasa.gov/stem-content/change-over-time-interactive/, accessed at 18/11/2024
- https://codap.concord.org/ , CODAP, accessed at 17/11/2024
- https://wad.jrc.ec.europa.eu, Europa, Joint Research Center, 2024, accessed at 18/11/2024
- https://www.unccd.int, accessed at 17/11/2024

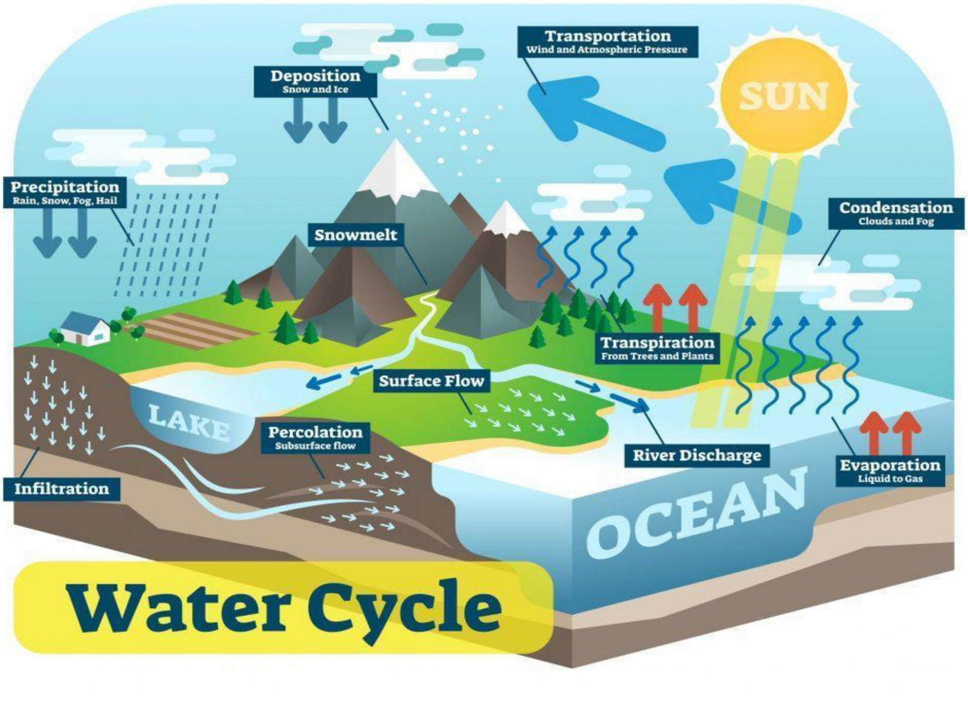
- https://earthobservatory.nasa.gov/images/152467/drought-parches-morocco, accessed at 18/11/2024
- Marks, E., Hickman, C., Pihkala, P., Clayton, S., Lewandowski, E.R, Mayall, E., Wray, B., Mellor, C., van Susteren, L. (2021). Young People's Voices on Climate Anxiety, Government Betrayal and Moral Injury: A Global Phenomenon. Posted: 7 Sep 2021 as a preprint with **the LANCET**. Available at SSRN: https://ssrn.com/abstract=3918955 or http://dx.doi.org/10.2139/ssrn.3918955

Learning Scenario 7 - Water Cycle Experiments

Learning Scenario Information	
Title	Water Cycle Experiments
Age Level	10–12 years old
Duration	45 minutes
Informatics topic areas	Data and Information, Algorithms
Content domain (Integrated Subjects)	Geography, Earth Science, Mathematics/Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand that the natural water cycle shows the constant movement of water around the environment. ● See how water moves through evaporation, transpiration, condensation, precipitation, run-off, infiltration, and percolation. ● Develop the water cycle algorithm using UML tools, such as Visio or UML Pad.
Scenario Description	
Setting	Water Cycle Experiments These experiments look at the water cycle and why water is so important. Water is the most common substance found on earth and essential for all life forms. Various

	elements can dissolve in water, and it can exist as a gas (water vapour and steam), a liquid (water), or a solid (ice). 1. **<u>Experiment 1</u>**: Students will make a mini terrarium to observe how water moves through evaporation, transpiration, condensation, precipitation, runoff, infiltration, and percolation. 2. **<u>Experiment 2:</u>** Students will make a dried-up experiment (evaporation process). 3. **<u>Experiment 3:</u>** Students will make a cloud (condensation process).
(Digital) Tools	**Online tools:** We will be using a variety of tools in these lessons. In preparation, it will be helpful to familiarise yourself with the following: 1. (U.S. Geological Survey's (USGS) Water Science School, 2024) 2. (Water Science School / Water cycle diagrams, 2024) 3. (European Space Agency, 2024) **Tools in the classroom:** ● Computer/Laptop ● Projector/ Whiteboard ● Marker ● UML software **Material for the experiments:** **<u>Experiment 1: Defining the water cycle</u>** ● a large class with a lid, alternatively a large soft drink bottle ● a small plant ● potting mix layers of gravel sand ● pebbles ● water and ● some gloves **<u>Experiment 2: Defining evaporation</u>** ● Three cups ● Three sticky labels or a marker ● Water ● A Ruler ● A clock **<u>Experiment 3: Defining condensation</u>**

	● 1 glass jar with a metal lid ● Boiling water ● Blue food colouring ● Ice cubes ● Matches
Activity	**Step 1 (10 minutes): Introduction to the natural water cycle.** The hydrological or water cycle, at least in Europe, was known by Aristotle's time, and so by 350 BCE. In ***Aristotle's Meteorology***, we have: 'Now, the sun, moving as it does, sets up processes of change and becoming and decay, and by its agency, the finest and the sweetest water is carried up and is dissolved into vapour and rises to the upper region, where it is condensed again by the cold and so returns to the earth'. He notes this again in his ***Physics***: 'Zeus does not send the rain to make the corn grow: it comes out of necessity. The stuff drawn up is bound to cool and, having cooled, turns to water and comes down. It is merely concurrent that this has happened, the corn grows. 

	 *Source: The Water Cycle ©* [normaals] ● Explain to the students what the natural water cycle is with the following real-world examples, using the following: 4. (Water Science School / The water cycle for schools, 2024) 5. (Water Science School /Interactive Water Cycle Diagram for Kids (Beginner),2024) ● and see the following video: https://www.youtube.com/watch?v=TD3XSIE4ymo (Learn Bright Organisation, 2024) **Step 2 (10 minutes): Understanding the natural water cycle and its processes, such as:** ● **Evaporation** occurs when the sun shines on the water and heats it, turning it into a gas called water vapor, which rises into the air. ● **Transpiration** occurs when the sun warms people, plants, and animals, and they release water vapor into the air. ● **Condensation** occurs when the water vapor in the air cools and turns back into a liquid, forming tiny water droplets in the sky. It is when water droplets fall from the sky as rain, snow, or hail. ● **Run-off** is when water flows over the ground and into creeks, rivers, and oceans.

	• **Infiltration** is when water falls on the ground and soaks into the soil. • **Percolation** is when water seeps deeper into tiny spaces in the soil and rock. The teacher presents the water cycle process, explaining its stages. Using the appropriate UML software (such as Visio, or UML PAD), the students, with the help of the teacher, develop the water cycle algorithm. **Step 3 (20 minutes): Water Cycle Experiments.** • Arrange the chairs and desks and create three different working areas for students (This can take place also in the garden area of the school if a cordless connection can be applied). • Divide students into three mixed-gender pairs or small groups. One group will be entitled "Exper1_scientists", the other "Exper2_scientists" and the last "Exper3_scientists". **Experiment 1: Defining the water cycle.** **Method** In the jar add a layer of pebbles' gravel and sand then potting mix. Plant your small plant and add enough water to moisten the soil, but not so much as to flood the container. Close the lid. Place the terrarium beside a window with some sun, but not too much, or you will bake the plant. What do you think will happen in our mini-earth? Will water disappear? Does the plant play a role in the terrarium? What is your prediction? When we add water, watch and observe changes that tell you your water cycle is working. **Experiment 2: Defining evaporation** **Method** 1. Label your three cups with the name of your group. 2. Pour 100 ml of water into each one. 3. Use a ruler to measure the height of water in each cup. Write your measurements on the table (given below) along with the date and time.

4. Leave one of your cups somewhere sunny, another somewhere shady, and the third in a dark place.

5. Now and again (your teacher will tell you how often), measure the height of the water in every cup and record it in the following table.

Day	Time	Time since start	Water height in cm		
			Cup in a sunny place	Cup in a shady place	Cup in a dark place.
		0			

6. Observe each dish every 4 hours, then overnight, and record what happens to the water.

- Where did the water go?
- What happened to the height of the water in the three cups?

From which container did the water disappear faster?

- What happened to the water that disappeared?
- What do your results suggest happens in the water cycle on:
  a. a sunny day.

  b. a cloudy day

- The cups were in places with different light levels (at least during the day).
- What else might have been different in the three places?
- What caused the water to disappear?

Experiment 3: Defining condensation (make a cloud!)

Method

The Teacher (or an adult) pours a little bit of the water into the jar and gently swirls it to warm the sides.

	Add some blue food colouring to the water and gently swirl it until the water is completely coloured (e.g. blue). Turn the lid of the jar upside down and rest it on the top of the jar. Place several ice cubes in the lid. Have an adult (or the teacher) light a match and let it burn for a few seconds. Lift the lid of the jar and hold the lit match above the water. After a few seconds, drop the match into the water and replace the lid. What can you see? I can see a cloud! How does this happen? ● Throughout the experiments, the teacher also gives structured questions on key issues they need to consider. As students become more comfortable, gradually, the help is removed. Some examples of questions are given above. **Step 4 (5 minutes): Group Reflection and Discussion** ● Ask each group to share and compare their results and describe the challenges they faced while experiments took place. ● Encourage them to talk about the difficulties found in doing these experiments. **Prompts for Discussion:** *"How did you improve your experiment?"*
Teachers and students' Roles	**Teachers**: Guide the students through the whole set of experiments and assist them in understanding the water cycle and its processes. **Students**: Act as "scientists" working in a lab environment.
Evaluation/ Assessment	Evaluate each group's ability to understand the importance of Earth's water cycle. Furthermore, it upgrades each group's ability to collect and interpret labourite's observational data.
TINKER Framework Integration	
How is the activity authentic learning?	The activity uses real-world problem-solving through hands-on activities. Data are collected on real-time procedures. Almost all principles of authentic learning are applied in this activity setting including authentic context and task, multiple perspectives, collaboration, reflection, scaffolding, and authentic assessment.
How is gender inclusiveness ensured?	The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, ensuring all students contribute as "scientists" in a lab environment.

Considerations for level progression	The teacher could take advantage of the flipped classroom approach to assign homework and ask students to do the same experiments at home. For example, to have each one of them its own terrarium. This will whet the students' appetite for the lesson and will help them better understand complex physical phenomena.

Useful links used in this learning scenario:

- https://www.usgs.gov/special-topics/water-science-school , U.S. Geological Survey's (USGS) Water Science School, accessed at 14/11/2024
- https://www.usgs.gov/special-topics/water-science-school/science/water-cycle-diagrams , Water Science School / diagrams, accessed at 14/11/2024
- https://climatedetectives.esa.int/the-water-cycle/ , European Space Agency, accessed at 14/11/2024
- https://www.usgs.gov/special-topics/water-science-school/science/o-ydrologikos-kyklos-water-cycle-schools-greek#overview , Water Science School / The water cycle for schools, accessed at 14/11/2024
- https://water.usgs.gov/edu/watercycle-kids-beg.html , Water Science School /Interactive Water Cycle Diagram for Kids (Beginner) accessed at 14/11/2024
- https://www.youtube.com/watch?v=TD3XSIE4ymo , Learn Bright Organization / Introduction to the water cycle accessed at 14/11/2024

Learning Scenario 8 - Underlining Excel's potential

Learning Scenario Information	
Title	Underlining Excel's potential
Age Level	10–12 years old
Duration	45 minutes
Informatics topic areas	Data and Information, Algorithms, Responsibility and Empowerment
Content domain (Integrated Subjects)	Informatics, Mathematics

Learning Objectives	Upon completing this activity, the students should be able to: ● Know Excel's capabilities. ● Type an Excel formula. ● Present data, using tables and graphs. ● Develop Business Informatics skills, solving simple enterprise problems.
Scenario Description	
Setting	Real-life problems cannot be easily modelled. You want your students to learn to transform daily life and simple enterprise problems into computer-solving processes. After this activity, students will be able to address such kinds of problems using competent Business Informatics tools like Excel. In detail, students will learn to visually present data, using tables and graphs. Through real-life examples, all students will learn to use Excel efficiently. Moreover, students will develop Business Informatics skills.
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Pencils, Paper ● Learning Resources, Digital tools (Multimedia)
Activity	**Step 1 (5 minutes): Lesson Foretaste** Students are asked to calculate a specific formula like P= 25+3*4-2*8+4*6, using their brains, rapidly and automatically. The educator writes the students' answers on the board. The educator stresses the need for a potent tool, introducing Excel. The teacher underlines that Excel is a representative member of the spreadsheet's family. **Step 2 (15 minutes): Knowing Excel** Students watch a presentation that unveils Excel. Through real-life examples, they realise how Excel is used to solve simple problems. A questionnaire's answers, participation percentages in a survey, the financial management of family income and costs, the presentation of a company's sales rate, and the calculation of simple statistical measures could be used to accentuate Excel's potential. Formulas, graphs, and tables flash before the students' eyes. A fruitful discussion on the presentation's topics is conducted. The discussion revolves around Excel's functions and visual capabilities, as described in the following videos: https://www.youtube.com/watch?v=y1126PQ5zRU https://www.youtube.com/watch?v=TfkNkrKMF5c

	Step 3 (20 minutes): Solving simple enterprise problems The teacher resorts to a simple enterprise problem to indicate how Excel is a competent Business Informatics tool. DIDACTIC SCENARIO: A company keeps a record of sales per month. Using Excel, do the following: 1. Enter sales data into an Excel table. 2. Calculate simple statistical measures for the sales data. 3. Provide a graphical illustration of the total sales. Students are divided into mixed-gender groups. Each group is asked to come up with a solution. The teacher monitors their progress, offering support. A constructive discussion follows the groups' solutions. The discussion focuses on: - The functions used. - The way the data set was presented in tables. - The visualisation outcome. **Step 4 (5 minutes): Recapitulation** The educator brings up the question posed in the foretaste stage, attempting to recapitulate the main points that trigger the students' assimilation process.
Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator, guiding students to reach vital conclusions. In parallel, the educator acts as an "animator", fostering student engagement. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.

Evaluation/ Assessment	• The answers to the questions of the didactic scenario reveal the extent to which the students have taken in the rudimentary knowledge. • The groups' solutions indicate the extent to which students are upskilled to solve Business Informatics problems. • The quality of the groups' solutions shows the degree to which students have developed collaborative and Business Informatics skills. • The completion of the work assigned to students indicates the extent to which students take on the responsibility to fulfil their obligations. • The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. • The student's behavioural engagement is assessed through the student's overall participation in the learning process.
TINKER Framework Integration	
How is the activity authentic learning?	Enterprise problems are based on real-life experiences. Discussion is also facilitated through daily life paradigms.
How is gender inclusiveness ensured?	1. All students equally participate in the learning process. 2. Discussion is based on daily life experiences that all students are familiar with. 3. Learning resources (such as the enterprise scenario) are drawn from topics that interest all students.
Considerations for level progression	One group can evaluate another in a peer-to-peer assessment mode. More steps can be added to the learning flow to trigger the student's metacognitive process.

Ireland

Learning Scenario 1 - Code My Day: Sequencing Everyday Tasks

Learning Scenario Information	
Title	Code My Day: Sequencing Everyday Tasks

Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Mathematics, Language Arts, Logic
Learning Objectives	Upon completing this activity, the students should be able to: ● Organise daily tasks in a logical sequence using programming terms like "step-by-step" and "sequence." ● Create a simple flowchart representing steps to complete a routine task. ● Describe how breaking down tasks into sequences relates to programming concepts.
Scenario Description	
Setting	Imagine students are helping a robot "learn" how to do a task they complete every day (like brushing their teeth, packing a school bag, or making a sandwich). They need to **break down each step in the process** and ensure that the instructions are clear and specific. Encourage students to think of common daily routines as sequences that need clear instructions. Ask them, "How can you make sure your instructions are easy for the robot to follow?"
(Digital) Tools	● Worksheet for sequencing steps in a daily routine. ● Paper and markers to create simple flowcharts. ● Optional: Laptops with simple block-based coding apps (e.g., Scratch).
Activity	**Step 1 - Unplugged Exploration (10 minutes): Introduction to Sequencing** ● Explain the concept of breaking down tasks and sequencing steps in a way that can be easily followed. ● Video from Kodable can be used: https://www.youtube.com/watch?v=v_Pc3UnePZY ● Share examples of how computers need exact steps to function correctly.

	Step 2 – Unplugged Exploration (10 minutes): Task Breakdown ● Split the students into small groups. ● In groups, students pick a daily task (e.g., brushing teeth) and write down each step in the process. ● Encourage students to be specific, thinking like a robot who doesn't know the task yet. **Step 3 (15 minutes): Create a Flowchart** ● Using paper and markers, students turn their list of steps into a simple flowchart to represent each action. ● Emphasise clarity and sequence in their charts. **Step 4 (10 minutes): Reflection and Connection to Programming** ● Discuss as a class how their flowcharts resemble the way programmers write code. ● Ask questions like, "What would happen if a step were out of order?"
Teachers and students' Roles	**Teachers**: Introduce the concept of sequencing and help students organise their thoughts. Facilitate flowchart creation and guide students to consider the importance of step order. **Students**: Work collaboratively to sequence a task, design a flowchart, and reflect on their learning. Explain their flowchart steps and discuss the importance of sequence.
Evaluation/ Assessment	● Flowchart Review: Assess the clarity and order of steps in each student's flowchart. ● Discussion Participation: Observe students' engagement in discussing the importance of sequencing.
TINKER Framework Integration	
How is the activity authentic learning?	The activity links programming concepts to real-life routines, making abstract programming skills more relatable for young learners.
How is gender inclusiveness ensured?	The task choice is open-ended, allowing students to select a routine that interests them, and the collaborative format encourages equal participation.

Considerations for level progression	For younger or less experienced students (beginner level), use a predefined task with basic steps provided and focus on sequencing. For older or more advanced students (advanced level), allow students to use Scratch or a similar block-based coding tool to simulate the task digitally, introducing basic programming commands like loops or conditionals if appropriate.

Learning Scenario 2 - Exploring Online Safety: Who's Behind the Screen?

Learning Scenario Information	
Title	Exploring Online Safety: Who's Behind the Screen?
Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	SPHE (Social, Personal, and Health Education), English, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify potential risks of interacting with unknown people online. ● Explain how to protect personal information while using the internet. ● Analyse different scenarios to determine safe online behaviour.
Scenario Description	

Setting	You're preparing your class for a conversation on internet safety. Refer to Radia Perlman and her contributions to internet safety. A student in your class recently mentioned receiving a message from a stranger in an online game. This presents a perfect opportunity to explore the importance of keeping personal information safe online. Guide students through the process of thinking critically about online interactions. Start by sharing an example story of someone who shared too much online. Get students to ask questions like, "How do we know who we are really talking to online?" and "What kind of information should we avoid sharing?"
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for showing a short internet safety video (e.g., from Webwise or Safer Internet Day). ● Whiteboard for brainstorming ● Markers
Activity	**Step 1 - Unplugged Exploration (10 minutes): Introduction to Personal Information and Online Interactions** ● Start with a class discussion about who students interact with online. ● Discuss about what kind of information students share online. ● Use a whiteboard to list some common online risks like ○ Oversharing ○ Talking to strangers ○ Phishing scams ● Encourage students to ask questions like "How do websites collect information?" or "Why do people pretend to be someone else?" **Step 2 - Plugged Exploration (10 minutes): Digital Safety Video** ● Show a short video that introduces concepts like privacy, identity theft, and safe online practices. A sample one from WebWise.ie is *"What Can I Trust Online?"*: https://vimeo.com/313425081 ● Another video from Amaze.com can be used: https://www.youtube.com/watch?v=HxySrSbSY7o ● Other videos from WebWise.ie are also related: https://www.webwise.ie/teachers/classroom-videos/ ● After watching the video, ask students to discuss what they learned. ● Ask the students to compare their current thoughts with their earlier thoughts. **Step 3 (15 minutes): Interactive Role-Play** ● Split the students into small groups.

	● Each group receives a scenario where they are either an online stranger trying to get information or someone protecting their information. ● Students take turns role-playing and must decide what information is safe to share. ● Sample scenarios can be: ○ **Scenario 1: Social Media Friend Request** A student receives a friend request from someone they don't know on a social media platform. The "online stranger" tries to start a friendly conversation, asking for personal details like age, school name, or hobbies. The "information protector" must respond carefully, deciding what is safe to share, if anything, and whether to accept the request. ○ **Scenario 2: Winning a Contest Email** A student gets an email claiming they've won a free gadget. The "online stranger" asks for personal details such as a home address and phone number to send the prize. The "information protector" must evaluate whether the email seems trustworthy or if it could be a scam, deciding how to respond appropriately. **Step 4 (10 minutes): Group Reflection and Discussion** ● Bring the class together to reflect on the activity. ● Ask each group about how to decide if an information is sensitive to share or not. ● Ask each group to discuss the challenges they faced in keeping their personal details secure. ● **Prompts for Discussion:** ○ *"Who to trust online? Or can we trust anyone online? How to decide, where to look, what to check for online safety?"* ○ *"What is personal or sensitive information? What information can we share online and which information should we not share online?"* ○ *"What did you learn from the video and how can you improve after discussing it with your classmates?"*

Teachers and students' Roles	**Teachers**: Facilitate discussions and lead brainstorming sessions. Guide students through the role-play activity by offering hints and keeping the discussion focused on online safety. Help and assist them in understanding the concept of personal and sensitive information. Supervise the role-playing activity. During discussions and role-playing, inject critical questions to reveal your students' thinking and push them to progress and learn the definition of personal information and how to protect them from strangers online. Encourage students to reflect on the differences between their initial and current thoughts. **Students**: Engage in group discussions, asking questions and giving feedback on internet safety topics. Actively participate in role-play scenarios and reflect on their decision-making process. Act as an online stranger or someone trying to protect their information during the role-play activity. As online strangers, try to extract sensitive information, and as an online stranger's competitor try to protect your personal information.
Evaluation/ Assessment	● Class Discussion: Observe students' engagement and contributions to discussions on online safety and how they define personal information. ● Role-Play Sessions: Observe students' participation during the role-playing sessions, paying attention to their definition of sensitive information. ● Role-Play Reflection: After the activity, have students reflect on their role-play experience, evaluating what they learned about protecting personal information online.
TINKER Framework Integration	
How is the activity authentic learning?	The scenario ties internet safety to the real-world context of students' daily online interactions. It encourages critical thinking about personal security and offers direct application of the knowledge they gain. The activity uses real-world problem-solving through hands-on activities. Students design and test algorithms in a tangible environment, making the abstract concept of algorithm design more concrete. Almost all principles of authentic learning are

	applied in this activity setting including authentic context and task, multiple perspectives, collaboration, reflection, scaffolding and authentic assessment.
How is gender inclusiveness ensured?	Reference to Radia Perlman empowers role models for female students. The activities are designed to engage all students equally by emphasising shared concerns about online safety, regardless of gender. Students are encouraged to participate in all roles. The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, ensuring all students contribute as both programmers and robots.
Considerations for level progression	For younger or less experienced students (beginner level), focus on simple discussions and personal experiences with online games or platforms. For older or more advanced students (advanced level), introduce more complex concepts like data encryption and phishing techniques, asking students to critically analyse actual examples of online risks.

Learning Scenario 3 - Favourite Things: Analysing Class Data

Learning Scenario Information	
Title	Favourite Things: Analysing Class Data
Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Mathematics, Social Studies, Art

<table>
<tr><td>Learning Objectives</td><td>Upon completing this activity, the students should be able to:
Organise collected data into categories for analysis.
Create a visual representation of data, such as a bar chart.
Interpret the data to identify popular trends or preferences.</td></tr>
<tr><td colspan="2">Scenario Description</td></tr>
<tr><td>Setting</td><td>Students will be surveying their classmates to find out about their favourite activities, foods, or hobbies. After collecting the survey data, they will organise it and create a visual chart to identify which options are the most popular. Help the students brainstorm different topics for the survey, then guide them through organising and visualising the data to see which preferences stand out.</td></tr>
<tr><td>(Digital) Tools</td><td>Paper and coloured markers for creating charts.
Optional: Tablets or laptops with spreadsheet software for digital chart creation.
Survey worksheet for data collection.</td></tr>
<tr><td>Activity</td><td>Step 1 - Unplugged Activity (5 minutes): Introduction to Surveys and Data
Introduce the idea of gathering data through surveys
Discuss why understanding preferences and patterns is useful.
Step 2 - Unplugged Activity (15 minutes): Survey Design and Data Collection
Divide students into groups.
Let students brainstorm questions for their survey (e.g., favourite sport, colour, food).
Each student or group surveys classmates and records answers in a table.
Step 3 - Unplugged Activity (15 minutes): Chart Creation
Once data is collected, students organise the results and create a bar chart or pie chart to represent the data visually.
Encourage creativity in chart designs.
Step 4 - Unplugged Activity (10 minutes): Data Interpretation
Let students analyse their charts.
Discuss the trends they observe, such as:
Identifying the most popular categories or
Identifying the least popular categories.</td></tr>
</table>

Teachers and students' Roles	**Teachers**: Assist students with data collection and ensure they understand chart creation. Prompt students to explore different ways to represent data visually. **Students**: Conduct surveys and organise the data collected. Create and interpret charts, explaining what the data reveals about class preferences.
Evaluation/ Assessment	• **Chart Accuracy:** Assess how accurately students recorded and represented data. • **Discussion Participation:** Evaluate students' interpretations and understanding of the data trends.
TINKER Framework Integration	
How is the activity authentic learning?	This activity mirrors real-world data gathering, such as polling, encouraging students to explore survey techniques and data analysis they can apply in everyday life.
How is gender inclusiveness ensured?	The open-ended nature of survey topics ensures all students' interests are represented, and everyone participates equally in data gathering and interpretation.
Considerations for level progression	For younger students (for beginners), provide a predefined question and basic template for organising data. For older or more experienced students (advanced level), encourage students to analyse the data deeper, discussing why certain preferences might be more popular and exploring different chart types.

Learning Scenario 4 - Recipe Algorithms: Cooking Up Steps

Learning Scenario Information	
Title	Recipe Algorithms: Cooking Up Steps
Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)

Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Mathematics, Home Economics, English (sequential writing), Science
Learning Objectives	Upon completing this activity, the students should be able to: ● Explain what an algorithm is and relate it to step-by-step instructions. ● Sequence a task accurately, ensuring the steps lead to the intended outcome. ● Identify errors in a sequence and correct them to improve the algorithm.
Scenario Description	
Setting	Imagine students **helping a friend to bake cookies**. However, the friend's recipe steps are all mixed up, and they need to figure out the correct order for baking. As the teacher, your role is to guide students in **arranging the steps** and discussing why each step needs to follow a specific sequence. Ask students to think about a recipe they know well and break it into **individual steps**. Challenge them to identify steps that need to happen in a particular order and discuss what happens if steps are out of sequence.
(Digital) Tools	● Printed recipe steps or pre-written cards with scrambled steps. ● Whiteboard or large paper for group discussion and writing the correct order. ● Optional: Tablets or laptops to view videos of recipes to check accuracy
Activity	**Step 1 - Unplugged Activity (5 minutes): Introduction to Algorithms** ● Begin by discussing algorithms as a set of ordered steps to complete a task. ● Below sample video can be used: https://www.youtube.com/watch?v=578hB0E6y4o ● Another video which can be used to explain algorithm basics: https://www.youtube.com/watch?v=kM9ASKAni_s

	● Another video which is related: https://www.youtube.com/watch?v=6hfOvs8pY1k ● Explain that recipes are algorithms for cooking! **Step 2 - Unplugged Activity (20 minutes): Scrambled Recipe Challenge** ● Divide students into small groups ● Give each group a set of **scrambled recipe steps** (e.g., baking cookies). ● Challenge them to **arrange the steps in the correct order**. ● Once they have an order, have them **explain why each step needs to be in that sequence**. ● Ask each group to write or draw the correct order on the board. **Step 3 - Unplugged Activity (20 minutes): Class Discussion and Reflection** ● Invite each group to present their ordered recipe ● Discuss any variations or challenges they encountered. ● Ask students to think about: ○ Why ordering is important ○ How recipes are like instructions in computing.
Teachers and students' Roles	**Teachers**: Facilitate discussion and guide students in recognising the importance of correct step sequence. Support students in correcting steps and explaining why specific sequences matter. **Students**: Engage in organising the scrambled steps and explaining their reasoning. Present their ordered algorithms and reflect on the importance of order.
Evaluation/ Assessment	● **Group Presentation:** Evaluate students' reasoning as they explain the correct order of steps. ● **Sequence Clarity:** Observe whether students can correct errors and maintain logical sequence.
TINKER Framework Integration	
How is the activity authentic learning?	By relating algorithms to cooking, this activity shows that algorithms have real-world applications beyond computers.

How is gender inclusiveness ensured?	Recipes appeal broadly to different interests, ensuring all students feel included.
Considerations for level progression	For younger students (for beginners), provide visual aids with icons or images for each recipe step. For older or more experienced students (advanced level), challenge students to identify optional steps or combine algorithms for different recipes into one.

Learning Scenario 5 - Safe Sharing Online: Who Can See My Data?

Learning Scenario Information	
Title	Safe Sharing Online: Who Can See My Data?
Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Social Studies, Digital Literacy, Art
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify personal information that is safe to share and what should be kept private. ● Explain how data shared online can be seen and accessed by others. ● Evaluate safe versus unsafe sharing behaviours through hypothetical examples.
Scenario Description	

Setting	Imagine the students are preparing to set up a social media account (fictional for classroom purposes) and want to make sure they **only share information safely**. Their task is to decide which details they would feel comfortable sharing and which details they would prefer to keep private. They will examine what it means when data is "public" and think about who might see their data. Guide students to list examples of information that should stay private and ask them to consider questions like, “Who else might see this if I post it?” and “Why is it important to protect certain details about ourselves?”
(Digital) Tools	● Whiteboard or chart paper for brainstorming. ● Optional: Digital poster-making tool or coloured paper and markers. ● Simple social media template to illustrate profile sharing (paper-based).
Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction to Safe Sharing** ● Discuss what types of information we commonly share online. Samples are: ○ **Personal Information:** Name, age, birthday, and address. *Example:* Posting a birthday celebration photo with a caption that includes your birthdate. ○ **Contact Information:** Email addresses and phone numbers. *Example:* Sharing your email on a public forum for business inquiries. ○ **Location Information:** Current location or travel plans. *Example:* Checking in at a restaurant or sharing vacation photos while on a trip. ○ **Social Information:** Photos, videos, and updates about daily life. *Example:* Posting family photos from a weekend picnic on social media. ○ **Financial Information:** Bank details or payment information. *Example:* Entering credit card details on an online shopping site. ○ **Login Credentials:** Usernames and passwords. *Example:* Using the same password across multiple websites can risk exposure if one site is breached. ● Why people might choose to keep certain details private. **Step 2 - Unplugged Activity (10 minutes): Brainstorm: What to Share?** ● Have students use a worksheet to categorise types of information like: ○ name, ○ school ○ address ○ favourite colour ○ add others to the list

	As; **1.** “Safe to share” or **2.** “Keep it private” ● Discuss their choices and ask them to explain their reasoning. **Step 3 - Unplugged Activity (10 minutes): Poster Activity** ● Divide students into small groups. ● In groups, students create a poster or digital presentation titled "Sharing Safely." ● Ask them to illustrate their ideas about privacy. What information is safe to share with: ○ the world ○ the friends, or ○ only themselves. **Step 4 - Unplugged Activity (15 minutes): Reflection** ● Let students discuss as a class why protecting personal information is important ● Brainstorm examples of safe sharing in everyday situations.
Teachers and students’ Roles	**Teachers**: Facilitate discussion on private vs. public information and guide students in brainstorming. Provide examples of safe and unsafe sharing. **Students**: Engage in discussions, share ideas, and collaborate on the poster activity. Reflect on what they learned about privacy and safety.
Evaluation/ Assessment	● **Poster Review:** Assess students' understanding based on the content of their posters. ● **Reflection Responses:** Evaluate students’ participation in discussions and their reasoning about privacy.
TINKER Framework Integration	
How is the activity authentic learning?	This activity relates directly to students' daily lives, helping them develop awareness of online sharing in a real-world context.

How is gender inclusiveness ensured?	All students engage in the shared experience of social media, and the activity encourages everyone to explore their views on privacy equally.
Considerations for level progression	For younger students (for beginners), provide example categories and help categorise them together as a class. For older or more experienced students (advanced level), introduce more nuanced scenarios about personal data sharing with varied audiences (e.g., friends, school staff, strangers).

Learning Scenario 6 - Traffic Light Algorithms: Safety in Sequence

Learning Scenario Information	
Title	Traffic Light Algorithms: Safety in Sequence
Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Science, Civic Studies, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: ● Describe the function of an algorithm in controlling devices. ● Identify the order of steps needed in a simple traffic light sequence. ● Modify the sequence to explore different patterns and understand consequences.
Scenario Description	

Setting	Imagine students are city planners working on designing safe intersections. Their task is **to figure out how a traffic light should be programmed** to ensure safety for cars and pedestrians. The scenario prompts them to think critically about **how algorithms control systems** in real life. Guide students in thinking about how traffic lights operate and help them outline the steps in the light sequence (e.g., green, yellow, red). Have them consider what might happen if the sequence is incorrect. To help students understand how traffic lights are programmed to ensure safety at intersections, the short video below can be used. The video provides an overview of the complexities involved in programming traffic lights to manage traffic flow effectively. By watching this video, students can gain insights into the real-world application of algorithms in controlling traffic systems, which aligns with the scenario of designing safe intersections. https://www.youtube.com/watch?v=DP62ogEZgkI How Do Traffic Signals Work?
(Digital) Tools	● Traffic light sequence cards showing colours and their respective times. ● Coloured paper or sticky notes for students to arrange steps. ● Optional: Tablets or screens to view videos of traffic light systems.
Activity	**Step 1 - Unplugged Activity (5 minutes): Introduction to Algorithms** ● Discuss with students how **algorithms control devices** such as traffic lights. ● Explain that these algorithms ensure safety by following a precise sequence. **Step 2 - Unplugged Activity (20 minutes): Create a Traffic Light Sequence** ● Divide students into pairs. ● In pairs, students arrange coloured cards or notes to represent the correct traffic light sequence (green, yellow, red). ● They should: ○ **Identify the proper order** and explain why it needs to follow that specific sequence. ○ Discuss **what might happen if the order is changed** (e.g., if green comes before red). **Step 3 - Unplugged Activity (10 minutes): Experimenting with Variations** ● Ask each pair to experiment with other sequences and predict the results ● Encourage critical thinking about how sequences can impact real-life systems.

	Step 4 - Unplugged Activity (10 minutes): Reflection ● Lead a discussion on the importance of precise algorithms in ensuring safety and order in everyday systems.
Teachers and students' Roles	**Teachers**: Guide students in understanding algorithmic control in real-world devices. Encourage exploration by allowing students to test and question different sequences. **Students**: Actively participate in sequencing the traffic light colours and testing variations. Reflect on the importance of the right order for safe outcomes.
Evaluation/ Assessment	● **Sequencing Accuracy:** Assess students' understanding of the correct traffic light sequence. ● **Experiment Reflection:** Evaluate students' reflections on why certain sequences are necessary.
TINKER Framework Integration	
How is the activity authentic learning?	This scenario highlights how algorithms impact everyday safety, linking abstract concepts to real-life applications
How is gender inclusiveness ensured?	All students engage in a familiar, everyday concept, ensuring inclusive participation without biases.
Considerations for level progression	For younger students (for beginners), provide pre-arranged cards and ask students to identify the correct order. For older or more experienced students (advanced level), challenge students to create sequences for complex traffic scenarios (e.g., intersections with crosswalks).

Learning Scenario 7 - Weather Watch: Collecting and Interpreting Data

Learning Scenario Information	
Title	Weather Watch: Collecting and Interpreting Data
Age Level	10-12 years old – (Primary Cycle Stage 4 – Students in Grades 5 & 6)
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Science, Mathematics, Geography
Learning Objectives	Upon completing this activity, the students should be able to: ● Collect data related to weather patterns and record it systematically. ● Analyse and interpret data trends to make simple predictions. ● Compare their findings with historical or regional weather data.
Scenario Description	
Setting	Imagine the students are weather reporters tasked with tracking and reporting on local weather patterns for a week. They will **collect daily weather data** such as temperature, precipitation, and wind speed, and then **analyse the trends** to make predictions about the weather for the upcoming week. Guide the students in setting up a simple data collection chart and ask them to think about **why weather patterns are valuable to track**. Challenge them to make basic predictions based on the trends they observe.
(Digital) Tools	● Weather tracking worksheet or notebook for data recording. ● Thermometer, rain gauge, and wind vane (if available) for hands-on data collection. ● Access to online weather sites or apps to compare daily readings.

Activity	**Step 1 - Unplugged Activity (5 minutes): Introduction to Data Collection** ● Explain the concept of data and why scientists and meteorologists collect weather information. ● Discuss how data patterns can help make predictions. **Step 2 - Unplugged Activity (10 minutes): Data Collection Setup** ● Divide students into groups. ● Provide each student or group with a **weather tracking worksheet**. ● Review with them how to use tools like thermometers and rain gauges to gather accurate measurements. **Step 3 - Unplugged Activity (15 minutes): Data Recording** ● Students will **gather weather data for a single day** using their tools and record it on the worksheet. ● Encourage them **to observe any patterns or unusual changes**. **Step 4 - Unplugged Activity (15 minutes): Reflection** ● Lead a discussion about the data they collected and ask questions such as: ○ What patterns did you notice? ○ How does today's weather compare to yesterday's (or historical averages if available)? ○ What do you predict the weather will be like tomorrow based on this data?
Teachers and students' Roles	**Teachers**: Guide students in accurate data collection and interpretation. Facilitate discussion and help students make connections between weather patterns and predictions. **Students**: Engage in data collection and analysis, using tools to record information. Discuss findings and share predictions with the class.
Evaluation/ Assessment	● **Data Worksheet:** Review students' data for accuracy and completeness. ● **Prediction Accuracy:** Assess how students' predictions compare to actual results.
TINKER Framework Integration	

How is the activity authentic learning?	This activity uses real-world data collection, helping students connect classroom learning with everyday phenomena they observe.
How is gender inclusiveness ensured?	Weather reporting and data analysis encourage universal participation, with a focus on inquiry that interests all students.
Considerations for level progression	For younger students (for beginners), focus on collecting one or two types of data (e.g., temperature only). For older or more experienced students (advanced level), encourage analysis over a week and compare with regional data trends for deeper insights.

Italy

Learning Scenario 1 - Bringing fairy tales to life

Learning Scenario Information	
Title	Bringing fairy tales to life
Age Level	10 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Art, Literature, Computer Science, Media Studies
Learning Objectives	Upon completing this activity, the students should be able to: ● Create a short digital animation that tells a story based on a fairy tale or an original idea. ● Explain the principles of animation, such as frames, motion, and timing.

	• Collaborate with peers to design and produce a cohesive animated narrative. • Demonstrate the use of digital tools for creative storytelling and visual representation.
Scenario Description	
Setting	You are an elementary school teacher tasked with introducing your students to the fascinating world of digital storytelling. Your goal is to encourage creativity and technological skills by guiding them to animate a fairy tale or an original story. In this lesson, students will use simple animation software to design characters, settings, and basic movements, transforming their ideas into animated sequences. Imagine a diverse classroom where each student brings their unique perspective to a shared creative challenge. Some students might feel hesitant about technology, while others might lack confidence in storytelling. What should you do? Your role is to create an environment where all students feel included and empowered to participate, ensuring that both boys and girls are equally involved in creative and technical roles.
(Digital) Tools	**Plugged activities:** • Tablets or computers with animation software (e.g., Scratch, FlipaClip, or Canva). • Access to free online resources for sound effects or music (e.g., Freesound). **Unplugged activities:** • Storyboard templates. • Markers, pencils, and paper for sketching characters and settings.

Activity	**Session 1: Storyboarding and digital art creation (45 minutes)**
	Warm-up discussion (5 minutes) – Unplugged activity
	● Begin with a brainstorming game:
	    ○ Ask students to quickly shout out their favourite fairy tales or invent a one-sentence story idea.
	    ○ Write some ideas on the board to spark creativity.
	● Show a short, age-appropriate animated clip and guide students to observe key elements:
	    ○ What happens in the story?
	    ○ How do the characters express emotions?
	    ○ How is the setting visually represented?
	
	Storyboarding (15 minutes) – Unplugged activity
	● Distribute storyboard templates with predefined frames.
	● Guide students to sketch the key scenes for their chosen story, focusing on:
	    ○ **Scene 1:** Introduction (main character and setting).
	    ○ **Scene 2:** Problem or magical element introduced.
	    ○ **Scene 3:** Resolution or exciting conclusion.
	● Encourage simple sketches and captions to explain what happens in each scene.
	
	Variation for collaboration: Pair up students to share and combine their ideas into a single story, building teamwork.
	
	Digital art (25 minutes) – Plugged activity
	1. **Tool introduction (5 minutes):**
	    ○ Demonstrate the animation software's basic tools using a projector or screen-share (e.g., how to draw shapes, add colours, and import backgrounds).
	2. **Character and setting design (20 minutes):**
	    ○ Students begin designing characters and settings digitally, inspired by their storyboards.
	    ○ Encourage them to experiment with digital brushes, textures, and colours.
	
	Unplugged variation for early finishers:
	● Students who finish early can create cut-out paper props or puppets of their characters to visualise their ideas physically.
	
	Session 2: Animation and Presentation (45 minutes)

	Animating the story (30 minutes) – Plugged Activity
	1. **Mini animation workshop (10 minutes):**
	  ○ Teach basic animation concepts with a quick demonstration:
	    ▪ Frame-by-frame movement.
	    ▪ Adding transitions (e.g., fade-in/out).
	    ▪ Simple sound effects or music (if the software allows).
	  ○ Use an example like making a character wave or walk.
	2. **Create animated scenes (20 minutes):**
	  ○ Students animate one or two key scenes from their storyboard, working individually or in small groups.
	  ○ Encourage collaboration by assigning roles:
	    ▪ **Animator:** Focuses on movement.
	    ▪ **Designer:** Refines visuals.
	    ▪ **Sound Editor:** Adds music or sound effects (optional).
	
	Presentation and feedback (15 minutes) – Unplugged activity
	● Organise a **"Mini Film Festival"** in the classroom:
	  ○ Students project their animations and briefly explain their creative process.
	  ○ Peers provide positive feedback using prompts:
	    ▪ "I really liked how you…"
	    ▪ "Your animation made me feel…"
	● Encourage a focus on effort and creativity rather than technical perfection.
	
	(Optional extension activities)
	Unplugged option:
	● **Stop-motion animation:**
	  ○ Use paper cut-outs, clay, or small objects to create a short stop-motion animation.
	  ○ Students photograph each frame with a tablet or phone and assemble it in a slideshow or app.
	Plugged option:
	● **Adding audio narration:**
	  ○ Students record voice-overs or dialogue for their characters using a simple audio tool.
	  ○ Combine the audio with their animation for a complete mini-movie.
	
	Creative challenge:

	• Challenge students to adapt their animations into short GIFs or create a digital poster advertising their animated film.

Teachers **and students' Roles**	**Teachers:** ● Facilitate discussions and demonstrate software tools. ● Provide individualised support and ensure equitable participation. ● Encourage all students to take on both creative (storytelling) and technical (animation) roles. **Students:** ● Collaborate in pairs or small groups to create a storyboard and animation. ● Take turns designing characters and animating scenes. ● Share their work and provide constructive feedback to peers.
Evaluation/ Assessment	**Observation:** ● Monitor students' participation and collaboration during activities. **Product Assessment:** ● Use a rubric to evaluate creativity, technical skills, and storytelling quality. **Reflection:** ● Facilitate a discussion where students share what they learned and how they overcame challenges.
TINKER Framework Integration	
How is the activity authentic learning?	This activity immerses students in the real-world applications of animation and digital storytelling, skills widely used in the creative industries. By working on their own short animated films, students engage in meaningful, hands-on experiences that mimic professional workflows, such as designing characters, creating storyboards, and animating scenes. The collaborative nature of the task mirrors team-based environments found in animation studios, as students work together to solve creative challenges and bring their ideas to life. The focus on producing a tangible product—a completed animated film—not only reinforces their technical and storytelling skills but also fosters a sense of pride and accomplishment as they see their creations come to fruition.
How is gender inclusiveness ensured?	To promote inclusivity, the activity ensures that all students, regardless of gender, take part in both creative and technical roles, such as drawing, animating, and narrating. This balanced role rotation avoids assigning tasks based on stereotypes and encourages every student to explore different aspects of the animation process. The

	inclusion of diverse role models from animation, highlighting professionals of various genders and backgrounds, helps students see themselves represented in the field. Additionally, the activity challenges gender norms by encouraging students to create diverse characters and stories, fostering a more open and creative environment where everyone feels equally capable and valued.
Considerations for level progression	**For beginners**: Simplify the activity by focusing on creating a single animated character or a simple sequence (e.g., a character waving). **For advanced students**: Allow them to add sound effects, dialogues, or experiment with layering and advanced animation techniques.

Learning Scenario 2 - Community Helper App

Learning Scenario Information	
Title	Community Helper App
Age Level	10 years old (4^{th} – 5^{th} grade)
Duration	45 minutes
Informatics topic areas	Human-Computer Interaction, Responsibility and Empowerment
Content domain (Integrated Subjects)	Social studies, ICT
Learning Objectives	Upon completing this activity, the students should be able to: • Identify community challenges such as littering, lost pets, or access to services. • Design a simple app interface to address a specific community issue. • Collaborate in groups to develop solutions that improve community well-being. • Reflect on the role of technology in solving real-world problems.

Scenario Description	
Setting	The local city council has asked your class for ideas on how technology can help solve everyday problems in the community. They want you to design a concept for a “Community Helper App” that tackles a specific challenge. Students will brainstorm problems in their neighbourhood, choose one to focus on, and design an app interface to address it. What should you do? Introduce the activity by discussing problems students might notice in their communities. Ask, “What could make our neighbourhood a better place to live?” Examples might include finding lost pets, reporting broken streetlights, or organising park clean-ups. Guide students to design an app that could help their community solve one problem.
(Digital) Tools	Plugged: Google Slides, Canva, or a simple app prototyping tool (e.g., Marvel App or Figma) Unplugged: Storyboards, coloured markers, printable app interface templates
Activity	**Step 1: Introduction (5 minutes)** ● **Authentic Context:** Begin with a discussion on how apps solve real-life problems. Provide relatable examples such as apps for reporting stray animals or recycling. ● **Gender Inclusion:** Highlight diverse app developers, showing examples of apps created by women or underrepresented groups. **Steps:** 1. Show examples of community-focused apps like “Next-door” (community help) or “Too Good To Go” (food waste reduction). 2. Pose a question: *“What are some problems in our neighbourhood that you think technology could solve?”* 3. Record students’ ideas on the board to set the stage for brainstorming. **Step 2: Group brainstorming and planning (15 minutes)** ● **Collaboration:** Organise students into mixed-gender teams, ensuring all members have roles such as researcher, designer, and presenter. ● **Scaffolding:** Provide examples of app features, such as maps for lost pets or forms for reporting issues. **Steps:** 1. Each group brainstorms and selects one community problem to address. 2. Use guiding questions to refine ideas, such as: ○ *“What features would make the app easy for everyone to use?”* ○ *“Who would benefit most from your app?”*

	3. Groups sketch their ideas on paper using storyboards to outline the app's interface and key features. **Step 3: App interface design (20 minutes)** ● **Plugged Activity:** ○ Use Canva, Figma, or Google Slides to create app mock-ups. ○ Design at least two screens: a home screen and a feature page (e.g., "Report an Issue"). ● **Unplugged Activity:** ○ Use printable app templates to sketch interfaces. ○ Include diverse users (e.g., icons or scenarios showcasing people of various genders and abilities). **Steps:** 1. Guide students in creating an interface that is visually clear and user-friendly. 2. Remind them to design for inclusivity, considering features like text-to-speech or high-contrast visuals. **Step 4: Presentation and reflection (5 minutes)** ● **Articulation:** Groups present their app designs to the class, explaining the problem they addressed, the app's features, and how it benefits the community. ● **Reflection:** Encourage peer feedback with prompts like: ○ *"What did you like about their app?"* ○ *"What could make it more inclusive or effective?"* **Steps:** 1. Facilitate a brief group discussion about the social impact of their apps. 2. Conclude by asking: *"How do apps like these empower individuals in our community?"*
Teachers and students' Roles	**Teachers:** ● Facilitate discussions on community challenges and guide brainstorming sessions. ● Provide examples, assist with digital tools, and troubleshoot as needed. ● Encourage collaboration and inclusivity within groups. ● Observe and assess app designs for creativity, practicality, and inclusivity. ● Offer constructive feedback during presentations. **Students:** ● Collaborate in teams to identify problems and design app solutions. ● Create app interfaces using storyboards or digital tools. ● Research the problem to ensure the app addresses community needs.

	● Present app concepts, explaining features and benefits. ● Reflect on peer feedback and discuss the role of technology in community empowerment.
Evaluation/ Assessment	- **Participation in brainstorming:** Assess understanding of community needs. - **App interface:** Evaluate creativity, practicality, and clarity. - **Presentation:** Assess communication skills and ability to explain the app's purpose effectively**.**
TINKER Framework Integration	
How is the activity authentic learning?	This scenario is an example of authentic learning because it connects classroom activities to real-world challenges. Students actively explore problems in their local environment and propose actionable solutions. By working on a "Community Helper App," they address issues relevant to their lives and neighbourhoods, fostering civic engagement and problem-solving skills. Inviting a community leader or app developer to provide feedback enhances the activity's relevance and offers insights into how technology can drive meaningful change.
How is gender inclusiveness ensured?	To ensure gender inclusiveness, the activity highlights diverse app designers as role models, sharing stories of men and women from different backgrounds who have successfully developed apps. The collaborative format encourages equal participation, with all students contributing creative and technical ideas. Providing a variety of tools (both plugged and unplugged) ensures accessibility for all learners, regardless of prior exposure to technology.
Considerations for level progression	- **Beginner Level:** Provide pre-made templates and drag-and-drop options to simplify the design process while focusing on conceptual understanding. Provide Scratch templates with pre-built variables and loops for ease of use. - **Advanced Level:** Introduce additional app features such as user notifications, profiles, or real-time updates.

Learning Scenario 3 - Design a digital garden

Learning Scenario Information	
Title	Design a digital garden
Age Level	10 years old

Duration	45 minutes
Informatics topic areas	Digital Creativity, Modelling and Simulation
Content domain (Integrated Subjects)	Science (ecology), Mathematics (geometry), Art (design)
Learning Objectives	Upon completing this activity, the students should be able to: ● Design a simple digital model of a garden using a visual programming tool. ● Explain the role of computational thinking in creating models. ● Collaborate effectively within a group to develop a shared solution. ● Reflect on the impact of design choices on real-world biodiversity.
Scenario Description	
Setting	As a teacher, you aim to introduce students to digital modelling while raising ecological awareness. Students are tasked with designing a digital garden that promotes biodiversity. The activity connects computational thinking, science, and art, culminating in a collaborative project that could serve as a blueprint for a school gardening initiative.
(Digital) Tools	● **Plugged Tools**: Scratch (or similar visual programming tools), tablets or laptops, a projector ● **Unplugged Tools**: Graph paper, coloured pencils, and biodiversity booklets
Activity	**Step 1: Introduction to biodiversity and digital design (10 minutes)** ● Begin with a discussion about the importance of biodiversity in ecosystems. ● Show examples of diverse ecosystems and discuss features that promote coexistence (e.g., variety of plants, pollinators). ● Introduce Scratch and demonstrate a pre-made digital garden to show the features they'll create. ● Set the challenge: "How can we design a garden where different species thrive together?"

	Step 2: Unplugged activity - garden design (15 minutes) ● Divide students into small, mixed-gender groups and assign roles (e.g., plant selection, layout design, habitat planning). ● Groups use graph paper to sketch their garden, labelling plant types, pathways, and habitats. ● Encourage them to think about biodiversity by including spaces for pollinators, shade, water, and ground cover. ● Provide biodiversity booklets for guidance, ensuring inclusive perspectives by considering plants and designs suited for various needs. **Step 3: Plugged activity – digital garden creation (15 minutes)** ● Groups transition to Scratch to recreate their garden sketches digitally. ● Students program basic animations (e.g., bees moving between flowers, water rippling in a pond). ● For added complexity, groups can simulate plant growth or interaction with pollinators using simple conditional statements. ● Emphasise creativity and usability, encouraging all group members to contribute equally. **Step 4 (5 minutes): Presentation and reflection** ● Each group presents their digital garden to the class, explaining their design choices and how their garden fosters biodiversity. ● Facilitate a reflection session where students discuss challenges they faced and lessons learned.
Teachers **and students' Roles**	**Teachers**: - Guide the discussion on biodiversity and computational modelling. - Provide step-by-step support during Scratch programming. - Ensure inclusive participation by monitoring group dynamics and scaffolding where needed. **Students**: - Collaborate within teams, ensuring equal roles in design and programming. - Apply critical thinking to balance aesthetics, functionality, and biodiversity needs. - Reflect on their learning experience and explain their choices during presentations.

Evaluation/ Assessment	● Collaboration: observe how well groups work together and share responsibilities. ● Digital Garden: assess creativity, functionality, and how well the garden promotes biodiversity. ● Presentation: evaluate clarity and depth of explanations about design and ecological impact. ● Participation: ensure all students contribute to discussions, design, and programming.
TINKER Framework Integration	
How is the activity authentic learning?	The activity embodies authentic learning by engaging students in a real-world issue that directly impacts their daily lives and community. By identifying and assessing safe walking and biking routes in their neighbourhood, students apply their knowledge to a meaningful and practical task, connecting classroom concepts to their local environment. The fieldwork component allows students to gather first-hand data, analyse real safety features, and propose tangible solutions, making the learning process deeply relevant. Moreover, creating a digital map using tools like Google My Maps or ArcGIS Online mirrors real-world practices in urban planning and community advocacy, providing students with valuable digital skills that have practical applications. Sharing their findings with peers and potentially local stakeholders further reinforces the activity's authenticity, as students see how their work can contribute to community safety and awareness.
How is gender inclusiveness ensured?	Gender inclusiveness is woven into the activity by fostering collaborative group work, where all students are encouraged to contribute equally to the project. Mixed-gender groups ensure diverse perspectives during fieldwork and analysis, reducing the potential for biases in identifying safety features or hazards. The activity also emphasises inclusivity in design, prompting students to consider the needs of all community members, including those of different genders, ages, and abilities. For example, students are asked to think about wheelchair accessibility, well-lit areas for night-time safety, and routes that are safer for children or elderly individuals. By encouraging a broader perspective on safety and accessibility, the activity highlights how equitable solutions benefit everyone, promoting inclusivity across the board.

Considerations for level progression	• **Beginner Level:**
	  ○ Provide pre-made Scratch templates and focus on basic garden designs.
	• **Advanced Level:**
	  ○ Introduce programming loops and conditional statements for complex simulations (e.g., seasonal changes in the garden).
	  ○ Encourage advanced groups to create interactive elements like user-controlled planting.

Learning Scenario 4 - My dream room makeover

Learning Scenario Information	
Title	My dream room makeover
Age Level	10 years old
Duration	45 minutes
Informatics topic areas	Design and Development, Digital Creativity
Content domain (Integrated Subjects)	Mathematics, Arts, Social studies
Learning Objectives	Upon completing this activity, the students should be able to: • Apply measurement concepts to plan a scaled layout of a room. • Use digital tools to create a visual representation of a functional and aesthetically pleasing room design. • Critically evaluate their design choices based on constraints such as space and budget. • Reflect on how room design affects daily life, fostering empathy and inclusivity.
Scenario Description	

Setting	Imagine a tech company has asked your class for ideas to create a new fitness tracker designed specifically for kids. Students will analyse existing fitness trackers and design an interface that tracks health metrics like steps, sleep, or hydration in an engaging and user-friendly way. Guide students to explore the features of fitness trackers and think about what metrics are most useful for kids their age. Challenge them to design an interface that's both functional and visually appealing.
(Digital) Tools	● **Plugged Tools:** ○ Tinkercad, Canva, or Google Slides (for creating room layouts digitally). ○ Projector or digital whiteboard for teacher demonstrations. ● **Unplugged Tools:** ○ Graph paper, rulers, scaled furniture cut-outs, and coloured markers for initial sketches.
Activity	**Step 1 (10 minutes): Introduction** ● **Engage Students:** ○ Show diverse examples of creatively designed bedrooms (modern, cosy, tech-inspired, minimalist). ○ Discuss the role of functionality and aesthetics in room design: ■ "What makes a room feel comfortable and welcoming to you?" ■ "What do you think is essential for your hobbies and schoolwork?" ● **Activity:** ○ Ask students to imagine their dream room and think about features they'd like to include for hobbies or needs (e.g., study corner, relaxation area). ○ Connect the task to real-world relevance by framing it as a contest run by a furniture store. ○ Highlight how design choices need to balance personal style and practical needs. Key Concepts: Introduce the importance of using a scale, managing space effectively, and staying within a budget. Inclusion: Use inclusive visuals that feature diverse designers and non-stereotypical room elements (e.g., avoid linking pink to girls or technology-focused designs to boys).

	Discuss how different people might have unique needs (e.g., sensory-friendly spaces for children with autism or shared spaces for siblings). **Step 2: Room sketching (10 minutes)** Provide students with graph paper and a room template with dimensions (e.g., 3m x 4m). ● Sketch their dream room layout to scale, using 1 square = 10 cm. ● Choose at least three essential furniture items (e.g., bed, desk, wardrobe) and arrange them for functionality and flow. ● Add creative elements (e.g., color-coded areas for studying, sleeping, or relaxing). Encourage collaboration: Pair students to review each other's plans and suggest improvements. ***Authentic Learning Enhancements:*** Contextualise the task by asking students to design their rooms for specific real-world scenarios: ○ Example: "Imagine your family moves to a smaller house—how would you make the most of your new room space?"; "You want to start a new hobby like painting or gaming—how will you fit this into your room?" Encourage students to incorporate basic budgeting into their sketches by assigning approximate costs to furniture items and setting a total budget limit. ***Gender Inclusion Enhancements:*** Guide discussions about diverse needs: ○ "What would your design look like if it were for a sibling or friend with different interests?"; "How would you make this space accessible for someone using a wheelchair or with sensory sensitivities?" Foster collaborative peer feedback: Ask students to trade sketches with a partner of a different gender and suggest improvements that make the design more inclusive.

Step 3: Plugged activity: digital design (20 minutes)
Transition sketches into digital designs using tools like Tinkercad or Canva:

- Recreate room layouts with digital furniture pieces and add personal touches (e.g., wall colours, decorations).
- Annotate key areas (e.g., "Study Zone" or "Relaxation Nook") to explain their functionality.
- Advanced students can add a simple budget estimation for their designs.

Authentic learning enhancements:
Provide students with a design brief modelled after real-world challenges, such as:

    - "Create a room for a contest where judges will evaluate based on creativity, functionality, and inclusivity."
- Advanced students can add interactive features, such as a "virtual walkthrough" or design a colour palette that evokes specific moods (e.g., calming blues for relaxation zones).

Gender inclusion enhancements:
- Encourage students to represent diverse needs visually in their digital designs, such as ergonomic furniture for studying, sensory-friendly lighting, or shared-use layouts for siblings of different genders.
- Celebrate individuality by showing examples of unique room designs from boys and girls that break stereotypes (e.g., girls incorporating tech setups, boys designing cosy reading corners).

Step 4: Reflection and presentation (5 minutes)
- Activity:
    - Each student presents their design to the class, explaining their layout and how they balanced creativity and functionality.
    - Groups provide peer feedback on strengths and suggestions for improvement.
- Critical Thinking and Inclusion:
    - Ask students to reflect on how their design meets diverse needs and avoids assumptions about users.

Optional way of doing: Incorporate a "shopping catalogue" with costs for furniture and decoration items, asking students to select items within a given budget. They can use web-shops from existing furniture stores in your area, e.g. Ikea or similar.

Teachers **and students' Roles**	**Teachers**: - Facilitate discussions and guide students through the design process, emphasising both **functionality** and **creativity** in room layouts. - Introduce key concepts like **scale, budgeting, and space management**, ensuring that all students understand and apply them effectively. - Promote inclusivity by showing **diverse examples** of room designs that challenge stereotypes and represent unique needs, such as accessibility considerations or sensory-friendly spaces. - Support students' use of digital tools (e.g., Tinkercad, Canva), offering step-by-step guidance and scaffolding for those who need additional help. - Encourage peer collaboration and constructive feedback, fostering a classroom culture of shared learning and mutual respect. **Students**: - Engage actively in discussions about design functionality, aesthetics, and inclusivity, sharing their ideas and preferences. - Apply creative and critical thinking skills to sketch their room layouts on graph paper and develop them digitally using design software. - Collaborate with peers to provide feedback on each other's designs, focusing on improvements that incorporate inclusivity and balance personal needs with real-world constraints. - Reflect on how their design choices address diverse needs and scenarios, including sensory sensitivities, accessibility, or shared spaces.
Evaluation/ Assessment	**Creativity**: ● Assess how imaginative and original the room designs are, with particular focus on personalised elements like themes, layouts, or unique features (e.g., sensory-friendly lighting, interactive zones). **Functionality**: ● Evaluate whether students balanced aesthetics with practical needs, including the effective arrangement of furniture and zoning for specific tasks (e.g., study, relaxation). **Use of tools**: ● Measure how well students applied digital tools (e.g., Tinkercad, Canva) to translate their sketches into polished, annotated designs. For advanced learners, interactive elements or budget considerations can be included. **Inclusivity**:

	• Review how well students incorporated diverse needs into their designs (e.g., wheelchair accessibility, sensory zones, or shared spaces). Check for evidence of inclusive thinking in peer feedback and final presentations. **Critical reflection**: • Assess students' ability to explain their design decisions, articulate how they balanced creativity and functionality, and reflect on inclusivity.
TINKER Framework Integration	
How is the activity authentic learning?	The activity embodies **authentic learning** by situating students in a real-world design challenge that reflects the practical processes of interior design, architecture, and space management. Framing the task as a furniture store contest provides relevance and purpose, encouraging students to think critically and creatively about functionality, aesthetics, and individual needs. Through tasks such as sketching room layouts to scale, managing spatial constraints, and incorporating budgets, students engage in problem-solving while applying interdisciplinary knowledge from mathematics (scale and budgeting), art (visual design), and technology (digital tools like Canva or Tinkercad). Real-world scenarios, such as designing for smaller spaces or accommodating new hobbies, deepen the connection to real-life contexts, while peer feedback fosters collaboration and iterative improvement, mirroring professional design processes.
How is gender inclusiveness ensured?	The activity promotes **gender inclusiveness** by challenging traditional stereotypes and encouraging diverse perspectives throughout the design process. Inclusive visuals showcase non-stereotypical examples, such as girls incorporating tech-based designs or boys creating cosy, reading-friendly spaces. Students are guided to consider the unique needs of others, including accessibility for individuals using wheelchairs or sensory-friendly spaces for neuro-diverse users. Collaborative peer feedback, where students of different genders review each other's work, ensures equitable participation and highlights varied perspectives. Language and task framing avoid gendered assumptions, fostering an environment where all students feel represented, valued, and empowered to create designs that reflect both individuality and inclusivity.

Considerations for level progression	**Beginners**: ● Provide pre-drawn room templates with basic furniture cut-outs for students to arrange, focusing on developing an understanding of scale and layout. ● Simplify the budgeting component by offering fixed prices for a small set of items. ● Offer step-by-step guidance on digital tools like Canva or Tinkercad, ensuring that beginners focus on translating their sketches into simple digital designs. **Intermediate:** ● Encourage students to add zoning annotations (e.g., "Study Area," "Relaxation Nook") and basic cost estimates for furniture items. ● Introduce real-world scenarios, such as designing for a sibling or considering sensory-friendly elements. ● Prompt students to experiment with personal touches like wall colours, decorations, and ergonomic furniture choices. **Advanced:** ● Challenge students to include detailed budget breakdowns that reflect real-world constraints using catalogues or online furniture stores (e.g., IKEA). ● Ask students to design their rooms for a specific purpose (e.g., starting a new hobby, accommodating a family member with disabilities). ● Encourage advanced students to add interactive elements like a virtual walkthrough or create a colour palette designed to evoke specific emotions (e.g., calming blues for relaxation). ● Integrate more complex spatial challenges, such as designing for unusually shaped or smaller rooms.

Learning Scenario 5 - Neighbourhood weather reporter

Learning Scenario Information

Title	Neighbourhood weather reporter
Age Level	10 years old (4th – 5th grade)
Duration	45 minutes
Informatics topic areas	Data and Information, Digital Creativity
Content domain (Integrated Subjects)	Science, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: ● Collect and organise basic weather data (e.g., temperature, rain, wind). ● Create a visual weather report using digital tools. ● Explain how weather patterns affect daily life and community activities. ● Reflect on how technology helps us understand and prepare for weather changes.
Scenario Description	
Setting	Your class is tasked with helping the community stay informed about the weather. Acting as junior weather reporters, students will create a daily weather report, including temperature, precipitation, and outfit suggestions (e.g., "Wear a jacket—it's windy!"). They'll gather real data, analyse it, and present it visually. Begin by asking: *"How do you decide what to wear in the morning? How would you help others get ready for their day?"* Challenge students to create a weather report that's simple, clear, and helpful for their neighbours.
(Digital) Tools	**Plugged:** Canva, Google Slides, Microsoft Paint for creating reports; an online weather app or thermometer for data collection. **Unplugged:** Paper, coloured markers, weather icons for cutting and pasting.

Activity	**Step 1: Introduction (10 minutes)** • **Authentic Context:** Discuss the importance of weather reports in daily life. Show examples, both written and visual, highlighting key elements like temperature, conditions, and practical advice (e.g., "carry an umbrella"). • **Gender Inclusion:** Mention meteorologists from diverse backgrounds to inspire students. **Steps:** 1. Ask students, *“Why do we need weather reports? How do they help people?”* 2. Show examples of real-life weather reports and analyse what makes them clear and helpful. **Step 2: Data Collection and Analysis (10 minutes)** • **Collaboration:** Students work in groups to collect current weather data using thermometers (outdoor or online sources). • **Scaffolding:** Provide prompts to interpret data, such as, *“What does 25°C feel like? What should people wear?”* **Steps:** 1. Groups gather data on temperature, precipitation, and wind. 2. Discuss their findings and determine how these conditions affect daily activities. **Step 3: Weather Report Creation (20 minutes)** • **Plugged Activity:** Use Canva, Google Slides, or Paint to design reports with weather icons and text. • **Unplugged Activity:** Create reports using paper, markers, and pre-drawn weather icons. **Steps:** 1. Each group creates a forecast (e.g., "Today will be sunny with 25°C"). 2. Design a visual report with icons (e.g., sun, clouds, rain) and advice (e.g., "Wear sunglasses!"). 3. Ensure reports are clear, colourful, and user-friendly. **Step 4: Presentation and Reflection (5 minutes)**

	● **Articulation:** Groups present their weather reports, explaining how they analysed the data and why their advice is helpful. ● **Reflection:** Encourage peer feedback with questions like: *"What did you like about this report?"* or *"How could it be improved?"* **Steps:** 1. Facilitate presentations and discussions on the role of weather reports in community life. 2. Conclude by asking: *"How does technology make weather predictions more accessible?"*
Teachers and students' Roles	**Teachers:** ● Facilitate discussions about the importance of weather reports. ● Provide support during data collection and ensure accuracy. ● Assist with digital or manual tools for report creation. ● Encourage equal participation and collaboration. ● Offer feedback on presentations and guide reflective discussions. **Students:** ● Collaborate in groups to collect and analyse weather data. ● Design visual reports using digital or manual tools. ● Present their findings and engage in discussions. ● Reflect on the role of weather data in improving daily life.
Evaluation/ Assessment	● Assess participation during data collection and group discussions. ● Evaluate the creativity, clarity, and accuracy of the weather reports. ● Observe presentations and peer feedback to gauge understanding and collaboration.
TINKER Framework Integration	
How is the activity authentic learning?	This activity embodies authentic learning by engaging students in a real-world task—collecting and interpreting weather data to create informative reports for their community. Students apply their learning in a practical context, mirroring how meteorologists analyse data to provide forecasts. The collaborative nature of the task allows students to work in teams, fostering teamwork and communication skills as they interpret data and design their reports. Reflection is integral to the process, as students assess the relevance and impact of their reports and explore how technology enhances our ability to predict and prepare for weather

	changes. These elements ensure the activity is not only academically engaging but also meaningful and relevant to students' lives.
How is gender inclusiveness ensured?	The activity prioritises gender inclusion by promoting diverse representation and equitable participation. Highlighting meteorologists from varied backgrounds as role models challenges stereotypes and inspires all students to envision themselves in STEM roles. The collaborative structure ensures every student has an equal opportunity to contribute, whether in data analysis, report design, or presentation. By providing a mix of digital and manual tools, the activity accommodates diverse learning preferences and skills, making it accessible and empowering for all participants. This inclusive approach fosters a classroom environment where students of all genders feel valued and capable of excelling in informatics and STEM-related tasks.
Considerations for level progression	**For Beginners:** Offer pre-drawn weather icons and simplified data interpretation guides. **For Advanced Learners:** Challenge students to track weather trends over a week and create graphs or predictions.

Learning Scenario 6 - Save the planet – recycling detective

Learning Scenario Information	
Title	Save the planet – recycling detective
Age Level	10 Years old (4th and 5th grade)
Duration	45 minutes
Informatics topic areas	Responsibility and Empowerment, Data and Information
Content domain (Integrated Subjects)	• Environmental science (recycling), Mathematics (categorising and counting), Social Studies (community impact)

Learning Objectives	Upon completing this activity, the students should be able to: • Identify common household waste items and classify them into recyclable categories. • Analyse and tally data on waste collected to create a simple report. • Explain how recycling helps protect the environment and reduces waste. • Reflect on how personal actions impact their community and the planet.
Scenario Description	
Setting	Imagine your local recycling centre needs help teaching kids how to sort waste correctly. Your class will become "Recycling Detectives" to learn about identifying recyclable items, organising them, and creating a report to educate families about recycling. Ask students: "Have you ever wondered where trash goes? What if you could help reduce waste and make a difference in your community?" Challenge them to sort and analyse waste items and create a report showing what can be recycled versus what becomes trash.
(Digital) Tools	• Plugged: Excel or Google Sheets (optional) for tallying waste; Canva or Google Slides for creating reports. • Unplugged: Printed "waste cards" (images of items like paper, plastic bottles, food scraps), recycling bins, and poster materials.
Activity	**Step 1: Introduction (10 minutes)** • **Authentic Context:** Show images of overflowing landfills and discuss the environmental impact of waste. • **Gender Inclusion:** Highlight diverse environmental scientists or waste management leaders focusing on making examples that represent diversity. **Optional: consider shower** students a video of recycling process and/or exploring the journey of recycled materials, e.g., [Entire Recycling Process Explained] **Steps:** 1. Discuss why recycling is important for the planet and our communities. 2. Explain the activity and introduce categories: recyclables, compost, and trash. **Step 2: Recycling Sorting Game (15 minutes)**

	• **Collaboration:** Groups receive piles of "waste cards" and sort them into the correct bins. • **Scaffolding:** Provide hints for tricky items like pizza boxes or straws. **Steps:** 1. Divide students into mixed-gender groups and give each a set of waste cards. 2. Groups sort items into bins and tally how many items fall into each category. 3. Discuss challenges in sorting and clarify any misconceptions. **Step 3: Data Analysis and Report Creation (15 minutes)** • **Plugged Activity:** Use Excel or Google Sheets to create simple bar charts or tables. • **Unplugged Activity:** Create posters with hand-drawn charts and recycling tips. **Steps:** 1. Groups count and categorise the waste items. 2. Create visual representations of their findings, such as "20 items recycled, 5 composted, 10 trash." 3. Add facts or tips (e.g., *"Recycling paper saves trees!"*). **Step 4: Reflection (5 minutes)** • **Articulation:** Groups present their findings, sharing insights on how recycling impacts the planet. • **Reflection:** Discuss one actionable tip everyone can use to improve recycling habits. **Steps:** 1. Each group presents their chart or poster to the class. 2. Conclude with a group discussion on personal responsibility in recycling.
Teachers and students' Roles	**Teachers:** • Explain recycling categories and provide examples. • Assist students with sorting, tallying data, and creating reports. • Offer hints and feedback during group activities. **Students:** • Work in teams to sort waste items and tally results. • Collaborate to create visual reports or posters.

	● Present findings and reflect on the environmental impact of their actions.
Evaluation/ Assessment	● Observe teamwork and sorting accuracy during the activity. ● Assess charts or posters for clarity, creativity, and content. ● Use peer feedback to highlight effective ideas and suggest improvements.
TINKER Framework Integration	
How is the activity authentic learning?	This activity connects directly to real-world challenges, engaging students in sorting and analysing waste to promote recycling in their community. Through hands-on investigation and data analysis, students gain a deeper understanding of recycling's environmental benefits. Collaboration is central, as teams work together to create informative reports. Reflection on their findings encourages students to think critically about their impact and share actionable insights, fostering civic responsibility.
How is gender inclusiveness ensured?	To ensure inclusivity, the activity highlights role models from diverse backgrounds in environmental science, breaking stereotypes. Leadership roles within groups are rotated to ensure equal participation. Providing both digital and manual tools ensure accessibility for students with varying skill levels, fostering a supportive environment where all contributions are valued.
Considerations for level progression	● **For beginners:** Simplify sorting into two categories: recyclables and trash. ● **For advanced learners:** Challenge students to create a “Recycling Journey Map” showing what happens to items after they are recycled.

The Netherlands

The Netherlands

Learning Scenario 1 - Crack the code - the binary code (letters)

Learning Scenario Information	
Title	Crack the code - the binary code (letters)
Age Level	10-12 years old
Duration	45 minutes
Informatics topic areas	Algorithms, Programming
Content domain (Integrated Subjects)	Mathematic, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● the principles of binary coding ● decode a word written in a secret code based on binary code ● relate the idea of storing letters on paper to the idea of storing information in a computer
Scenario Description	
Setting	The concept of binary is extremely important in the world of computers. And you want to introduce your student to the binary code but in a more engaging, hands-on and playful way to reduce the fear of failure of some students struggling with abstraction. This game-based approach will help your students in practicing the binary code in a playful and engaging way.
(Digital) Tools	● Projector and laptop. ● Whiteboard. ● A Binary code box per group of students - each box will contain: 1 combination lock (with letters), Code/decode worksheet for each student, 1 lock riddle card template, 1 exit card template.
Activity	**Step 1 (10 minutes): Introduction the meaning of "code"**

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Introduce students to the concept of “code” by drawing some short sentences to the whiteboard using emoticons. A good and easy approach can be: write the emoticons codes and ask them what they means: e.g. <3 → 💗 or XD → 😝 or :'-(→ 😢
To engage students, ask them to draw on a piece of paper their feelings using emoticons, pick some of them casually and then decode the emoticon in a text format (here the list of shortcuts).
Ask the students to write a sentence by using emoticons, some easy examples can be: “It’s time to have lunch” or “Remember we have an appointment for a pizza this evening” or “I am sick, could you bring me the medicine please?”.
Introduce the concept “codes are used to represent data in a more abstract way”

Step 2 (10 minutes): From emoticons to Binary code, let get familiar with Binary code

Introduce the concept of “binary” code and bits starting from this video (2’22’’)
Introduce and resume the basic dictionary of the lesson (write the definitions on the whiteboard):
Binary - A way of representing information using only two options; on (1) and off(0)
Bit - A contraction of "Binary Digit"; the single unit of information in a computer, typically represented as a 0 or 1

Byte - 8 bits = 1 letter
Draw on the whiteboard two or three easy/short words (cat, dog, pig, love) and translate them in binary code, and write also the number of bytes of the word.

Step 3 (20 minutes): Activity part 1→ create the secret code

Each group will secretly decide one unlocking-code , after that they will fill in the two card- templates with the support of the teacher and of the code worksheet.
The Exit card template will contain the unlocking word in binary code .

Step 4 (5 minutes): Activity part 2 → Crack the code

Student groups will have 8 minutes to unlock the code of one of the other groups.

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<td>Teachers

and students’ Roles</td>
<td>Teacher: The teacher assumes the role of facilitator, guiding students to reach vital conclusions and to foster student engagement.</td>
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	Students: The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. The student's behavioural engagement is assessed through overall participation in the learning process. Succeeding in cracking the code can be used for the evaluation process if with a debriefing and metacognitive analysis.
TINKER Framework Integration	
How is the activity authentic learning?	The use of code as part of the daily communication tools is considered closer to the young experience of "code" making the abstract concept of code much more understandable to them.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, promotes the use of daily communication in coding.
Considerations for level progression	You can ask your student to create an unlocking-word with a pattern.

Learning Scenario 2 - Data Treasure Story

Learning Scenario Information	
Title	Data Treasure Story
Age Level	9-11 years old
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Math, Civic education
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the difference between "data" and "information". ● Understand how raw data can be transformed into useful information.
Scenario Description	
Setting	You want to introduce your students to data science and do it in a more engaging, playful and cooperative way to reduce the fear of failure of some students struggling with technology and abstraction. The activity introduces the concept of "data" as raw facts and "information" as processed data that has meaning.
(Digital) Tools	● Paper cards (measure 2.5 inches by 3.5 inches (63.5mm x 88.9mm) ● Pens/pencils/colours

Activity	Step 1 (10 minutes): Introduction to "data" and "information"
	Step 1 (10 minutes): Introduction to "data" and "information" ● Prepare 6 cards. In each card describe an object of a short sentence you want to tell to your students (e.g. Yesterday I found a cat in my garden) and on some pieces of paper describe the objects of your sentence (you, cat and garden): a) the colour b)the shape and c)the materials. Then read the "data a+b+c" about the objects to the students asking them to try to guess the objects. Add the data and try again, stimulating your students to find the story (=information). ● Now you can introduce the difference between data and information. You can start with: Data, which commonly refers to a collection of text, numbers and symbols with no meaning. Data therefore has to be processed, or provided with a context, before it can have meaning. Information which is the result of processing data, usually by computer. This results in facts, which enables the processed data to be used in context and have meaning. Information is data that has meaning. ● To reinforce the concept, present students with this video (2 'total). **Step 2 (10 minutes): Understanding** ● Split the students in groups of 3-4 and ask each group to write a sentence replicating the example you presented them before (around 6 minutes) writing their set of cards, and then ask 2 groups to show their cards to the class. Discuss together the results of each card to reinforce the students' understanding of "data" and "information". **Step 3 (20 minutes): Activity** ● Ask your students (divided in groups) to prepare a set of 10 cards per group for a "Data Treasure Story" - a short story done by data written in each card. After 15 minutes ask each group to transform the collected data into meaningful information and present their results to the class. **Step 4 (5 minutes): Reflection and debriefing** The session concludes with a discussion on the difference between data and information, with optional extensions that include organising data logically or filtering out irrelevant information. This scenario not only introduces the concepts of data and information but also encourages students' collaboration, critical thinking, and problem-solving skills.

Teachers and students' Roles	**Teachers:** - Guide the students through the initial examples - Assist them preparing their cards of data - Supervise each activity, encouraging students to reflect the meaning of data and information. **Students**: - Act as creator of the Treasure Story - Interact with other groups and within the group
Evaluation/ Assessment	● Observe student participation during each activity phase and how they interact between them. ● Evaluate each group's ability to design a well detailed function with a clear description of patterns.
TINKER Framework Integration	
How is the activity authentic learning?	The activity uses hands-on activities. Students explore and design a function and a set of patterns in a tangible environment, making the abstract concepts more concrete.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles. Being based on creativity and imagination can be more stimulating for young students, boys and girls, with an attitude in designing stories.
Considerations for level progression	Can ask your student to create a longer story with more than 10 cards and/or to create a common story for the class using some of the cards created by each group and adding the missing cards.

Learning Scenario 3 - Let's move the robot

Learning Scenario Information	
Title	Let's move the robot
Age Level	10 years old
Duration	45 minutes
Informatics topic areas	Algorithms, Human-Computer Interaction
Content domain (Integrated Subjects)	Physical education
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the meaning of: sequencing, algorithms, and debugging.
Scenario Description	
Setting	In this engaging activity students can learn programming concepts in a fun and interactive way, without the use of computers.
(Digital) Tools	● Paper sheets and pencils ● Space ● Tape/chalk
Activity	**Step 1 (10 minutes): Setting** ● Present the challenge—your students gather in groups and are introduced to the task of programming their own robotic friends to stack cups in specific configurations. ● The programming itself is done using simple paper and arrows. Each group has a programmer who writes down a program using arrows, while a robot (played by one of the participants) reads and interprets those arrows to determine how

	to stack the cups accordingly. ● Draw a grid on the floor **Step 2 (25 minutes): Activity** ● Organise students into groups of 4/6. Only one team will use the network at a time. ● One of the students will be the robot. ● Ask the other students to draw the "direction cards" and then use the card to give the correct instructions to guide the robot out of the grid in the most efficient way **Step 3 (10 minutes): Reflection** ● Ask some questions to your students: How do you think that the robot knows what to do? Does a robot really "understand" what you say? Is it worried about getting in trouble if it doesn't do what it's told? The goal of this quick discussion is to call out that while robots may seem to behave like people, they're actually responding only to their programming. Students will likely refer to robots from movies and TV that behave more like humans. Push them to consider robots that they've seen or heard of in real life, like Roombas, or even digital assistants like Amazon Alexa.
Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. The student's behavioural engagement is assessed through overall participation in the learning process. You can evaluate the engagement of the students in the final discussion.
TINKER Framework Integration	
How is the activity authentic learning?	The use of movement as a way to understand the theory behind a concept is a hand on approach and is helpful to increase understanding of complex concepts through embodiment.
How is gender	This activity encourages collaboration in mixed-gender teams, promotes equal

inclusiveness ensured?	participation, and avoids gendered roles.
Considerations for level progression	You can repeat the game asking new activities e.g. up/down, repeat the set of x moves (loop), and also use your hands to move forward.

Learning Scenario 4 - Simon says

Learning Scenario Information	
Title	Simon says
Age Level	8-11 years old
Duration	40 minutes
Informatics topic areas	Algorithms, Programming
Content domain (Integrated Subjects)	Language and Physical education
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand of what "conditions" are and how they can be used as part of an algorithm
Scenario Description	
Setting	Before starting the activity you can watch this video to find inspiration for your lesson.
(Digital) Tools	● Whiteboard and a laptop
Activity	**Step 1 (5 minutes): Introduction** ● Introduce your students to the topic of "conditions" in programming watching

	together this video (1 minute) and/or this video (not all the video but starting from the beginning and stopping the video at time 1.30) **Step 2 (25 minutes): Activity** ● This activity can be done together if supported by the teacher. Play a game of “Simon Says” with a twist. Before starting, explain to your students that the game will simulate conditional statements (if-then-else). For example, “Simon says, ‘if wearing blue pants, then stand; else, sit down.” **Step 3 (10 minutes): Reflection** ● After the game, ask your students to give you some examples of “conditions” from their daily life to reinforce the concept.
Teachers and students’ Roles	**Teacher:** The teacher assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. **Students:** The students assume the roles of ” respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	The positive student’s emotional engagement is assessed through the student’s willingness to get involved in the learning activities and their behavioural engagement.
TINKER Framework Integration	
How is the activity authentic learning?	This activity helps students understand conditional logic by physically acting out the “if” and “else” scenarios, reinforcing the concept of making decisions based on conditions.
How is gender inclusiveness ensured?	This activity promotes equal participation, and avoids gendered roles.
Considerations for level progression	You can introduce some additional conditions such as “and” or “or” statements.

Learning Scenario 5 - The class photo-diary

Learning Scenario Information	
Title	The class photo-diary
Age Level	11-12 years old
Duration	35 minutes
Informatics topic areas	Digital Creativity, Design and Development
Content domain (Integrated Subjects)	Art + Language
Learning Objectives	Upon completing this activity, the students should be able to: ● Design and analyse the part of a project. ● Operationalise a process and use creativity to deepen their understanding of interconnected topics, explore problems, and collaborate on solutions. ● Practice some free software and will be able to better understand the concepts of file, text, images (jpeg and or png), file size and content/structure.
Scenario Description	
Setting	With this activity you will introduce your student to the design of creative contents and to the use of some free software to create digital art contents in which images are combined to words in a meaningful way. You can use an unplugged approach to design the class cards and then you can use several free online tools to create the class album (e.g. Prezi, Genial.ly, Google Presentation, Book creator, Canva).
(Digital) Tools	● Laptop with an access to the web and a camera ● Paper and colours
Activity	**Step 1 (10 minutes): Introduction** ● Start introducing your student to the meaning of software → a program or set of programs designed to perform specific tasks on a computer. In simple terms, software encompasses the programs, rules, and instructions that allow a computer to perform various functions. ● Show to your students this short video about the project “Humans of new york”

	• Ask your students to work in couples. Provide each couple with a card ad pencil • Each couple will write at least two meaningful questions to ask to their classmates • Ask each couple to write a general structure of the short interview to the other classmates (when, why? What are you going to ask them? **Step 2 (25 minutes): Activity** • Leave to the students to make their short interviews and collect pictures. • Use one of the models offered by each software freely available online and ask your students to add one picture with the text of the story they collected. • Refine the final product and analyse with your students the stories and how they are structured to stimulate their curiosity
Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. **Students:** The students assume the roles of " respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities and their behavioural engagement.
TINKER Framework Integration	
How is the activity authentic learning?	It is a practical activity to foster storytelling and imagination.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles
Considerations for level progression	You can introduce some additional info about pixels, inviting your students to create a bigger one with their pictures.

Learning Scenario 6 - The sorting network

Learning Scenario Information

Title	The sorting network
Age Level	8 years old
Duration	45 minutes
Informatics topic areas	Programming, Algorithms
Content domain (Integrated Subjects)	Math, Physical education
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand what sorting algorithms is. ● Understand how decision-making is a bridge between programming and interaction of humans with computers.
Scenario Description	
Setting	You want to introduce your students to the concept of "sorting network". Even though computers are fast, there is a limit to how quickly they can solve problems. One way to speed things up is to use several computers to solve different parts of a problem. In this activity we use sorting networks which do several sorting comparisons at the same time.
(Digital) Tools	● Chalk or tape to mark squares and paths on the floor. ● Cards on lesson plan— printed or hand-written ● Stopwatch or timer ● Look at THIS video to have an idea before starting and use THIS as a reference for the sorting network. ● Use the Sorting Network template to draw a 6 person Sorting Network on a paved surface outside using chalk or tape. Note that the Sorting Network needn't use different colours or line thicknesses, but if suitable chalk or tape is available, this can help students remember which way to go. It should be large enough that two students can comfortably stand in the rectangles; the more spread out it is, the more effective the exercise is.
Activity	**Step 1 (10 minutes): Setting** ● Present the challenge—computers sort data all the time—to make looking

	things up fast, to process data, to merge information. How do they do that? ● Even though computers are fast, there is a limit to how quickly they can solve problems. One way to speed things up is to use several computers to solve different parts of a problem. In this activity we use sorting networks which do several sorting comparisons at the same time. ● Show the students the Sorting Network drawn on the ground, and tell them "This chalk computer can do some things very fast, let's investigate what it does." **Step 2 (25 minutes): Activity** ● Organise students into groups of six. Only one team will use the network at a time. The current team should stand on the circles at the "input" end of the Sorting Network. ● Give each of the six students a card to hold (initially use the set of cards containing the numbers from 1 to 6; the cards should be given to the students out of order). These cards are the inputs into this cool chalk computer (this is a special kind of computer that can process several operations at the same time). ● Get the first two students to follow the lines from their circles until they meet at a box (the others should pay attention). ● When the two have entered the box, they should say "Hello" to each other (this is to make sure that they stop and both engage in this step), and then compare cards to decide who has the lower number and who has the higher number. ● The student with the lower number should follow the line out to the left and go to the next box, while the person with the higher number follows the line leaving to the right to go to the next box. ● Now get the next pair of students to do the same, meeting at a box and leaving it with the smaller to the left and the larger to the right. You can now get the remaining pair of students to do this (remind them to say hello when they meet). ● Once they have the idea, tell them to repeat this process until they get to the end of the network. If someone gets left behind, have the students go back to the beginning; they will need to pay attention when they meet at a square, and ensure that both people who have met know the outcome. ● When they have all reached the circles at the other end of the network, have them turn and face the starting circles and read what's on their card, from left to right. They should be in the correct order from smallest to largest; if not, they may need to try again and work more carefully.

	Step 3 (10 minutes): Discussion & Reflection
Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. The student's behavioural engagement is assessed through overall participation in the learning process.
TINKER Framework Integration	
How is the activity authentic learning?	The use of movement as a way to understand the theory behind a concept is a hand on approach and is helpful to increase understanding of complex concepts through embodiment.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles.
Considerations for level progression	When each group has been through the Sorting Network, introduce a Sorting Network race to see which group can successfully complete the task in the shortest amount of time (either with two Sorting Networks racing teams at the same time, or one network with the times measured using a stopwatch).

Learning Scenario 7 - The sun-catcher - Find the patterns in a function

Learning Scenario Information	
Title	The sun-catcher - Find the patterns in a function
Age Level	8-10 years old
Duration	45 minutes
Informatics topic areas	Algorithms, Computing Systems
Content domain (Integrated Subjects)	Mathematics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Learn what a pattern is and how to find patterns in processes ● Interpret symbols as they relate to physical manipulatives ● Practicing art as a way to communicate science ● Learn more about definition and understanding of Functions, definition of patterns ● Understand the link between patterns and functions
Scenario Description	
Setting	You want to introduce your students to coding and do it in a more engaging, hands-on and playful way to reduce the fear of failure of some students struggling with technology and abstraction. In this lesson, students will create a sun-catcher using string nuts, and beads following repetitive steps. Creating their sun-catchers, working in pairs, they will identify repeated "patterns" which will be called from a main program and recorded on a single sheet of paper.
(Digital) Tools	● Projector and laptop ● Whiteboard

	- Sun-catcher boxes for your students - each box should contain: a string or fishing line per student, 2-4 charms + 2-4 other accessories (buttons, hoops, nuts, beads), 2-4 spacers, 1 special beam or button) - Pens, Pencils, & Scissors - One Working Sheet per group to write the patterns and actions done in two columns and with an additional column to write the complete function at the end of the activity
Activity	**Step 1 (10 minutes): Introduction to Pattern and Functions Using Real-Life Examples** - Explain to the students the meaning of “function and patterns” starting from one of your daily actions - having a coffee or brushing your teeth are common daily functions. Write the steps of the chosen function on the whiteboard → - take the toothbrush - take the dentifrice - open the dentifrice tube - put the paste on the toothbrush - brush your teeth - turn on the tap - rinse your mouth - turn off the tap - clean your toothbrush - put away the toothbrush - close the dentifrice tube - put away the dentifrice tube - Present students with the video “FUN-ction.” (4 '30’’ total but from the time 0 to the time 1’ 45’’ is the relevant part for this introduction, you can stop the video at 1 '40’’). - Ask your students to tell you what they do each day and ask them to explain the process step by step. Write the steps on the whiteboard → if needed you can give them suggestions: set the table for the dinner, pack the backpack, have a shower… - Explain that a **function is a single action, that you can easily do over and over again, made by some well-defined and repeated steps**. - recall the actions done and described by one of your students. **Step 2 (20 minutes): Understanding** - Show to the students a sun-catcher made by you before and use it to explain to the class how the sun-catcher is made. Write on the whiteboard all the steps you did while you told them: e.g.: First, I put a button on the string, then I tied a knot. After that, I did it all again. I put a spacer on the string, and tied another

	knot. Then, I put a beam on the string and tied another knot… N.B.--> in THIS VIDEO you can find a short description about how you can make your own suncatcher. ● Ask each group of students (in this activity a group of two or three is good) to create their sun-catchers. In the meantime they can also fill in the working paper writing the list and sequence of actions in one of the columns + the list and sequence of elements (beads, charms…) in the other one. **Step 3 (15 minutes): Group Reflection and Discussion** ● Introduce the terms *function* and *pattern* in a more technical way: ○ **Function:** a block of code that defines **a sequence of steps or commands**, such as movement - recall the sequence of actions done to create the sun-catcher. ○ **Pattern**: Introduce the term by analysing the differences in your sun-catchers (e.g. 2 red beads each 2 buttons or a spacer each 3 nuts and 2 charms…) and also in the actions done to introduce them to identify similarities between decomposed problems.. ● Ask to your students to find in their sun-catchers the patterns (both elements and actions) and discuss them together ● Ask each group to write in the third column the “Function of my sun-catcher” putting together in sequence the actions and the elements. You can discuss and comment together one or two examples from them. Focus on the pattern recognitions and the meaning of function to solve the problem “create a sun-catcher”. ● Ask your students to find patterns in different contexts, you can suggest them to work with the daily activities such as brushing their teeth, preparing a sandwich,...
Teachers and students’ Roles	**Teachers:** - Guide the students through the initial examples - Assist them in writing their lists of actions and elements to create the function. - Supervise each activity, encouraging students to reflect on patterns. **Students**: - Act as creator of the sun-catcher. - As coders they write a function to design the sun-catchers
Evaluation/ Assessment	● Observe student participation during each activity phase and how they interact between them. ● Evaluate each group’s ability to design a well detailed function with a clear description of patterns.

TINKER Framework Integration	
How is the activity authentic learning?	The activity uses hands-on activities. Students explore and design a function and a set of patterns in a tangible environment, making the abstract concepts more concrete.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, promotes the use of arts in coding and encourages different creative languages.
Considerations for level progression	To level up with this activity you can challenge your students to increase the pattern of the suncatcher adding more elements and replicating patterns.

Lower Secondary Education

Croatia

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Croatia

Learning Scenario 1 - Algorithms on social media

Learning Scenario Information	
Title	Algorithms on social media
Age Level	12-14 years old
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Informatics, Language classes, Civil education
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand how social media algorithms prioritise content based on user interactions. ● Explore how algorithms can shape perspectives by creating "filter bubbles." ● Develop critical thinking about the role of algorithms in influencing information exposure and personal opinions.

Scenario Description	
Setting	You're preparing a lesson for your students on how technology shapes their everyday lives. One of your objectives is to help them understand how social media platforms influence the content they see and how algorithms work in the background. You know that many of your students spend some time on social media platforms. You've noticed that some students assume they are in full control of what they see on their feeds, while others may not realise that algorithms are actively shaping their online experience. The problem: Students are unaware of how algorithms can create echo chambers by showing them only content like what they've already liked. You want to engage them in a way to help them critically think about this issue and see how it applies to their digital lives. What should you do? You need to design an activity that simulates how algorithms work and helps students experience first-hand how social media feeds are personalised based on their interactions.
(Digital) Tools	• Internet-connected devices (Computer/Laptop or Tablets) • Projector/ Video platform for .ppt • Whiteboard for brainstorming • Markers
Activity	**Activity 1 - Algorithm Simulation** **Duration:** 10 minutes 1. Prepare a "feed" of posts on a board, slide deck, or printed cards. Include various content types like sports, music, tech news, and memes. Divide students into small groups, each representing a different user profile (e.g., sports enthusiast, music lover, activist). In each round, students select posts they would engage with based on their profile (3-5 posts). After each round, adjust the feed to reflect the algorithm's behaviour: showing more content that aligns with their interests and removing content that doesn't. After completing all rounds, have students discuss how their feeds changed and if they became more focused on their preferences. **Activity 2 – Filter Bubble Discussion** **Duration:** 10 minutes

	Students will understand how algorithms can create filter bubbles and limit exposure to diverse perspectives. 1. After the simulation, lead a class discussion about filter bubbles and let the students watch the VIDEO. Ask students how they feel about only seeing content they "like" and if this limits their understanding of other perspectives. Discuss real-world examples, such as how political or social media algorithms reinforce existing beliefs and limit exposure to opposing viewpoints. **Activity 3 – Algorithm Behind the Scenes** **Duration:** 15 minutes 1. Divide students into small research teams and assign each team a social media platform (e.g., Facebook, YouTube, TikTok). Ask students to research how their platform's algorithm works (e.g., what factors are used to prioritise content, like user engagement, relevance, or advertisements). Each group presents their findings to the class, explaining the technical and ethical implications of algorithms on content visibility. **Activity 4 - Personal Reflection: Impact of Algorithms on Me** **Duration:** 10 minutes 1. Have students reflect individually on their social media habits. Ask them to think about how often they encounter content that aligns with their interests and whether they ever see diverse opinions or ideas. Provide guiding questions like: "How does your feed make you feel?" "Do you ever see content that challenges your beliefs?" "How might your digital life be different if algorithms were less personalised?" Additional activity: Visuals for demonstrating algorithms Show the logic of an algorithm using a flowchart. For example: ● A recommendation system flowchart: "Does the user like X? If yes, recommend similar content. If not, exclude content tagged as X." ● Students design their own flowcharts for a simple decision-making process, such as deciding what to eat.

Teachers and students' Roles	**Teachers**: the teacher's role is to facilitate learning by guiding students through the process of understanding how social media algorithms work. The teacher will prepare the materials, such as the simulated social media feed, and provide instructions for each activity. They will lead discussions, encourage critical thinking, and support students in connecting their findings to real-world issues like filter bubbles and content manipulation. The teacher is also responsible for fostering an inclusive learning environment, ensuring that every student feels comfortable sharing their thoughts and reflections. **Students**: will take an active role in exploring the impact of algorithms. In groups, they will engage with the simulation, select posts based on their assigned profiles, and discuss how algorithms shape their experiences. They will research the inner workings of social media platforms, present their findings to the class, and reflect on how algorithms influence their own social media usage. Throughout the activities, students will collaborate, think critically, and share their insights to develop a deeper understanding of algorithmic influence in their digital lives.
Evaluation/ Assessment	Evaluation and assessment for this activity can be based on several components. First, students' ability to engage with the simulation will be assessed by observing their participation in the rounds of selecting posts, as well as how accurately they reflect their assigned profiles. After the simulation, students can be assessed through group discussions, where they share insights on how the algorithm shaped their feed and how filter bubbles emerged. Critical thinking can also be evaluated based on their responses to questions like how algorithms might influence their perspectives or opinions, and whether they noticed any content disappearing or becoming more repetitive. Additionally, students can be assessed on their research skills, as they explore how algorithms work in social media and present their findings to the class. The teacher can provide feedback on both the process and the final reflection, ensuring students grasp the concept of algorithmic influence while encouraging them to think critically about the implications for their own digital lives.
TINKER Framework Integration	

How is the activity authentic learning?	The activity is considered authentic learning because it engages students in a real-world application of how algorithms shape the digital content they interact with every day. By simulating social media algorithms, students gain hands-on experience in understanding how personalised feeds work, making the learning process relevant to their daily lives. This active participation encourages critical thinking about the broader implications of algorithmic influence, including the potential to create "filter bubbles" that limit exposure to diverse perspectives. Additionally, by reflecting on their experiences and discussing the effects of algorithms on their opinions and interactions, students are practicing skills such as digital literacy, analysis, and critical reflection.
How is gender inclusiveness ensured?	In this activity, gender inclusiveness is ensured by encouraging diverse participation and ensuring that all students, regardless of gender, are equally engaged in the task. Students are assigned specific user profiles based on interests like sports, music, or art, which avoids reinforcing gender stereotypes (e.g., girls liking art, boys liking sports). The posts in the "feed" are also designed to include a variety of content that represents a wide range of interests and experiences, ensuring that no gender is excluded from the simulation.
Considerations for level progression	As students progress, they could delve deeper into the social and psychological effects of filter bubbles, critically analysing how algorithms might limit perspectives. More advanced students could be tasked with researching the ethical implications of algorithms and proposing ways to make social media platforms more inclusive.

Learning Scenario 2 - Creating an Interactive Digital Manual for Future Students

Learning Scenario Information	
Title	Creating an Interactive Digital Manual for Future Students
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Design and Development

Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the purpose and structure of a digital manual and how it serves as a helpful tool for new users. ● Learn how to use digital design and multimedia elements (text, images, videos, and interactive features) to make a user-friendly, informative guide. ● Develop skills in information organisation, ensuring content is clear, engaging, and accessible for different audiences. ● Apply critical thinking in designing a digital manual that addresses the needs and questions of future students. ● Explore how user experience (UX) and user interface (UI) design influence the ease of navigation and accessibility of digital content.
Scenario Description	
Setting	Your school is about to welcome a new group of students, and you give your students a task to design and develop a digital manual that will help them navigate their new environment. This manual will be used by future students before they even step foot in the school, giving them a clear and engaging introduction to school life. It will include important information like how to get around the school, what resources are available, and what the daily routines look like. As the teacher, your role is to guide the students through the research, design, and development of the digital manual, helping them consider what future students need to know and how to present that information in an engaging and accessible way: ● Guide your students to gather relevant information for the manual. What do future students need to know? What will help them feel comfortable in the new school environment? ● Teach your students about user-friendly design principles—how can the manual be easy to navigate? What layout will work best? ● Discuss accessibility features, such as large text, colour contrasts, and the inclusion of alternative text for images or audio clips. How can the manual be made useful for all students, including those with visual or hearing impairments?

	● Divide the class into smaller teams, assigning different tasks such as writing content, designing layout, creating multimedia, and testing the manual for usability.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Introduction to User-Friendly Design Principles** **Duration:** 10 minutes 1. Begin by showing examples of good and bad user interface (UI) designs (HERE). Discuss features like clear navigation, readable fonts, intuitive layout, and visual contrast. Explain the concept of user-centred design and why it's important in creating content for others to interact with. Encourage students to brainstorm key features that would make the manual easy to use for a new student. **Activity 2 – Content and design elements** **Duration:** 35 minutes Divide the class into smaller teams, each focusing on a specific aspect of the manual, such as: 1. **Content Creation Team:** Write clear and engaging text for assigned sections (e.g., FAQs, resource guides). 2. **Layout and Design Team:** Sketch or prototype the layout, ensuring it's easy to navigate. 3. **Multimedia Team:** Plan and create ideas for visual or interactive elements like videos, images, or maps. 4. **Usability Testing Team:** Plan a checklist for usability testing, focusing on accessibility and navigation. Groups collaborate to develop their assigned sections, with teacher guidance to ensure cohesion.
Teachers and students' Roles	**Teachers**: The teacher's role is to facilitate the activities, provide guidance on user-centred design, and ensure that all students understand the importance of accessibility in digital content creation. The teacher should also monitor group

	progress and offer support, especially in the research and design phases, ensuring all students contribute to the project. **Students**: Students are responsible for researching content, designing the digital manual, and applying multimedia elements like images, text, and video. They will collaborate in teams, applying their understanding of accessibility and usability to create a manual that will effectively guide future students. Students are also responsible for testing their manual and offering constructive feedback to improve its usability.
Evaluation/ Assessment	Students will be evaluated based on their participation in group discussions, the quality and creativity of their contributions to the manual, and their ability to apply principles of user-friendly design and accessibility. Teachers can assess the digital manual's usability by observing how well it caters to the needs of future students, including ease of navigation, clarity of information, and inclusion of accessible features. Additionally, the collaborative nature of the project will be assessed based on each student's ability to work effectively in teams and contribute to the overall project.
TINKER Framework Integration	
How is the activity authentic learning?	This activity is authentic because students address a real-world challenge: helping new students transition into their school. They use practical digital design skills and focus on creating accessible, user-focused solutions that reflect modern technology practices.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured by encouraging all students to participate equally in team discussions and decisions. By focusing on collaborative group work, the activity creates space for both male and female voices to be heard in the creation of the manual. Teachers can foster an inclusive environment by ensuring that all students feel confident sharing their ideas and that the content of the manual reflects a variety of perspectives, ensuring no gender is marginalised.
Considerations for level progression	Challenge students to incorporate advanced features like interactive maps, voice-over guides, or customisable settings for accessibility.

Learning Scenario 3 - Designing a Digital Time Capsule for the Future

Learning Scenario Information	
Title	Designing a Digital Time Capsule for the Future
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Apply digital creativity tools to visualise and design future scenarios. ● Develop critical thinking and problem-solving skills to address potential challenges in the future. ● Explore and incorporate diverse perspectives when imagining how society, technology, and culture might evolve. ● Demonstrate storytelling and multimedia skills to present a cohesive vision of the future.
Scenario Description	
Setting	You want to teach your students about digital creativity and assign them a task to create digital representations of the future, showcasing how society, technology, and the environment might evolve. As the teacher, you are tasked with guiding your students through this challenge. You'll need to: ● Help them brainstorm what life might look like in 2124, focusing on different aspects like housing, transportation, education, and technology. ● Encourage them to consider the needs of diverse groups of people, ensuring their vision represents an inclusive and accessible future.

	• Support them in using digital creativity tools to bring their ideas to life through images, animations, or multimedia presentations. • Introduce the concept of imagining the future by exploring current trends in technology, society, and the environment with your students. • Guide students to brainstorm ideas and collaborate in small groups to develop their vision of the year 2124. • Teach students to use digital tools like graphic design software, AI tools, or animation tools to visually represent their ideas.
(Digital) Tools	• Internet-connected devices (Computer/Laptop or Tablets) • Projector/ Video platform for .ppt • Papers for brainstorming • Markers
Activity	**Activity 1: Brainstorming Future Scenarios** **Duration:** 10 minutes 1. Start by introducing students to the concept of a "digital time capsule" that reflects the future. Have students break into small groups and brainstorm the future of specific categories such as housing, transportation, education, technology, and the environment. Encourage them to think critically about global trends, like sustainability, AI, and climate change. Guide them to consider how these advancements could improve or challenge society, and emphasise inclusivity—thinking about the needs of diverse groups of people, including marginalised or underrepresented communities. **Activity 2 – Research & Idea Refinement** **Duration:** 10 minutes 1. Ask each group to choose one of the aspects they brainstormed (e.g., future housing or transportation) and research current trends or ideas that might influence it by 2124. Students should use online resources to find current innovations and predictions, such as technological developments, sustainability efforts, or demographic shifts. Once they gather information, they will refine their initial ideas **Activity 3 - Design a Digital Representation** **Duration**: 25 minutes 1. Introduce students to a digital creativity tool, such as Canva, Adobe Spark, or even animation software like Powtoon. Ask them to use these tools to design a visual representation of their scenario for 2124. It could be a futuristic cityscape, a new mode of transportation, or a digital classroom. Emphasise

	the use of visual storytelling techniques, such as images, animations, or even audio elements to convey the atmosphere and challenges of their future vision. 2. Ask each group to present their digital time capsule scenario to the class.
Teachers and students' Roles	**Teachers**: The teacher is a facilitator and guide, supporting students in brainstorming, researching, and applying digital tools to create their future scenarios. The teacher will provide instruction on how to use digital creativity tools, encourage critical thinking around inclusivity and accessibility, and offer feedback throughout the process. They will also ensure that students stay focused on the learning objectives, particularly in areas like considering diverse perspectives and creating a cohesive vision of the future. The teacher's role is to prompt, question, and guide students through challenges while allowing them to explore their own ideas. **Students**: Students will take on the role of active creators, researchers, and problem-solvers. They will collaborate in teams to generate ideas, research current trends, and apply their knowledge to design a visual representation of a futuristic world. Students are encouraged to think critically about the societal challenges they might face and how to address those challenges through their designs, while also ensuring their ideas are inclusive and accessible. In the final activity, students will also play the role of presenters, communicating their ideas clearly and responding to feedback from their peers. This fosters teamwork, creativity, and self-reflection.
Evaluation/ Assessment	The evaluation and assessment for this activity can be based on both the process and the final product. Teachers can assess students' ability to collaborate effectively, apply digital creativity tools, and think critically about future scenarios through observation and feedback during the activities. Key points for evaluation include how well students integrate diverse perspectives, address potential challenges, and create inclusive, accessible designs. Teachers should also focus on students' ability to communicate their ideas through multimedia, considering factors such as clarity, coherence, and storytelling. For the final presentations, students can be assessed on the creativity, originality, and feasibility of their designs, as well as their ability to justify their design choices and explain how they considered inclusivity, accessibility, and future needs. You can include rubrics for their presentations.
TINKER Framework Integration	

How is the activity authentic learning?	Students are tasked with using digital creativity tools to represent their vision of the future, considering diverse perspectives and addressing challenges related to technology, society, and inclusivity. This mirrors real-world processes where professionals—such as designers, futurists, and technologists—combine creativity and critical thinking to solve complex issues. The collaborative nature of the activity encourages teamwork, and the focus on inclusivity and accessibility ensures that students are considering the needs of various people, just as professionals must consider diverse user needs when designing future technologies.
How is gender inclusiveness ensured?	Students are encouraged to consider diverse perspectives when imagining the future, which includes acknowledging the needs and experiences of people of all genders. This emphasis on inclusivity encourages students to think critically about how societal changes, technology, and culture may impact individuals in different ways. By addressing issues such as accessibility and ensuring that the future they envision is equitable for all, students are prompted to consider gender-neutral and non-stereotypical representations in their digital creations.
Considerations for level progression	As students progress, they will engage in more complex tasks, like collaborating in groups to synthesise their ideas and develop a cohesive, multimedia-rich presentation that showcases a comprehensive vision of the future. This requires them to not only apply their digital design skills but also incorporate more advanced storytelling techniques, considering how their designs communicate the societal, technological, and environmental changes they envision.

Learning Scenario 4 - Designing School IT System

Learning Scenario Information	
Title	Designing School IT System
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Computing Systems

Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify basic components of a school IT system: computers, software, and network. ● Understand how these components work together (to help students and teachers use technology for learning). ● Apply their knowledge to design and configure an IT system for a real-world scenario. ● Collaborate in teams to analyse, troubleshoot, and make decisions about system design, considering both functionality and efficiency.
Scenario Description	
Setting	Your school has decided to upgrade its IT infrastructure. They need a new system that will meet the needs of students, teachers, and administrative staff. The problem: Currently, the school's computer network is outdated. Students often have trouble accessing online resources due to slow internet, and teachers struggle with unreliable classroom computers. The school wants a new IT system that includes: ● Hardware: New computers, tablets, and other devices for students and teachers. ● Software: Programs that can be used for different subjects, plus a school-wide management system. ● Network: A fast, secure internet connection that allows everyone to connect and share resources easily. What should you do? You need to guide your students in creating an IT system design. First, help them understand the different components of a computing system: hardware, software, and networks. Then, together with your students, choose the right hardware (computers, tablets, etc.), software programs, and design a network that will work together to meet the school's needs. Make sure that the system is efficient, reliable, and secure.

(Digital) Tools	- Internet-connected devices (Computer/Laptop or Tablets) - Projector/ Video platform for .ppt - Papers for brainstorming - Markers
Activity	**Activity 1: Understanding IT System Components** **Duration:** 5 minutes 1. Start with a short reminder or presentation that defines the three main components of a computing system: hardware, software, and networks. **Activity 2 – Designing a Network for the School** **Duration:** 15 minutes 1. Students will be divided into teams and asked to design a network for the school. They should consider the number of devices, the required internet speed, and how devices will be connected. 2. Each group will share their proposed design, and the class will discuss the strengths and weaknesses of each approach. The goal is for students to think about scalability, security, and efficiency when designing a network. **Activity 3 – Selecting Hardware and Software** **Duration:** 15 minutes 1. Provide students with a list of various hardware (e.g., laptops, tablets, projectors, printers) and software (e.g., office suites, subject-specific programs, and management systems) options. **Define budget**. Students will be asked to consider the needs of students, teachers, and administrative staff and create a proposal for the hardware and software they would select, according to the budget. 2. Teams will present their proposed system and engage in a class discussion about the most effective options. **Activity 3 – Troubleshooting and Refining the System Design** **Duration:** 10 minutes 1. In this problem-solving session, students will be presented with potential issues in their proposed IT systems, such as network congestion, software compatibility, or hardware limitations. They will work in teams to troubleshoot these problems and propose solutions to make the system more efficient and reliable.

Teachers and students' Roles	**Teachers**: In this activity, the teacher is a facilitator and guide, providing students with the necessary resources and tools to explore and understand the components of an IT system. The teacher introduces key concepts like hardware, software, and networks, while also helping students navigate the design and troubleshooting processes. They encourage collaboration and critical thinking, ensuring students can effectively apply their knowledge to real-world problems. The teacher also moderates group discussions and presentations, providing feedback on their ideas and designs. **Students**: Students take on the role of problem-solvers and collaborators. They work in teams to design and develop a functional IT system, researching the needs of the school, selecting appropriate hardware and software, and troubleshooting potential issues. In their teams, students share tasks, such as researching, designing, and presenting, and are expected to apply their critical thinking skills to ensure their solutions are effective, efficient, and user-centred. They will also engage in group discussions and reflection activities, ensuring that the final design is both practical and inclusive.
Evaluation/ Assessment	Evaluation and assessment for this activity can be done through multiple methods to ensure a comprehensive understanding of the students' learning process. First, the teacher can assess students' knowledge of IT system components through quizzes or written reflections to confirm their understanding of hardware, software, and networks. During the group activities, the teacher can observe collaboration and problem-solving skills, evaluate how well students work together and apply their knowledge to design an effective IT system. The final presentation of the IT system design serves as an opportunity to assess their ability to communicate technical concepts and justify their design decisions. Additionally, peer feedback can be incorporated to assess teamwork and to encourage self-reflection on individual contributions. Lastly, the teacher can evaluate the practicality and efficiency of the proposed systems, considering factors like scalability, user-friendliness, and potential troubleshooting solutions.
TINKER Framework Integration	
How is the activity authentic learning?	By simulating the process of upgrading a school's IT infrastructure, students gain practical experience in identifying the components of a computing system, understanding how they work together, and applying this knowledge to create functional solutions. This task requires critical thinking, problem-solving, and collaboration, which are key skills needed in the technology industry. Students must also consider real-world constraints such as budget, security, and user needs, mirroring the challenges faced by IT professionals.

How is gender inclusiveness ensured?	The task is designed so that all students, regardless of gender, can actively participate in the decision-making process and contribute to the design of the IT system. The group activities and collaboration promote equal involvement, allowing each student's voice to be heard. Additionally, the roles assigned in the design process—such as hardware, software, and network roles—are not gendered, ensuring that every student can choose a task that matches their interests and skills without any stereotypes. The teacher encourages the formation of diverse teams, ensuring that all students have an equal opportunity to lead and collaborate.
Considerations for level progression	Throughout the process, teachers can assess student progress and adapt the complexity of the activity to meet students at their level, offering more autonomy as their understanding deepens. By the end, students should be able to apply critical thinking and collaborative skills to design and configure a functional IT system.

Learning Scenario 5 - Digital footprints

Learning Scenario Information	
Title	Digital footprints
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Responsibility and Empowerment
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Analyse common online security threats, such as phishing, fake websites, and malware. ● Understand the risks associated with sharing personal information online and how to protect sensitive data. ● Identify the characteristics of legitimate and fraudulent online communications.

	- Develop strategies for verifying online information, including checking website security and evaluating sources. - Practice safe online behaviours, including setting strong passwords and recognising suspicious activity.
Scenario Description	
Setting	You tasked your students with designing an initiative to reduce the digital environmental impact of your school. The challenge is to address these issues holistically, considering not just energy consumption, but also waste disposal, resource usage, and the digital divide between students who have access to newer technologies and those who don't. The problem: - Your school needs to strike a balance between advancing digital education and being responsible stewards of the environment. There are many aspects to consider: What happens to old technology when it's replaced? How do we minimise the data we store on the cloud? How do we ensure that the energy powering our digital activities comes from renewable sources? Not all students have access to the same devices, and some may rely on older, less energy-efficient technology. How can you ensure your initiative addresses these issues inclusively? What should you do? As the teacher, your role is to help guide students through the complexities of the environmental impacts of technology. - Start by helping students research the environmental costs of common digital activities, such as data storage, streaming, and device production. - Encourage students to explore real-world case studies, such as the carbon footprint of cloud computing or the lifecycle of electronic waste. Introduce the digital divide - Encourage students to brainstorm ideas to reduce their digital footprint in school. This can include options like using energy-efficient devices, reducing the amount of digital storage by deleting unnecessary files, and creating a recycling program for e-waste. - Consider how digital solutions can work for all students, regardless of gender, background, or socio-economic status. - Guide students in designing an action plan that includes practical solutions for reducing digital waste and energy consumption in the school. Their plan

	should address both immediate and long-term goals, such as creating a sustainable digital policy, promoting responsible usage among students, and lobbying the school administration for more sustainable technology procurement practices.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Research the Environmental Costs of Digital Activities** **Duration:** 10 minutes 1. Begin the session with a brief introduction about the environmental impact of digital activities. Highlight issues like carbon emissions from cloud storage, energy consumption of data centres, and the e-waste problem. 2. Students will work in small groups to research one environmental impact of digital technology using the Internet (e.g., carbon footprint of streaming services, electronic waste statistics). 3. Each group summarises their findings in two or three key points, focusing on the environmental costs and why they matter. **Activity 2 – Understanding the Digital Divide** **Duration:** 15 minutes 1. Show a short video or infographic that explains the concept of the digital divide. Follow with a whole-class discussion, encouraging students to consider how this affects their school. Discuss older devices' higher energy consumption and limited access to technology among some students. **Activity 3 - Brainstorm Solutions to Reduce the Digital Footprint** **Duration**: 20 minutes 1. In groups, students brainstorm actionable ideas for reducing the school's digital footprint. Suggestions may include: 2. Groups outline their ideas on chart paper or a collaborative online tool, highlighting both immediate and long-term initiatives. 3. Each group presents one or two key solutions to the class. The goal is to develop practical and inclusive ideas that address environmental concerns while considering the digital divide.

	Homework: Create an Action Plan This plan should detail: ● **Immediate actions:** E.g., conducting an e-waste drive or educating peers on digital file decluttering. ● **Long-term goals:** E.g., recommending sustainable technology procurement policies. Additional activity: Have students use a carbon footprint calculator (HERE) to estimate their personal digital footprints based on their device usage, emails, and online activities. Afterward, facilitate a discussion about their results and how they can reduce their impact.
Teachers and students' Roles	**Teachers**: teachers will introduce concepts, provide resources, and support group activities. They'll encourage critical thinking and inclusivity in discussions and guide students to focus on actionable and realistic solutions. **Students**: Students will engage in research, discussions, and brainstorming. They will work collaboratively in groups to analyse data, consider diverse perspectives, and create actionable plans.
Evaluation/ Assessment	Evaluation will focus on both the process and the product. Teachers can assess students' understanding of the environmental impacts of technology through participation in the group discussion and the quality of their contributions during brainstorming sessions. The students' ability to apply what they've learned can be evaluated based on their action plans for reducing their digital footprint. Teachers can also assess how well students consider inclusivity in their solutions, ensuring all voices are heard in group activities and discussions.
TINKER Framework Integration	
How is the activity authentic learning?	This activity is authentic because it addresses real-world challenges related to digital technology and environmental sustainability. Students engage in problem-solving by analysing the environmental impact of their school's digital practices and proposing solutions, skills transferable to other settings.

How is gender inclusiveness ensured?	The activity ensures gender inclusiveness by creating collaborative group dynamics where all students contribute equally. It emphasises the importance of addressing diverse needs in the digital divide discussion, fostering sensitivity toward equity and inclusivity.
Considerations for level progression	Encourage students to explore advanced concepts, like lifecycle analyses of devices or advocacy for policy changes, and prepare detailed action plans that involve the wider school community.

Learning Scenario 6 - Epidemic spread

Learning Scenario Information	
Title	Epidemic spread
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Modelling and Simulation
Content domain (Integrated Subjects)	Informatics, Nature, Science

Learning Objectives	Upon completing this activity, the students should be able to: ● Understand advanced concepts of modelling and simulation, including how models can be used to predict complex behaviours in real-world systems. ● Identify more complex real-world scenarios where modelling and simulation can be applied (e.g., epidemic spread, dynamic systems, optimising processes). ● Create and analyse an epidemic spread model using simulation software to understand the factors that influence the spread of infectious diseases. ● Run and evaluate simulations to understand how different factors such as vaccination, social distancing, and infection rates affect the spread of an epidemic. ● Collaborate in groups to solve complex problems using simulations and communicate their findings effectively.
Scenario Description	
Setting	You're preparing a lesson on how diseases spread and how public health measures can help control epidemics. As a teacher, you know that students have heard a lot about topics like COVID-19 or the flu, but many of them may not fully understand the science behind how diseases spread. The problem: Imagine there's a flu outbreak in your local community. Cases are rising quickly, and some schools are even considering closing to stop the spread. Your students are concerned about why these measures are necessary and how they help. What should you do? You want to help your students understand the complexity of disease spread. You decide to use an engaging simulation activity that allows students to experiment with these strategies and see their impact. How will you set up the activity to ensure your students gain a deep understanding of this real-world problem?
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers

Activity	**Activity 1: Introduction to Epidemic Spread and Public Health Measures** **Duration:** 15 minutes 1. Begin by showing a short video or animation that illustrates the spread of a contagious disease, like COVID-19 or the flu, through a community. After the video, facilitate a discussion about how diseases spread. This will set the stage for the simulation activity. Define "model" and "simulation," helping students understand how these tools are used to predict outcomes and guide decision-making in real-world scenarios. **Activity 2 – Group Work - Using the Epidemic Simulation Tool** **Duration:** 20 minutes 1. Students will be divided into small groups, and each group will use an epidemic simulation tool (such as the one available on Scratch) to explore how different factors influence disease spread. The groups will test various public health interventions, such as social distancing, vaccination, and isolation of infected individuals, by adjusting the simulation settings. Each group will answer questions related to the outcomes they observe, such as how infection rates change when these interventions are applied, and how the dynamics of the epidemic are affected by different strategies. Students will take notes on their findings, particularly the effectiveness of each strategy in reducing the spread **Activity 3 – Presentation and Class discussion** **Duration**: 10 minutes 1. Each group will present their findings to the class, explaining their model, the strategies they tested, and the results they observed. They will describe the interventions that had the most significant impact on controlling the spread and discuss the importance of different public health measures in a real epidemic. Additional activity: include ethical discussion on public health decisions - Are algorithms better than humans at making public health decisions?
Teachers and students' Roles	**Teachers**: The teacher will facilitate the introduction of concepts, provide guidance on using the simulation tool, and ensure that students understand the modelling process. Teachers will also encourage reflection and discussion, helping students connect their simulation results to real-world epidemic control strategies.

	Students: Students will take an active role in exploring the simulation tool, analysing the results, collaborating with their peers to test different strategies, and presenting their findings. Their involvement in group work and discussion will foster critical thinking and problem-solving skills.
Evaluation/ Assessment	Students will be evaluated based on their participation in the group simulation, their ability to analyse and interpret the results, and their presentation of the findings. Teachers will assess students' ability to explain how different interventions influenced disease spread and whether they were able to make evidence-based recommendations. Reflection on what they learned and improvements they would suggest for the model will also be important for evaluating their understanding of the complexity of epidemic control.
TINKER Framework Integration	
How is the activity authentic learning?	This activity provides authentic learning as it involves real-world problems and tools that simulate actual scenarios. By engaging students in a meaningful context, where they can test public health interventions and make decisions based on real-world data, they are learning valuable problem-solving and analytical skills that they can apply to future scenarios. The activity also emphasises teamwork, communication, and critical thinking, skills necessary for addressing complex global issues like epidemics.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured by fostering an environment where every student is encouraged to participate in all activities. Students will work collaboratively in mixed-gender groups, and the language used in the lesson and discussions will be neutral and inclusive. Additionally, the simulation tool does not have any gender-based biases, so students will work together to apply interventions that benefit everyone, regardless of gender.
Considerations for level progression	For students who may have more experience with simulations, the teacher can encourage deeper analysis and exploration of the model's variables, while students new to the topic can focus on grasping the basics of disease spread and the importance of public health interventions. The progression from basic understanding to complex analysis of simulated outcomes ensures that students develop both their theoretical and practical knowledge over time.

Learning Scenario 7 - Mastering Internet Security

Learning Scenario Information	
Title	Mastering Internet Security
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Analyse common online security threats, such as phishing, fake websites, and malware. ● Understand the risks associated with sharing personal information online and how to protect sensitive data. ● Identify the characteristics of legitimate and fraudulent online communications. ● Develop strategies for verifying online information, including checking website security and evaluating sources. ● Practice safe online behaviours, including setting strong passwords and recognising suspicious activity.
Scenario Description	
Setting	Online fraud is getting more sophisticated, and people are increasingly falling victim to scams. As a result, it's crucial to understand how scams work, how to spot them, and how to protect your personal information. As the teacher, your task is to: ● Help students understand the concept of phishing and other online scams that could compromise their security. ● Guide them through the process of analysing suspicious emails, websites, and messages. ● Show students how to check if a website is secure ● Discuss the importance of multi-factor authentication and using secure passwords to protect accounts.

	● Lead a discussion about the ethical implications of online security, including the importance of respecting others' privacy and data.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Introduction to Online Security Threats** **Duration:** 20 minutes 1. Start with a short video (HERE) or presentation that explains common online scams such as phishing, fake websites, and malware. After watching the video, facilitate a class discussion on the characteristics of these threats. Focus on recognising red flags, such as suspicious email addresses, misspelled URLs, or unexpected attachments. **Activity 2 – Analysing Phishing Emails and Fake Websites** **Duration:** 25 minutes 1. Divide students into small groups and give them examples of phishing emails or fake websites (you can use THIS or create some sample emails or use real-world examples with personal information removed). Have each group analyse the emails and websites, looking for signs that suggest they might be fraudulent, such as unfamiliar sender addresses, urgent language, strange links, or spelling mistakes. 2. Students will present their findings and discuss how they determined which elements of the emails/websites were fraudulent. They will also discuss what actions they would take if they encountered such messages online.
Teachers and students' Roles	**Teachers**: The teacher will guide the class through the activities, offering explanations, facilitating discussions, and providing feedback during the group analyses. The teacher will also demonstrate how to check website security and create strong passwords. In the group activities, the teacher will circulate and assist students, answering questions and ensuring that students understand how to identify security threats. **Students**: Students will take an active role by participating in the discussions, analysing phishing emails, exploring websites, and creating secure passwords. They will work collaboratively in groups to solve problems and share their findings with the class.

Evaluation/ Assessment	Students will be assessed based on their participation in the group activities and class discussions. Teachers will evaluate their ability to recognise phishing attempts and fake websites, and how well they apply what they've learned to create secure passwords and assess website security. Additionally, students will be assessed on their understanding of the ethical implications of online behaviour, particularly respecting others' privacy and data.
TINKER Framework Integration	
How is the activity authentic learning?	This activity is an example of authentic learning because it directly addresses real-world issues, such as online scams and digital security, that students are likely to encounter in their everyday lives. By engaging in hands-on activities such as analysing phishing emails and testing website security, students are learning practical skills they can apply to protect their personal information and navigate the digital world safely.
How is gender inclusiveness ensured?	The activity ensures gender inclusiveness by creating a learning environment where all students are encouraged to participate and collaborate. The materials provided (phishing emails, websites, password exercises) are not gender-specific, and the group work encourages equal participation from all students, regardless of gender. The discussion on ethical online behaviour fosters a respectful and inclusive online culture, reinforcing the importance of equal protection for all individuals in the digital space.
Considerations for level progression	For students who may already be familiar with digital security concepts, the teacher can provide more advanced scenarios for analysis, such as identifying more subtle phishing attempts or discussing advanced security measures like encryption or biometric authentication. For students who are less familiar with the topic, the teacher can simplify the examples and offer more step-by-step guidance on how to identify threats.

Learning Scenario 8 - Redesigning school app

Learning Scenario Information	
Title	Redesigning school app
Age Level	13-14 years old

Duration	45 minutes
Informatics topic areas	Human – Computer Interaction
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the basic principles of user interface (UI) design and its importance in human-computer interaction. ● Identify key elements of a user interface, including buttons, menus, text, and icons. ● Evaluate how accessibility (text size, colour contrast, button size) and usability affect the user experience. ● Apply inclusive design principles to create an accessible and user-friendly interface for a real-world application. ● Demonstrate critical thinking by analysing and redesigning the UI of a classroom app to meet the needs of diverse users.
Scenario Description	
Setting	Your school uses an app designed to help students track their homework, grades, and school announcements (like e-Dnevnik in Croatia, ClassDojo, etc.). Students have reported that the app is difficult to navigate. Some find the text too small to read, while others have trouble figuring out where to click for important information. Additionally, the design doesn't work well for everyone—students with visual impairments have trouble distinguishing between icons or reading the small text. What's the problem? The current app design doesn't consider the different needs of its users. Some students need larger text, others may need colour contrast to differentiate between elements, and some need clearer icons and easier navigation to find what they need. The app is intended to be a tool that helps everyone, but it's not currently inclusive of all users. Redesign the user interface of the classroom app by considering the following: ● Navigation: How can you structure the layout of the app so that it's easy for all students to find what they need, no matter their age or experience with technology?

	● Text and Icons: How can you ensure that text is large enough for everyone to read, and how can you make icons more intuitive, so everyone can understand them, even without labels? ● Colours and Contrast: What colours and contrast levels will make the app more accessible for students with visual impairments? How can you ensure the app is easy to read in different lighting conditions? ● Responsiveness: How can you design the app to work seamlessly on different devices, such as tablets, laptops, and phones? What should you do? As the teacher, you will guide the students through the UI design process, providing examples of good and bad user interface designs. Encourage students to think critically about their design choices and to consider how different users will interact with the app. Help them understand the importance of making technology accessible to everyone and provide feedback as they create their redesigns.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Evaluating the Current App** **Duration:** 10 minutes 1. Provide students access to the school app or screenshots of its interface. In small groups, students will identify problems in navigation, text size, icons, and colour contrast, listing specific issues and suggesting improvements. Each group will create a short report with their observations and ideas. 2. **Encourage students to include inclusive language in app and present them examples of a good UI design:** https://www.interaction-design.org/literature/article/ui-design-examples?srsltid=AfmBOorbUhEdng5O9Mxg2U6GqkUBGg3e_pE4lVMtDlNY1LeTeXLv3t3f **Activity 2 – Sketching Redesigns** **Duration:** 20 minutes 1. Using their evaluations, students will work in groups to redesign the app interface on paper or digitally using simple design tools like Canva, Figma, or PowerPoint. They will focus on improving navigation (e.g., clearer menus), text readability (e.g., larger fonts), and accessibility features (e.g., high-

	contrast colours, intuitive icons). Groups will annotate their sketches, explaining how their designs meet the needs of diverse users. **Activity 3 - Peer Review and Presentation** **Duration**: 15 minutes **1.** Groups will present their redesigned interfaces to the class, explaining the rationale behind their choices and how their design improves accessibility and usability. Peers will provide constructive feedback on the inclusivity and functionality of each redesign.
Teachers and students' Roles	**Teachers**: The teacher acts as a facilitator and guide, introducing students to the fundamental concepts of user interface (UI) design, accessibility, and inclusivity. They provide examples, lead discussions to encourage critical thinking, and support students as they evaluate the app and brainstorm improvements. The teacher ensures the focus remains on creating an inclusive design, offering feedback throughout the process to refine students' ideas and encouraging collaboration and participation from all group members. **Students**: Students play an active role as designers and problem-solvers. They evaluate the current app critically, identifying usability and accessibility challenges. Working in teams, they brainstorm and propose redesigns that address diverse user needs, demonstrating creativity and empathy. During presentations, students articulate their design choices, explain their rationale, and engage in peer review, fostering teamwork and constructive feedback. Through these roles, students take ownership of their learning and develop practical skills in UI design and inclusivity.

Evaluation/ Assessment	The **evaluation and assessment** for the redesigning school app activity focuses on both the process and the final outcomes of students' work. Teachers assess how effectively students identify and analyse issues with the current app, evaluating their ability to articulate problems related to usability and accessibility. During the redesign phase, the emphasis is placed on the application of inclusive design principles, such as the use of appropriate navigation, accessible text sizes, intuitive icons, and colour contrast for visibility. Peer presentations provide an opportunity to assess students' communication skills and their ability to justify design choices based on user needs. Collaboration and teamwork are also evaluated, observing how students contribute to group discussions and tasks.
TINKER Framework Integration	
How is the activity authentic learning?	The activity of redesigning a school app is an example of authentic learning because it requires students to engage with a real-world problem that they can relate to directly. In this case, students are tasked with improving the usability and accessibility of a classroom tool that they—and their peers—use on a daily basis. This challenge mirrors real-world design processes, where professionals must understand users' needs, collaborate with others, and apply technical knowledge to solve practical problems. By working on an actual app redesign, students not only apply theoretical concepts in user interface design but also consider the diverse needs of the user base, such as accessibility for individuals with visual impairments. Furthermore, students must communicate their design choices and explain how these changes will improve the user experience, simulating a professional design process.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured in the redesigning of the school app by considering how the app's interface and content can appeal to and be accessible for all genders. This includes using gender-neutral language and avoiding stereotypes in the content, ensuring that visuals or icons do not reinforce gender biases. The app design also focuses on making sure all students, regardless of their gender, feel represented and supported in their use of the app. By creating a user-friendly and inclusive interface, students are encouraged to think about how the design impacts all users, considering varying experiences and needs across genders.

Considerations for level progression	As students progress in their learning, the complexity of the tasks should increase. For the school app redesign activity, progression can be achieved by initially providing foundational knowledge on UI design principles, including basic accessibility guidelines and usability features. As students advance, they should be encouraged to integrate more complex design concepts, such as responsive design, interaction design, and deeper accessibility considerations, like implementing features for students with visual or motor impairments.

Learning Scenario 9 - School website

Learning Scenario Information	
Title	School website
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Networks and Communication
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the components of a computing system, including hardware, software, and networks. ● Apply user-centred design principles to create a system (in this case, a website) that is inclusive, accessible, and functional for a diverse user base. ● Analyse and address real-world issues such as gender equality, accessibility, and fairness when creating digital solutions. ● Collaborate in teams to design, plan, and create a website that meets the needs of all students, promoting inclusivity and equal access to information.

Scenario Description	
Setting	Your school is planning to launch a new website. The problem: The current website design doesn't consider the different needs of all students. Some students have visual impairments, while others may struggle with navigation due to a complicated interface. Some students, especially girls, feel underrepresented in the content, and the language used is not always welcoming or neutral. What should you do? You are tasked with guiding your students through the process of designing and planning a new, improved website. They will need to consider factors like: ● Accessibility: How can you make sure students with visual or hearing impairments can easily use the website? ● Gender inclusivity: How can you make sure the website content and design feel welcoming and neutral to all genders? ● User experience: How can you ensure that the website is easy to navigate for all students, no matter their level of digital literacy?
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Introduction to Accessibility and Gender Inclusivity** **Duration:** 15 minutes 1. Start with a short discussion or video (HERE) on the importance of accessible websites for students with visual impairments, hearing impairments, or other disabilities. 2. Discuss the idea of gender inclusivity in digital content, focusing on language choices, representation, and neutrality in images. In groups, students will review some existing content on the school website (or other websites) and suggest changes to make the content more inclusive. This could include rewriting paragraphs, selecting images, or suggesting new categories of content. 3. Have students brainstorm what they think makes a website accessible and inclusive, using real-world examples (HERE). Discuss how these elements can be incorporated into the new school website.

	Activity 2: User Experience and Navigation **Duration:** 10 minutes 1. Provide students with a few examples of poorly designed websites (HERE or find those with broken links, poor navigation, or inaccessible features) and ask them to identify the problems. 2. Split students into small teams and have each team evaluate a website (could be the current school website or another example) based on user experience. Have them list what works and what doesn't. **Activity 3 - Designing for Accessibility** **Duration**: 20 minutes 1. Let your students select simple website template from Canva 2. In groups, ask students to choose and design at least one accessibility feature: this could be text-to-speech, high-contrast colours for visual impairments, or ensuring that images are properly described with alt text for screen readers. 3. They should also consider the overall layout: How can they make sure it is easy to navigate for users of all digital literacy levels? 4. Allow each team to present their ideas to the class and explain how their feature improves accessibility.
Teachers and students' Roles	**Teachers**: In these activities, the teacher's role is to guide, facilitate, and support students in their exploration of accessible and inclusive website design. The teacher begins by introducing concepts such as accessibility, inclusivity, and user-centred design, using real-world examples to provide context. They encourage collaboration by organising students into teams and providing clear instructions for each activity. The teacher also acts as a resource, clarifying doubts, offering feedback, and ensuring the discussion includes diverse perspectives. They ensure the learning environment is inclusive, respectful, and conducive to active participation by all students. **Students**: Students play an active role as creators, collaborators, and critical thinkers. They work in teams to analyse existing website designs, brainstorm features for accessibility, and draft content and layout ideas for inclusivity. Students are encouraged to apply their understanding by creating tangible solutions, such as accessible navigation features or gender-neutral content. They also engage in peer review, presenting their ideas and receiving constructive feedback from their classmates, refining their designs collaboratively. Through these activities, students take ownership of their learning and contribute to creating a practical, inclusive solution for their school community.

Evaluation/ Assessment	Teachers assess students' final prototypes for accessibility features such as navigation simplicity, readable fonts, and inclusive language, ensuring diverse user needs are considered. Peer and teacher feedback during presentations evaluates the clarity and inclusivity of the designs and how well the proposed solutions address real-world challenges like visual impairments or gender neutrality. Participation in team discussions and adherence to assigned roles reflect collaborative effectiveness, while reflective discussions allow teachers to gauge students' critical thinking and understanding of inclusivity.
TINKER Framework Integration	
How is the activity authentic learning?	This activity embodies authentic learning by engaging students in a task rooted in real-world challenges, such as inclusivity, accessibility, and user-centred design. Students address genuine issues faced by their school community, like creating a platform that represents all users equitably and is easy for everyone to navigate. Through collaboration and problem-solving, they simulate roles and responsibilities they might encounter in professional life. Additionally, the activity connects directly to broader social and ethical considerations, such as gender equality and digital accessibility, helping students see the impact of technology on diverse groups.
How is gender inclusiveness ensured?	Students are encouraged to critically evaluate language, visuals, and content to ensure they are neutral, welcoming, and representative of all genders. The activity includes discussions on gender stereotypes in digital media, fostering awareness of how such biases can manifest in design choices. Teams are balanced to ensure equitable participation and voice, giving all students—regardless of gender—opportunities to contribute meaningfully.
Considerations for level progression	The complexity of tasks can be adjusted based on students' abilities and prior knowledge. Younger or less experienced students may start by brainstorming and critiquing existing websites, focusing on identifying accessibility and inclusivity gaps. As they progress, they can advance to drafting wireframes or using simple tools to create prototypes. More experienced students, or those with prior knowledge in web design or coding, can implement their designs using advanced tools, coding languages, or content management systems.

Learning Scenario 10 - Smart home

Learning Scenario Information	
Title	Smart home
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Analyse user needs and translate them into functional requirements for a smart home system. ● Apply intermediate programming concepts such as variables, conditionals, loops, and event-driven programming to design and implement a smart home feature. ● Evaluate and optimise code to ensure it is efficient and meets the requirements of diverse users. ● Demonstrate problem-solving and teamwork while designing inclusive and user-friendly technological solutions. ● Reflect on how technology can address real-world problems, considering inclusivity and accessibility.
Scenario Description	
Setting	You're introducing your students to the world of smart home systems. In this activity, students will step into the role of smart home designers, tasked with creating a program to address the needs of a diverse family. The problem: Imagine a family living in a smart home: ● A teenager wants to optimise their study time with reminders for breaks. ● A parent needs smart controls for lighting and temperature to enhance their work-from-home productivity.

	● Grandma requires a user-friendly emergency alert system and voice-controlled features for accessibility. Your students' challenge is to design and program a feature that integrates some of these needs into a functional and efficient smart home solution. What should you do? Consider how to guide students to explore different approaches to coding a smart home system. Encourage students to think about the diverse needs of users and create inclusive solutions. Assist students in testing and adjusting their programs to meet these specific requirements.
(Digital) Tools	● Internet-connected devices (Computer/Laptop or Tablets) ● Projector/ Video platform for .ppt ● Papers for brainstorming ● Markers
Activity	**Activity 1: Programming a Smart Home System** **Present students smart home automation using IoT project:** **https://webbylab.com/blog/smart-home-automation-using-iot/** **Duration:** 30 minutes 1. Divide student in smaller teams (3-4 students per team) 2. Introduce a simple smart home environment simulation (e.g., using platforms like Scratch, Arduino, or Raspberry Pi). Students will program a selected feature such as an automatic light control system that turns on lights based on motion or time of day. They will use variables (e.g., time of day, sensor input), conditionals (if statements for different scenarios), and loops (repeating tasks). **Activity 2: Present the Smart Home System** **Duration:** 5 minutes per team (total 10-15 minutes for presentations) Students will present their prototypes, showcasing their design, the problem it addresses, and how it incorporates inclusive features. They will explain how their solution works and the steps taken to ensure it's accessible to selected family members.

Teachers and students' Roles	**Teachers**: The teacher will introduce the core concepts of smart home technology and programming, such as variables, conditionals, and loops. They will guide students through using platforms like Scratch, Arduino, or Raspberry Pi to create a basic smart home feature, such as an automatic light control system. The teacher will support the students as they work in teams, ensuring everyone is involved and providing feedback on the accessibility aspects of their designs. The teacher will facilitate the presentation of each team's project, ensuring that students clearly explain the functionality, the real-world problem their system solves, and the inclusivity features they integrated. **Students**:The students will apply their knowledge of programming to design, code, and test the smart home system, focusing on features like accessibility for elderly or disabled family members. They will be responsible for dividing tasks, like coding, testing, and designing the system flow. Students will showcase their prototypes, describe how their systems function, and discuss how they made the system accessible, particularly for people with disabilities.
Evaluation/ Assessment	For evaluating and assessing students in these activities, the teacher can focus on both the process and the final product. The evaluation can include criteria such as the technical functionality of the smart home system, including how well the features work and whether the programming concepts (variables, conditionals, loops) were applied correctly. Additionally, students should be assessed on their ability to create inclusive designs that consider the needs of diverse users, such as those with disabilities or the elderly. The quality of teamwork, collaboration, and individual contributions can be assessed, along with how well students communicate their ideas during the presentation phase. Peer feedback can also be incorporated, allowing students to assess each other's designs based on creativity, functionality, and inclusivity. Finally, reflection on the ethical considerations and real-world impact of their designs—such as energy efficiency and accessibility—can be an important aspect of the evaluation.
TINKER Framework Integration	

How is the activity authentic learning?	The activity is authentic learning because it closely mirrors real-world problem-solving scenarios. In this case, students are tasked with creating functional smart home systems that could address everyday issues, such as energy efficiency and accessibility, much like professionals would do in the tech and engineering industries. By applying programming concepts like variables, conditionals, and loops to design these systems, students engage in hands-on learning that reflects actual practices in fields such as software development and IoT (Internet of Things) systems. Additionally, the focus on inclusivity, accessibility, and user-centred design models' real-world values, encourages students to think critically about how technology impacts diverse users.
How is gender inclusiveness ensured?	Gender inclusiveness in the activity is ensured by encouraging equal participation and making sure all students' voices are valued throughout the design process. During the team-based tasks, every student is assigned a role, ensuring that each person could contribute their unique strengths, regardless of gender.
Considerations for level progression	As students gain experience, they can tackle more complex tasks, such as integrating multiple smart home features or designing for accessibility, which encourages them to think critically about user needs. In advanced stages, students can focus on optimising their code, ensuring its efficiency, and developing comprehensive smart home systems that meet various accessibility needs.

Cyprus

Cyprus

Learning Scenario 1 - Collaborating Across the Web

Learning Scenario Information	
Title	Collaborating Across the Web
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Networks and Communication
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand how networks enable real-time communication and collaboration. ● Learn how data moves between devices over the internet. ● Use online tools for real-time collaboration on a shared project.
Scenario Description	
Setting	You are excited to prepare your students for the future of work. Imagine they are global collaborators, working together on projects using online tools like Google Docs or Zoom. They will explore how networks enable teamwork and data exchange, simulating real-world remote collaboration.
(Digital) Tools	● Google Docs, Microsoft Word (SharePoint), Google Slides, Zoom, or other collaborative tools ● Computers/laptops with Internet access

<table>
<tr><td>Activity</td><td>Step 1 (5 minutes): Introduction to Online Collaboration
Discuss the importance of networks in enabling communication and collaboration across distances (e.g., shared documents, video conferencing).
Introduce collaborative tools (Google Docs, Zoom, Microsoft Word (SharePoint), etc.) and explain their features for teamwork.
Step 2 (10 minutes): Exploring Tools
Demonstrate how to use Google Docs and Microsoft Word (SharePoint) for real-time collaboration, explaining features like comments, editing, and sharing.
Students practice by creating a short collaborative document or slide.
Step 3 (20 minutes): Collaborative Project
Groups create a shared presentation on a topic (e.g., advantages of online collaboration).
Assign roles within each group (researcher, writer, designer) to ensure balanced participation.
Step 4 (10 minutes): Reflection and Presentation
Groups present their work and discuss the collaboration process.
Reflection prompts:
"What tools helped you work together most effectively?"
"What challenges did you face in collaborating online, and how did you resolve them?"</td></tr>
<tr><td>Teachers
and students' Roles</td><td>Teachers: Facilitate tool use and encourage collaborative teamwork.
Students: Collaborate on the project, utilising the networked tools for communication and teamwork.</td></tr>
<tr><td>Evaluation/
Assessment</td><td>Assess the quality of the collaborative work and the effective use of online tools.
Observe group dynamics and how well students share tasks and ideas.</td></tr>
<tr><td colspan="2">TINKER Framework Integration</td></tr>
</table>

How is the activity authentic learning?	The activity mirrors real-world online collaboration practices, giving students first-hand experience of how networks support communication and teamwork.
How is gender inclusiveness ensured?	Mixed-gender teams ensure equal participation and representation in the project.
Considerations for level progression	For beginners, simplify tasks by focusing on one tool. Advanced students can explore more complex collaborative projects requiring higher-level communication and coordination.

Learning Scenario 2 - Conquering the Flames: A Wildfire Simulation

Learning Scenario Information	
Title	Conquering the Flames: A Wildfire Simulation
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Modelling and Simulation
Content domain (Integrated Subjects)	Informatics, Design & Technology

Learning Objectives	Upon completing this activity, the students should be able to: ● Build a computational model to simulate the spread of a wildfire. ● Use abstraction to represent complex systems and parameters. ● Evaluate the effectiveness of different firefighting strategies based on simulation results.
Scenario Description	
Setting	You are excited to engage your students in real-world problem-solving. Imagine they are environmental scientists tasked with studying the devastating impact of wildfires. They will use computational models to predict fire behaviour based on different variables, such as wind speed, humidity, and fuel type.
(Digital) Tools	● Scratch, Excel, or simulation software ● Visual aids like maps or wildfire data
Activity	**Step 1 (10 minutes): Introduction to Wildfire Simulation** ● Present the scenario: a wildfire in a forest. Discuss how variables like wind speed, vegetation type, and weather conditions affect fire spread. ● Introduce the concept of computational models and how they can predict real-world outcomes. **Step 2 (10 minutes): Building the Model** ● Guide students in building a simple simulation that models wildfire spread based on different parameters (e.g., wind, temperature). ● Use tools like Scratch or Excel to implement their models. **Step 3 (20 minutes): Running Simulations and Testing** ● Students run their models and test how changes in parameters (e.g., stronger wind or dry conditions) affect the fire's spread. ● Analyse results to predict the most effective firefighting strategy. **Step 4 (5 minutes): Reflection and Group Discussion** ● Groups share their findings and discuss which strategies worked best for controlling the wildfire. ● Reflection prompts: ○ *"How did changing one variable affect the fire's spread?"*

	○ *"What strategies would you recommend for firefighters based on your results?"*
Teachers and students' Roles	**Teachers**: Facilitate the creation of models and guide students in understanding the relationship between variables. **Students**: Build, test, and analyse their models, then collaborate to discuss findings.
Evaluation/ Assessment	● Evaluate the models based on accuracy and logical use of parameters. ● Observe group collaboration and analytical thinking.
TINKER Framework Integration	
How is the activity authentic learning?	The activity simulates real-world environmental challenges, where students apply computational thinking to solve complex problems like wildfire prediction.
How is gender inclusiveness ensured?	Mixed-gender teams collaborate equally to build the simulation and share results.
Considerations for level progression	Beginners may work with simple models with fewer parameters. Advanced students can introduce more complex simulations, such as incorporating dynamic weather patterns or firefighting responses.

Learning Scenario 3 - Create Your Own Digital Story

Learning Scenario Information	
Title	Create Your Own Digital Story
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the concept of digital storytelling and its elements (narrative, visuals, and interactivity). ● Use digital tools to create engaging and interactive stories. ● Develop creativity and critical thinking skills through collaborative story creation.
Scenario Description	
Setting	You are excited to spark your students' creativity. Imagine they are digital storytellers, crafting captivating narratives using tools like Padlet or Canva. They will combine text, images, and design to create interactive and engaging stories that transport their audience to new worlds.
(Digital) Tools	● Padlet, Canva, PowerPoint, or similar tools ● Computers/laptops with Internet access

<table>
<tr><td>Activity</td><td>
Step 1 (10 minutes): Introduction to Digital Storytelling

Explain the concept of digital storytelling and discuss key elements: plot, characters, setting, and visuals.
Show examples of digital stories (e.g., short interactive stories, multimedia presentations).

Step 2 (15 minutes): Brainstorming and Planning

Students form small groups (mixed-gender) and brainstorm ideas for their digital stories.
Groups create storyboards outlining the narrative structure and visuals.

Step 3 (15 minutes): Story Creation

Using tools like Padlet or Canva, students create their stories by adding text, images, and interactive elements (such as clickable choices or multimedia).
Encourage creativity with visuals, sound, and interactive components.

Step 4 (5 minutes): Presentation and Reflection

Groups present their digital stories to the class.
Reflection prompts:

"What was the most engaging part of your story?"
"How did you use images or interactive elements to enhance your narrative?"

</td></tr>
<tr><td>Teachers and students' Roles</td><td>Teachers: Guide the use of tools, offer creative suggestions, and provide technical assistance.
Students: Collaborate to design and create their digital stories, integrating all elements effectively.</td></tr>
<tr><td>Evaluation/ Assessment</td><td>

Assess creativity, coherence of the narrative, and effective use of digital tools.
Observe teamwork and the integration of digital elements into storytelling.

</td></tr>
<tr><td colspan="2">TINKER Framework Integration</td></tr>
</table>

How is the activity authentic learning?	This activity simulates real-world multimedia storytelling, where students apply creative and technical skills to produce an engaging story.
How is gender inclusiveness ensured?	Mixed-gender teams foster diverse ideas and ensure equal participation in the creation process.
Considerations for level progression	For beginners, focus on simple stories with minimal interactivity. Advanced students can experiment with complex features, such as animations or branching storylines.

Learning Scenario 4 - Designing a Path to Success: Algorithms & Problem-Solving

Learning Scenario Information	
Title	Designing a Path to Success: Algorithms & Problem-Solving
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Informatics, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: ● Design a step-by-step algorithm to navigate a maze in a physical space. ● Apply loops and conditionals in their algorithms to solve the maze efficiently. ● Evaluate and debug their algorithm based on its performance during testing.
Scenario Description	

Setting	You are excited to introduce your students to the world of robotics and artificial intelligence. Imagine they are brilliant robot engineers tasked with designing algorithms to guide robots through a complex maze. They will test and refine their algorithms in a hands-on, physical environment.
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Markers ● Classroom with space cleared for a physical maze, such as desks/chairs or tape on the floor, forming a simple maze with obstacles.
Activity	**Step 1 (10 minutes): Introduction to Algorithms Using Real-Life Examples** ● Present a real-world example of an algorithm (e.g., making a sandwich). Show a video of "Sandwich Bot" (1:36), then ask students to break down the sandwich-making steps into a clear sequence. ● Define algorithm: "A systematic, step-by-step procedure designed to perform a specific task." **Step 2 (10 minutes): Understanding Maze Navigation** ● Show a simple map of a maze on the whiteboard. Ensure it's clear and visually appealing. - You can divide the whiteboard into a grid using horizontal and vertical lines. The size of the grid can be adjusted based on the complexity of the maze and the available space. - For the wall creation, you can use a thick marker to draw lines along the grid lines. - Create multiple starting points and end points: This can introduce the concept of multiple solutions and optimal paths. ● Introduce the concept of a robot that can navigate the maze. ● Discuss how solving the maze requires an algorithm and introduce loops (e.g., "While there's no wall in front, keep moving forward.") and conditionals (e.g., "If there's a wall in front, turn right. Otherwise, keep moving forward."). ● Walk students through the maze using their suggestions for directions (e.g., "Turn right" or "Move forward five steps, checking for a wall after each step."). **Step 3 (20 minutes): Designing and Testing Algorithms in a Physical Maze** ● Arrange desks or chairs to form an intricate maze with multiple obstacles and potential dead ends. Divide students into groups and assign each group a specific challenge, such as finding the shortest path or avoiding certain

	obstacles. Have groups create detailed algorithms, including specific instructions for turning angles and moving distances. Blindfold a "robot" from each group and have them follow the instructions provided by their team. Encourage groups to test their algorithms multiple times, adjusting as needed.
	• Once the algorithm is written, the robot follows the programmers' instructions. Teams evaluate and debug their algorithms, fixing errors along the way.
	
	Step 4 (5 minutes): Group Reflection and Discussion
	• Groups share their algorithms, discussing what worked and what needed refinement. They also think critically about the limitations of their algorithms and explore alternative approaches.
	• Reflection prompts:
	  ○ *"How did you use loops to improve efficiency?"*
	  ○ *"What conditionals did you use, and did they work as expected?"*
	  ○ *"Can you think of any real-world applications for the algorithms we've discussed today?"*
	  ○ *"How could you modify your algorithm to handle a more complex maze with multiple solutions?"*

Teachers and students' Roles	**Teachers**: Introduce algorithms and provide guidance and supervision on understanding algorithms, loops, and conditionals. Encourage reflection and critical thinking during the maze activity. **Students**: Work in groups and act as programmers and robots. As programmers, they create and test algorithms, and as robots, they follow the instructions exactly to highlight the importance of precise commands.
Evaluation/ Assessment	• Evaluate the clarity and functionality of each group's algorithm. • Observe teamwork and debugging strategies.
TINKER Framework Integration	

How is the activity authentic learning?	The activity involves real-world problem-solving, where students design and test algorithms to navigate a physical maze. This hands-on approach makes abstract algorithm concepts more concrete.
How is gender inclusiveness ensured?	Collaboration in mixed-gender teams ensures equal participation and avoids gendered roles. Both programmers and robots are roles shared by all students.
Considerations for level progression	For younger or less experienced students, simplify the maze and focus on basic algorithmic structures. For advanced students, introduce more complex mazes or additional algorithmic concepts, such as functions or nested conditionals.

Learning Scenario 5 - Digital Citizens Guide

Learning Scenario Information	
Title	Digital Citizens Guide
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Responsibility and Empowerment
Content domain (Integrated Subjects)	Informatics, Modern Greek / Civics

Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the responsibilities of being a good digital citizen. ● Recognise and respond to online risks such as cyberbullying and misinformation. ● Promote positive online behaviours and inclusive communities.
Scenario Description	
Setting	You are excited to empower your students to be responsible digital citizens. Imagine they are digital advocates, creating a guide to educate their peers about online safety, privacy, and ethical behaviour. They will explore the importance of building respectful and inclusive online communities.
(Digital) Tools	● Canva, Google Slides, or Word for guide creation ● Computers/laptops
Activity	**Step 1 (10 minutes): Introduction to Digital Citizenship** ● Define key concepts: online respect, safety, and empowerment. ● Share real-world examples of online risks (e.g., cyberbullying, fake news) and their consequences. **Step 2 (10 minutes): Brainstorming Guidelines** ● Groups brainstorm strategies to promote positive online behaviour, such as reporting harmful content or avoiding harmful interactions. ● Discuss how digital citizens can support and empower others in the online community. **Step 3 (15 minutes): Creating the Digital Citizenship Guide** ● Students work in groups to design a guide promoting responsible online behaviours, including tips for handling risks and creating inclusive environments. ● Assign specific roles to group members to ensure balanced participation: - **Visual Designer**: Responsible for the layout, graphics, and visuals of the guide. - **Content Writer**: Develops the text for strategies, tips, and key messages. - **Presenter/Editor**: Edits content for clarity, and ensures the guide is ready for presentation.

	• Students use tools like Canva, Google Slides, or Word for their designs.
	
	Step 4 (10 minutes): Presentation and Reflection
	• Groups present their guides and discuss how these strategies can be implemented in daily online activities.
	• Reflection prompts:
	  ○ *"How can we use these strategies in our social media or online gaming?"*
	  ○ *"What makes a positive and respectful online community?"*

Teachers and students' Roles	**Teachers**: Facilitate brainstorming, guide the design process, and encourage reflections. **Students**: Collaborate in groups, create the guide, and present their strategies.
Evaluation/ Assessment	• Review the quality and relevance of the guides, focusing on clarity, actionable strategies, and creativity. • Observe participation and the depth of reflections on online behaviour.
TINKER Framework Integration	
How is the activity authentic learning?	The activity addresses real-world issues such as online behaviour and safety, helping students practice responsible digital citizenship. Reflection on strategies connects the guide to practical, everyday online interactions.
How is gender inclusiveness ensured?	Mixed-gender teams ensure equitable participation in designing guidelines, and discussing online behaviours.
Considerations for level progression	Beginners focus on basic guidelines for responsible online behaviour. Advanced students can explore topics like misinformation, privacy breaches, or online activism.

Learning Scenario 6 - From Data to Decisions

Learning Scenario Information

Title	From Data to Decisions
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Informatics, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: • Understand how data is stored and represented in different formats (text, images, numbers). • Learn data compression and retrieval methods. • Analyse and visualise data to make informed decisions. • Reflect on the ethical implications of data usage and privacy.
Scenario Description	
Setting	You are excited to transform your students into data detectives. Imagine they are data analysts, working with large datasets to uncover valuable insights and inform decision-making. They will use data visualisation tools to explore trends, patterns, and anomalies.
(Digital) Tools	• Excel, Google Sheets, or data visualisation tools • Computers/laptops • Newspapers

Activity	**Step 1 (10 minutes): Introduction to Data Representation** ● Introduce how data is represented and visualised by showcasing examples from newspapers, online resources, or reports (e.g., a chart showing public health records) ● Discuss how these visualisations help in understanding information and decision-making. **Step 2 (15 minutes): Creating Visualisations from Real-Life Data** ● Students work in groups to create their own data visualisations. Use a real-life example, such as a school survey about dietary habits or technology usage. ● Groups analyse the data and create charts/graphs using tools like Excel or Google Sheet. Roles can be assigned for balanced participation: - **Data Analyst**: Reviews and organises the dataset. - **Visualisation Creator**: Designs and creates the charts or graphs. - **Presenter**: Prepares explanations of the findings. **Step 3 (10 minutes): Ethical Considerations** ● Discuss the ethical considerations related to the dataset: ○ *"What privacy concerns might arise when collecting and using this data?"* ○ *"How can we ensure data is used responsibly and ethically?"* ● Encourage students to think about the implications of sharing their visualisations with different audiences, such as parents, teachers, or school administrators. **Step 4 (10 minutes): Reflection on Data-Driven Decision Making** ● Groups present their visualisations and discuss how the findings could be used to make decisions. ● Reflection prompts: ○ *"How can this data inform decisions at the school level (e.g., for principals, parents, or teachers)?"* ○ *"What lessons can we learn about ethical data usage from this activity?"*
Teachers and students' Roles	**Teachers**: Present real-world examples, guide data analysis and visualisation, facilitate discussions on ethics, and encourage critical thinking. **Students**: Collaborate in groups, create visualisations, and engage in ethical discussions and reflections.

Evaluation/ Assessment	• Evaluate the clarity, accuracy, and creativity of visualisations. • Observe students' participation in ethical discussions and their ability to connect findings to real-life decision-making.
TINKER Framework Integration	
How is the activity authentic learning?	The activity reflects real-world data analysis tasks, helping students understand how insights inform decisions in areas like education, business, or healthcare. Students reflect on how data informs school-level decisions, engaging with practical, ethical considerations.
How is gender inclusiveness ensured?	Teams are structured to ensure equal access to tools and equal participation in roles and tasks, encouraging diverse perspectives in analysis and presentation.
Considerations for level progression	Beginners focus on basic data organisation and chart creation, while advanced students can work with larger, more complex datasets and explore deeper ethical questions (e.g., bias in data collection).

Learning Scenario 7 - Robot Maze Challenge

Learning Scenario Information	
Title	Robot Maze Challenge
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Informatics, Design & Technology

Learning Objectives	Upon completing this activity, the students should be able to: • Understand basic programming concepts such as loops and conditionals. • Apply programming knowledge to solve a real-world problem (navigating a maze). • Collaborate with peers to write and test code.
Scenario Description	
Setting	You are excited to challenge your students to become real-life heroes. Imagine they are skilled programmers tasked with creating a rescue robot to navigate a dangerous, disaster-stricken area. They will use a programming language like Scratch to write the robot's commands, guiding it through the maze and saving lives.
(Digital) Tools	• Scratch or Blockly • Virtual or physical maze setup • Laptop or tablet • Pen and paper
Activity	**Step 1 (10 minutes): Introduction to Programming Concepts** • Begin with a concise recap of key programming concepts such as loops, conditionals, and variables. If students have limited prior exposure, extend this step to explain each concept briefly using relatable examples (e.g., "a loop is like repeating daily routines such as brushing your teeth"). • Showcase a simple example maze, demonstrating step-by-step how the concepts translate into Scratch programming blocks (e.g., "move forward," "if obstacle, turn right"). **Step 2 (15 minutes): Programming the Robot** • Present a specific, simple maze to the class and briefly discuss its layout. • Students work in pairs or small groups to write code to control the robot's movement through the maze using loops and conditionals. • Advise them to use clear commands (e.g., "move forward," "turn right") for efficient maze navigation. • Encourage students to use laptops/tablets or pen and paper to draft their code before implementing it digitally. **Step 3 (15 minutes): Testing and Debugging** • Students test their code on the provided maze, using either a simulated environment or a physical maze setup.

	• They debug their code as the robot navigates, revising it when errors occur.
	• Ensure students are testing only on the maze introduced in Step 2.
	
	Step 4 (5 minutes): Reflection and Presentation
	• Groups present their solutions, discussing programming strategies, errors encountered, and resolutions.
	• Reflection prompts:
	  ○ *"How did using loops simplify your code?"*
	  ○ *"What would you change to improve the efficiency of your code?"*

Teachers and students' Roles	**Teachers**: Guide students in coding, provide support during debugging, and encourage reflective discussion. **Students**: Work in pairs or small groups to program and test the robot's path.
Evaluation/ Assessment	• Evaluate the functionality and efficiency of each group's program. • Observe teamwork and problem-solving during debugging.
TINKER Framework Integration	
How is the activity authentic learning?	Students apply programming concepts to a real-world challenge, learning how to use algorithms to navigate a maze. The hands-on nature of the activity reinforces the connection between abstract programming concepts and practical applications. Reflection prompts during the final step allow students to analyse their programming strategies, evaluate their problem-solving process, and connect their learning to practical applications.
How is gender inclusiveness ensured?	Mixed-gender teams are formed to ensure equal participation in programming tasks. Roles like "programmer" and "tester" are shared by all students.
Considerations for level progression	Beginners may work with simple programming tasks (e.g., basic movement commands). Advanced students can add complexity (e.g., handling obstacles or dynamic maze challenges).

Learning Scenario 8 - Shield Yourself: Defending Against Online Threats

Learning Scenario Information	
Title	Shield Yourself: Defending Against Online Threats
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Informatics, Modern Greek / Civics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the importance of online privacy and security. ● Identify common online threats, including phishing and scams. ● Implement practical steps to protect personal information online. ● Develop a proactive approach to online safety.
Scenario Description	
Setting	You are excited to equip your students with the knowledge to navigate the digital world safely. Imagine they are cybersecurity experts, analysing common online threats and developing strategies to protect their digital identities. They will learn how to secure their online presence and safeguard their personal information.
(Digital) Tools	● Computers/laptops ● Internet access for research ● Whiteboard for brainstorming and note-taking
Activity	**Step 1 (10 minutes): Introduction to Online Privacy and Security** ● Introduce common online threats (e.g., phishing, identity theft, malware). ● Share examples of data breaches or scams, highlighting the consequences. **Step 2 (10 minutes): Identifying Online Risks** ● Groups identify risks that apply to their online activities, such as social media or gaming.

	• They categorise threats as high or low risk and discuss how each can impact their privacy.
	
	Step 3 (15 minutes): Privacy Settings and Security Tools
	• Students will use a mock social media profile or real examples to review privacy settings.
	• They will also discuss strategies to create strong passwords and enable two-factor authentication.
	
	Step 4 (10 minutes): Reflection and Presentation
	• Groups share the privacy tips and strategies they found most effective.
	• Reflection prompts:
	    ○ *"What privacy settings can you adjust on your social media accounts?"*
	    ○ *"How does a strong password help protect you online?"*

Teachers and students' Roles	**Teachers**: Guide students in understanding online threats and setting up privacy protections. **Students**: Research online threats, review security settings, and develop safety strategies.
Evaluation/ Assessment	• Evaluate student engagement in discussions and the thoroughness of their privacy strategies. • Observe teamwork in identifying threats and creating security guidelines.
TINKER Framework Integration	
How is the activity authentic learning?	The activity simulates real-world online risks, providing students with practical knowledge on how to stay safe and secure online.
How is gender inclusiveness ensured?	All students contribute equally in discussions and tasks, focusing on shared responsibilities for online safety.
Considerations for level progression	Beginners focus on basic privacy settings and password protection. Advanced students analyse case studies and explore complex security tools like encryption or data sharing permissions.

Learning Scenario 9 - The Eco-Friendly App

Learning Scenario Information	
Title	The Eco-Friendly App
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Human-Computer Interaction, Design and Development
Content domain (Integrated Subjects)	Informatics, Design & Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Apply principles of human-computer interaction in app design. ● Utilise programming skills to create an eco-friendly app prototype. ● Analyse user needs and design an app that addresses a sustainability challenge.
Scenario Description	
Setting	You are excited to inspire your students to become eco-conscious innovators. Imagine they are app developers, creating user-friendly mobile applications that promote sustainable practices and environmental awareness. They will design apps that encourage eco-friendly habits and inspire positive change within their community.
(Digital) Tools	● Thunkable, MIT App Inventor, or Scratch ● Computers/laptops

<table>
<tr><td>Activity</td><td>Step 1 (5 minutes): Introduction to Eco-Friendly Apps
● Discuss the role of technology in promoting sustainability (e.g., apps for recycling, energy saving).
● Present examples of eco-friendly apps that encourage users to adopt sustainable behaviours.

Step 2 (10 minutes): Brainstorming and Planning
● Groups brainstorm ideas for an app focused on solving a specific environmental challenge (e.g., reducing waste, conserving water).
● Define the target audience, essential features, and goals of the app.

Step 3 (20 minutes): Designing the App Concept
● Students use tools like Thunkable, MIT App Inventor, or Scratch to create visual representations of their app's screens or features.
● Include layouts, mock-ups of interactive elements, or animations showcasing app functionality.
● Groups prepare a presentation that includes:
  - Key features and how they encourage eco-friendly behaviour.
  - Visuals created using the above tools or additional artistic elements (e.g., app logos or banners).

Step 4 (10 minutes): Presentation and Reflection
● Groups present their app prototypes and explain how it encourages eco-friendly behaviour.
● Reflection prompts:
  ○ "How does your app promote sustainable practices?"
  ○ "What user feedback could help improve your app?"</td></tr>
<tr><td>Teachers and students' Roles</td><td>Teachers: Guide students through the brainstorming and design process. Provide support during app designing.
Students: Collaborate to design and present an eco-friendly app prototype.</td></tr>
<tr><td>Evaluation/ Assessment</td><td>● Evaluate the creativity, functionality, and relevance of each app prototype.
● Observe teamwork and the ability to integrate human-computer interaction principles.</td></tr>
<tr><td colspan="2">TINKER Framework Integration</td></tr>
</table>

How is the activity authentic learning?	This activity simulates real-world app development and addresses community sustainability issues. Students gain practical experience in designing an impactful and user-friendly app.
How is gender inclusiveness ensured?	Mixed-gender teams ensure diverse ideas and equal participation.
Considerations for level progression	Beginners may focus on simple static features, while advanced students can add dynamic user interaction or integration with environmental data sources.

Learning Scenario 10 - The Ethical App Challenge

Learning Scenario Information	
Title	The Ethical App Challenge
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Design and Development, Programming
Content domain (Integrated Subjects)	Informatics, Design & Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Analyse the values embedded in existing apps. ● Design an app that promotes positive social values. ● Apply user-centred design principles to app development. ● Reflect on the ethical and cultural impact of technology.
Scenario Description	

Setting	You are excited to empower your students to make a difference. Imagine they are innovative app developers, creating mobile applications to address pressing community issues, such as environmental sustainability, mental health, or education.
(Digital) Tools	● Scratch/Canva/Microsoft PowerPoint ● Computers/laptops
Activity	**Step 1 (5 minutes): Discussion on Ethical App Design** ● Discuss examples of apps that focus on social impact, such as apps for mental health or environmental awareness. ● Explore how apps can reflect cultural values and ethical principles. **Step 2 (10 minutes): Brainstorming and Planning** ● Groups brainstorm ideas for apps that could solve a real-world community issue. ● They define the target audience, features, and values their app should promote. **Step 3 (20 minutes): Designing and Presenting the App Concept** ● Students create a visual representation of the app's key screens (e.g., home page, feature pages) on digital tools like Scratch or Canva. ● Designing a logo for their app. ● Include interactive elements like buttons, forms, or gamified features related to the social issue. ● Prepare a short presentation covering: - The app's purpose and features. - How it promotes ethical and social values. **Step 4 (10 minutes): Presentation and Reflection** ● Groups present their app prototypes, explaining how they address the community issue and incorporate ethical values. ● Reflection prompts: ○ *"How does your app promote positive social behaviour?"* ○ *"What ethical considerations did you take into account during the design?"*

Teachers and students' Roles	**Teachers**: Facilitate brainstorming, guide students in using app development tools, and encourage ethical reflections. **Students**: Collaborate to brainstorm, design, and prototype apps that reflect positive values.
Evaluation/ Assessment	• Evaluate the creativity, functionality, and ethical considerations in each app prototype. • Observe the teamwork and discussion regarding the app's impact on the community.
TINKER Framework Integration	
How is the activity authentic learning?	Students design a real-world solution to a community issue, using programming tools and ethical reflection to create apps.
How is gender inclusiveness ensured?	Mixed-gender teams ensure diverse perspectives and equal participation in the design and development process.
Considerations for level progression	Beginners can focus on creating simple, static apps, while advanced students can add features like data collection, notifications, or user feedback.

Greece

Learning Scenario 1 - A Flu Outbreak in School!

Learning Scenario Information	
Title	A Flu Outbreak in School!
Age Level	11-14 years old
Duration	45 minutes
Informatics topic areas	Modelling and Simulation
Content domain (Integrated Subjects)	Mathematics, Biology, Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Represent real-world problems with simple mathematical models ● Apply abstraction when representing problems with a view to generalising and parameterising solutions ● Develop the skill of abstraction as a central skill for computing and computational thinking ● Use a computer simulation model in the context of testing a proposed model for a real-world phenomenon
Scenario Description	
Setting	You would like your students to start to understand how to use abstraction to simplify problems and analyse different parameters. To do this, you decide to introduce modelling and simulation of real-world problems in a way that's accessible and fun. In this way, you can expose them to contemporary methods used by scientists, and build their confidence and perseverance when faced with complex problems.
(Digital) Tools	● Computer and projector ● Whiteboard and markers ● For the participatory activity: one pre-prepared card for each student, coloured red on one side and green on the other. ● Digital Tools (You will use NetLogo Web (or another programme of your choice) for the computer simulation activity. In preparation, it will be helpful to familiarise yourself with the NetLogo basic epidemic model.)

	https://www.netlogoweb.org/launch#https://www.netlogoweb.org/assets/modelslib/Curricular%20Models/epiDEM/epiDEM%20Basic.nlogo
Activity	**Step 1 Introduction (10 minutes):** ● Introduce the topic of infectious diseases and initiate a class discussion on the topic using the following prompts: ○ *What are infectious diseases? What examples can the class think of [e.g. the common cold, the flu, Covid-19, chickenpox]?* ○ *Have the students experienced a cold or flu outbreak in school? Can they describe what happened?* ● Introduce the concept of infection and infection rate: ○ Ask students to give ways in which the flu spreads [e.g. Coughing near someone]. ○ Explain that the flu (influenza) is an airborne virus that infects the nose, throat, and lungs, showing an image of the virus and a diagram of airborne disease spread. ○ Lead a brief discussion on what might influence the spread of flu in a school setting [e.g. number of students, interaction rate, hygiene practice]. ● Introduce the concept of recovery time and immunity ● Explain how scientists often use models (parameterisation) to understand the significance of particular factors in a real-world problem (e.g. does the rate of infection go up if population density increases?). Explain the use of computer simulations to compare the model to reality. **[Step 2 - OPTIONAL Participatory Group Activity (15 minutes)]:** The class will simulate the spread of the flu within the classroom in this participatory activity. They will do two different simulations. ● Move the desks and chairs to the side, so there is room to move around. This activity can also be done outdoors. ● Give each student a card that is red on one side and green on the other. ○ When a student is not holding up a card, they are ‘susceptible’. ○ When a student is showing the red side of the card, they are ‘infected’. ○ When a student is showing the green side of the card, they are ‘recovered’. ● First Simulation, infection rate = 1 :

	○ Choose one student to be the initial-infected student. Instruct the students to move around the space, 'bumping' into each other to simulate contact. ○ When the infected student comes into contact with another 'susceptible' student, they automatically become infected. ○ As the simulation progresses, call out the infected students' names to let them know when they have recovered. 'Recovered' students hold up the green card and cannot be re-infected. ○ Once the simulation is over (there are no more 'infected' students), reflect on the activity as a group. What happened in the simulation? ● Second Simulation, infection rate = 1/3 : ○ The simulation follows the same procedure. However, when an 'infected' student bumps into a 'susceptible' student, this time they play 'rock, paper, scissors'. If the 'infected' student wins, the 'susceptible' student becomes 'infected'. If not, they move on without transmission. ○ Once the simulation is over (there are no more 'infected' students), reflect on the activity as a group. What was different this time? **Step 3 Modelling (15 minutes):** Walk students through the creation of a simple mathematical model representing the flu outbreak. ● Start with a fixed number of students (population size). ● Define an initial number or percentage of 'infected' students. ● Introduce the SIR model for infection, using diagrams, and assign the chance of infection and recovery time. ● Explain how adjusting the parameters can change the outcome. ● If you did the group activity in Step 2, students can apply the model to the two classroom simulations, calculating the probability (1/3) of winning in 'rock, paper, scissors' to find the probability of infection. **Step 4 Computer Simulation (15 minutes):** Using the Basic Epidemic Model on NetLogo, students will now use computer simulations to test their models. Encourage them to adjust the parameters to see how the outcome changes. **Step 5 Reflection (5 mins):** Lead a class discussion to finish the activity. ● Review the outcome of the simulations, discussing any patterns observed. ● Ask students to comment on whether their models reflect the real world, and discuss discrepancies and potential improvements to the model. [E.g. Discrepancies: students stay home if they are sick; students have

	contact with other students not in their class at break or the bathroom; infection does not occur instantaneously.] ● Emphasise how abstraction and modelling are powerful tools for analysing complex issues, and that scientists use modelling and simulation to study the spread of disease and plan interventions. For example, policy decisions during the COVID-19 pandemic [such as lockdown, quarantine, closure of schools] were partly based on such models and simulations. ● If there is time, discuss historical figures in epidemiology (e.g. John Snow, whose research into cholera outbreaks was the first of its kind, and Françoise Barré-Sinoussi, who co-discovered and researched HIV) or go into the website of a contemporary research group (such as the London School of Hygiene and Tropical Medicine) and explore the research teams there, and the different roles and work that they do.
Teachers and students' Roles	**Teachers**: Facilitate discussions, coordinate the group activity, walk the class through the development of the model, and provide support during the computer simulation activity. **Students**: Participate actively in group activities, experiment with computer simulations, engage critically with the content, and contribute to group discussions.
Evaluation/ Assessment	Students are assessed on their participation in group discussions and their ability to construct a simplified epidemic model and test it using simulations. They are assessed based on their ability to critically reflect on the outcome of each activity and draw comparisons to real-world scenarios.
TINKER Framework Integration	
How is the activity authentic learning?	The activity introduces students to scientific approaches to addressing a real-world problem which has impacted them all in different ways. The topic is approached from multiple angles and uses different visualisation techniques, and the students discuss the outcome of each activity as a group.
How is gender inclusiveness ensured?	The activity promotes equal participation, avoids gendered roles, and utilises diverse teaching strategies to make the subject accessible to all students. It exposes all participants to real scientific research and possible avenues for higher education and career paths in STEM fields.
Considerations for level progression	This activity introduces a rich and accessible topic in mathematics and epidemiology, which can be extended in a variety of ways.

	● Testing the model and describing trends by recording data from simulations using different parameter combinations and observing patterns. ● Introduction of additional parameters into the model, and use of the extended 'Travel and Control' epidemic model in NetLogo: https://www.netlogoweb.org/launch#https://www.netlogoweb.org/assets/modelslib/Curricular%20Models/epiDEM/epiDEM%20Travel%20and%20Control.nlogo ● Exploration of the mathematics governing the 'susceptible-infected-recovered' model, such as graphing population numbers for the susceptible, infected, and recovered categories, or calculating the basic reproductive ratio R0. ● Introduction of concepts such as vaccination and herd immunity For younger or less experienced students, focus on the basic structure of the 'susceptible-infected-recovered' model without adding complicated parameters, using diagrams and group activity to illustrate the model in action.

Learning Scenario 2 - Building a Sustainable E-Commerce Website

Learning Scenario Information	
Title	Building a Sustainable E-Commerce Website
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Design & Development, Responsibility and Empowerment [Web Development, Digital Ethics, and Sustainable Practices]
Content domain (Integrated Subjects)	Computer Science, Mathematics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the basics of web design, including layout, navigation, and accessibility. ● Apply principles of inclusivity and ethical digital practices to website creation.

	• Analyse the role of technology in promoting sustainability and supporting diverse user groups.
Scenario Description	
Setting	Students will work in small, mixed-gender groups to design and prototype a sustainable e-commerce website that promotes eco-friendly products. This activity assesses students' skills in website design, ethical decision-making, and inclusivity. It incorporates user-friendly features, accessibility, and gender-neutral design principles while addressing environmental concerns.
(Digital) Tools	• Computers/tablets with internet access and a simple website builder (e.g., Wix, Google Sites, or Figma). • Sample e-commerce websites for inspiration, including gender-neutral and accessible platforms. • Templates for planning website features (e.g., wireframes or feature checklists).
Activity	**Step 1 (5 minutes): Warm-Up** Class Discussion: "What makes a website user-friendly and inclusive?" Brainstorm: Examples of eco-friendly and inclusive e-commerce platforms (Accessibility for People with Disabilities, Multilingual and Multicultural Support, Currency Flexibility, Inclusive Product Representation, Mobile-Friendly Design etc) **Step 2 (10 minutes) Planning Activity** • **Divide Students into mixed-gender groups**: Encourage collaboration and representation of diverse perspectives. • **Task**: Each group outlines their website, focusing on: ◦ **Sustainability**: How the website promotes eco-friendly products (e.g., reusable items, carbon offset options). ◦ **Inclusivity**: Features like gender-neutral language, diverse product categories, and accessible design (e.g., adjustable fonts, text-to-speech). ◦ **Ethics**: Addressing data privacy and ethical advertising. • Groups complete a planning worksheet with sketches and descriptions of key features.

	Step 3 (15 minutes): Prototype Development Groups create their website prototypes using the provided tools. Key elements to include: ● Homepage with a clear, inclusive mission statement. ● Product pages with diverse categories (e.g., "For Everyone," rather than gendered sections). ● Accessibility features (e.g., alt text for images, high-contrast colour schemes). **Step 4 (10 minutes): Presentations** Groups present their websites, focusing on: ● Inclusivity and accessibility features. ● How the website promotes sustainability. ● How data privacy is addressed (e.g., minimal data collection, clear terms). **Step 5 (5 minutes) Wrap-Up** Class discussion: "What challenges did you face in creating an inclusive and sustainable website?" Homework (optional): Write a reflection or blog post about their learning experience.

Teachers and students’ Roles	**Teachers’ Roles** 1. **Facilitator** o Guide discussions to help students explore the concepts of inclusivity, sustainability, and ethics in web design. o Provide structured prompts to encourage critical thinking, such as: ▪ "How can you ensure your website is welcoming to all users?" ▪ "What features will promote sustainability effectively?" 2. **Resource Provider** o Share examples of inclusive, accessible, and sustainable websites. o Provide materials such as wireframe templates, website builder tutorials, and accessibility checklists. 3. **Coach** o Visit groups during the planning and building phases to offer guidance and support. o Ask guiding questions to challenge students to think deeply, e.g., "How does your design accommodate users with disabilities?" 4. **Evaluator** o Use a rubric to assess technical skills, inclusivity, ethical considerations, and teamwork. o Provide constructive feedback during presentations, emphasising both strengths and areas for improvement. 5. **Advocate for Inclusivity** o Monitor group dynamics to ensure equitable participation. o Encourage respectful communication and collaboration among students. **Students’ Roles** 1. **Collaborators** o Work in mixed-gender groups, sharing tasks and ideas equitably. o Respect and build upon the contributions of all group members. 2. **Planners** o Brainstorm and outline their website’s purpose, features, and target audience. o Use the planning worksheet to document ideas about sustainability, inclusivity, and ethics. 3. **Designers** o Create a visually appealing, functional website prototype using the provided tools.

	- Incorporate gender-neutral language, accessible design elements, and eco-friendly messaging. 4. **Critical Thinkers** - Address challenges related to data privacy, ethical advertising, and diverse user needs. - Evaluate how their website aligns with the principles of inclusivity and sustainability. 5. **Presenters** - Showcase their website prototype to the class, explaining design decisions and features. - Respond to questions from peers and the teacher about their project. 6. **Reflective Learners** - Participate in the wrap-up discussion to evaluate what worked well and what could be improved. - Optionally, document their learning experience through a blog post or short video.
Evaluation/ Assessment	• Inclusivity: Thoughtfulness in addressing diverse user needs (e.g., language, accessibility). • Sustainability: Relevance and clarity of eco-friendly features. • Ethical Awareness: Incorporation of data privacy and ethical advertising practices. • Collaboration: Evidence of teamwork and equitable contributions.
TINKER Framework Integration	

How is the activity authentic learning?	This scenario is authentic because it mirrors real-world tasks in web development and sustainability. It combines technical skills with critical thinking and teamwork, providing students with a meaningful and practical experience while promoting gender inclusivity and ethical practices.
How is gender inclusiveness ensured?	Mixed-gender groups encourage collaboration and representation of diverse perspectives, promotes gender-neutral product categories and inclusive website language, highlights features that benefit users of all genders and abilities, such as customisable layouts and screen-reader compatibility, showcases case studies of gender-diverse entrepreneurs or developers in the tech and sustainability industries.
Considerations for level progression	To ensure students develop skills progressively, the activity can be divided into levels of increasing complexity. Each level builds on the previous one, gradually introducing new skills and concepts while accommodating diverse abilities.

Learning Scenario 3 - Coding Games

Learning Scenario Information	
Title	Coding Games
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Programming

Content domain (Integrated Subjects)	Informatics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify basic programming concepts (syntax, functions, loops). ● Apply programming skills to create a simple video game.
Scenario Description	
Setting	You hear some of your students discussing their favourite video games and what they would like to see changing in new games. You wonder if they have ever thought of creating one of their own, or if they understand the basic rationale behind developing the video games they play. You want your students to familiarise themselves with the basics of programming in a fun and engaging way. You aim to use authentic learning and practical activities so that students can grasp the foundations of programming.
(Digital) Tools	○ Computers/Laptops ○ Internet Access/Wi-Fi ○ Access to kids-friendly drag-and-drop programming software (e.g. Scratch, ScratchJr, Kodable, etc.) ○ Pens/Markers and Paper (for brainstorming) ○ Projector
Activity	**Introduction (10 minutes)** ○ Start the activity with the question, "What makes video games fun?" ○ Lead a brief discussion about how games are made using programming. ○ Explain basic concepts using everyday examples: ▪ Loops: Repeating actions (e.g. brushing teeth every morning) ▪ Functions: Steps grouped to solve a problem (e.g. baking a cake) **Game Creation with Scratch (30 minutes)** ○ Encourage students to join the Scratch website. ▪ This scenario involves the use of kids-friendly drag-and-drop programming software (e.g. Kodable, Scratch, etc.) that enables students to use loops, functions, and problem-solving skills in a fun and engaging way. Thus, it is advisable to get yourself acquainted with some drag-and-drop programming software before you

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proceed with the scenario implementation (ideally Scratch or ScratchJr, as they are completely free to use).
○ Show them the Scratch interface.
○ Briefly explain drag-and-drop blocks.
○ Guide the students to:
▪ Create a character (a sprite)
▪ Move the character using loops – Examples:
- Repeat 5 times
- Move 10 steps
▪ Add a function for when an event occurs – Examples:
- If touching the edge, bounce back
- If touching the mouse pointer, turn 180 degrees
○ Provide help when needed.

Reflection (5 minutes)
○ Ask questions like:
▪ Did you find it challenging? If yes, what was the most challenging part?
▪ Did you understand the concept of loops?
▪ Did you understand the notion of functions?
○ Conclude how these basic programming concepts are the building blocks for all games.
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<tr><td>Teachers and students’ Roles</td><td>
Teachers
○ Introduce the main concepts of loops and functions
○ Facilitate discussions
○ Provide support for the activities, if necessary
○ Encourage questions and provide clarifications when needed
○ Ensure inclusivity, making every student feel comfortable participating
Students
○ Participate actively in the discussions.
○ Follow teachers’ instructions while exploring the drag-and-drop programming software
○ Act as “game developers”
</td></tr>
<tr><td>Evaluation/ Assessment</td><td>
○ Use a checklist to assess completion of certain tasks - Examples:
▪ Did the students create a character? (Yes/No)
▪ Did they use a loop to make the character move? (Yes/No)
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	▪ Did they successfully implement a function in their "code"? (Yes/No) ○ Ask your students questions to share their experiences and to share their understanding of basic programming concepts (loops, functions) so a) you can evaluate their ability to articulate programming concepts and b) they can self-assess their challenges and learning.
TINKER Framework Integration	
How is the activity authentic learning?	The scenario consists of an authentic task, as this is described in the TINKER Framework. Students have the opportunity to learn about some of the fundamentals of programming while making a small, simple game of their own.
How is gender inclusiveness ensured?	The scenario promotes equality as it does not discriminate against the student's participation. All students are actively encouraged to get involved in the classroom, regardless of their gender.
Considerations for level progression	For students at a more beginner's level, one may: - Simplify some concepts ○ E.g. Use basic examples to explain functions like "if the character touches the wall, stop". - Focus on one concept at a time (e.g. explain and get them involved only with loops or only functions) - Group students with their peers so they can support each other For students with more advanced digital skills, the teacher may adopt some adjustments, like the ones below: - Encourage them to add more complex features, such as: ○ Animations ○ Sounds & Dialogues - Encourage them to help students who may find the activity difficult or present them with their work, explaining their process and logic.

Learning Scenario 4 - Designing a Smart Community App

Learning Scenario Information	
Title	Designing a Smart Community App

Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Programming, Design and Development
Content domain (Integrated Subjects)	Computer Science, Mathematics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand basic app development concepts such as user needs, design elements, and functionality. ● Apply logical problem-solving and teamwork to create a simple app prototype. ● Analyse data privacy concerns, emphasising inclusivity and ethical considerations in tech.
Scenario Description	
Setting	Students will work in small, mixed-gender groups to design a prototype for a community app that addresses real-life challenges, such as environmental sustainability, accessibility, or community engagement. The activity encourages critical thinking, inclusivity, and creativity while teaching essential informatics concepts like user interface (UI) design, algorithms, and data privacy.
(Digital) Tools	● Computers/tablets with simple prototyping tools (e.g., Canva, Figma, or paper for offline activities). ● A brief introduction presentation on UI/UX design and data privacy. ● A worksheet outlining personas for diverse users (e.g., a senior citizen, a teenager, a parent, a person with a disability).
Activity	**Step 1 (5 minutes): Warm-Up** Presentation: Introduction presentation on UI/UX design and data privacy. Discuss: "What makes a good app?" Brainstorm features of popular apps .Prompt: "How can apps serve everyone, regardless of their age, gender, or abilities?" “How can apps reduce disabled people barriers in society and in their environment”

	Step 2 (20 minutes): Group Activity: Design Challenge Introduction: Each group selects a challenge from real-life scenarios, e.g., reducing food waste, improving public transport, or creating a safe social space. Task: Design an app prototype. 1. Define the app's purpose. 2. Identify user needs using the provided personas. 3. Sketch the UI (e.g., screens, navigation) with online/offline drawing tools. 4. Describe how user data is collected and protected ethically. **Step 3 (15 minutes): Presentations and Feedback** Each group presents their prototype, explaining: ● How the app meets diverse user needs. ● How it ensures inclusivity (e.g., accessible text size, gender-neutral design). ● How it protects user data. **Step 4 (5 minutes): Wrap-Up** Reflect on the activity: "What did you learn about designing for everyone?" "Why is data privacy important, and how can developers build trust?" Homework (optional): Write a blog post or create a short video summarising what they learned.
Teachers and students' Roles	**Teachers' Roles** 1. **Facilitator**: ○ Guide discussions to ensure students stay focused on the lesson objectives. ○ Provide prompts and examples to encourage critical thinking and creativity. 2. **Resource Provider**: ○ Share tools, templates, and information about UI/UX principles and data privacy. ○ Ensure students have access to personas that highlight diverse user needs. 3. **Coach**: ○ Support groups during the design phase by asking guiding questions such as:

	▪ "How does this feature make your app accessible for all users?" ▪ "What privacy concerns could arise, and how can they be addressed?" 4. **Evaluator**: ○ Give constructive feedback during presentations, focusing on inclusivity, creativity, and technical feasibility. ○ Use a rubric to assess group participation, design thinking, and problem-solving.
	Students' Roles 1. **Collaborators**: ○ Work in mixed-gender groups to ensure diverse perspectives in discussions and decisions. ○ Divide tasks, such as sketching, writing descriptions, or presenting. 2. **Designers**: ○ Identify user needs from the personas and incorporate inclusive design principles into the app prototype. ○ Create sketches or mock-ups of the app screens. 3. **Ethical Problem-Solvers**: ○ Address challenges related to data privacy and inclusivity. ○ Propose ways to make the app accessible for different age groups, genders, and abilities. 4. **Presenters**: ○ Share their app prototype with the class, explaining the design choices, inclusivity features, and privacy considerations. 5. **Reflective Learners**: ○ Participate in the wrap-up discussion to evaluate what worked well and what could be improved. ○ Optionally, document their learning through a blog post or video.
Evaluation/ Assessment	● Creativity in addressing community challenges. ● Inclusivity in the app design and thoughtfulness towards diverse user needs. ● Demonstration of data privacy awareness.
TINKER Framework Integration	

How is the activity authentic learning?	The activity exemplifies authentic learning because it engages students in real-world problem-solving and connects classroom content to practical applications that are meaningful and relevant.
How is gender inclusiveness ensured?	Gender inclusiveness in this activity is ensured through careful planning, facilitation, and design of tasks to create an equitable and respectful environment where all students feel valued. Here's how: Group Formation (Mixed-Gender Groups, Role Rotation), Inclusivity in Learning Materials (Diverse Personas, Gender-Neutral Language), Promoting Equitable Participation (Teacher Facilitation, Encourage Voice), Focus on Inclusivity in App Design (gender-neutral avatars, inclusive language), Representation in Examples (Diverse Role Models), Reflective Practice (how their app design considered the needs of all genders), Feedback and Evaluation (gender-sensitive design and collaboration).
Considerations for level progression	When designing level progression for this learning scenario, it's essential to scaffold the learning to accommodate students' varying levels of prior knowledge, skills, and confidence. Progression should build gradually, with each level introducing more complexity and responsibility.

Learning Scenario 5 - Exploring Computer memory and storage media

Learning Scenario Information	
Title	Exploring Computer memory and storage media
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Computing Systems
Content domain (Integrated Subjects)	Informatics, Technology

Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the difference between primary memory (RAM) a.k.a memory and secondary memory a.k.a storage (HDDs, SSDs, USB, etc.). ● Analyse the basic principles (access time, capacity, volatility) of computer memory operation. ● Identify the different types of storage media and their uses and costs.
Scenario Description	
Setting	You want to teach your students about the main memory (memory) and secondary memory (storage) that underpin the operation of PCs, tablets, and mobile phones. Most students, although they use devices such as PCs, tablets, and mobiles, as well as devices such as USB flash sticks, external drives, and cloud services do not recognise the difference between primary and secondary memory, also known as storage media. To understand the different roles of primary memory from secondary memory, it is preferred to use the terms MEMORY and STORAGE. Through their involvement in authentic activities, you want them to distinguish on the one hand the difference in usage between memory and storage and on the other hand to learn about the speed of access, capacity, use, and cost of the main media storage (HDD, SSD, DVD-blu ray, USB flash sticks/drives, SD cards, cloud storage).
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Pencils, Paper ● Media storage (SSD, HDD, memory SD, USB flash sticks, CD/DVD/Blu-ray) ● Learning Resources, Digital tools for building electronic quizzes or presentations
Activity	**Step 1 (10 minutes): Distinguishing memory from storage - the characteristics: access speed, capacity, volatility** ● Start by giving simple definitions of speed, capacity, and volatility. It may help you to refer to "mechanical analogs" that may be easier to understand: - "Access speed is the time it takes to run 100m to reach the finish" - "Capacity is the amount of water that fits in a glass" - "Volatility is temporary and not permanent, e.g. When we write notes on the whiteboard they do not remain permanent but are lost when we erase them"

	● Divide the student class into two (2) groups with gender inclusion characteristics and name the 1st group: MEMORY and the 2nd group: STORAGE ● 1st Group (MEMORY): Each member of the group will try to **memorise** the birthday and favourite colour of as many members of their group as possible within 1 minute. ● 2nd Group (STORAGE): Each member of the group **will record**, using pencil and paper, the birthday and favourite colours of the group members without a time limit. (Note: practically 2–3 minutes) ● Then invite representatives from each group to share/present the information they collected about their classmates. **Step 2 (7 minutes): Group Reflection and Discussion** ● Discuss as a whole the processes of the teams so that they understand the characteristics of access speed and capacity. Ask them questions like: - Which group is faster? (access speed) - Which group collected more information? (capacity) ● Help them distinguish the difference between MEMORY and STORAGE. Specify that the characteristic of volatility distinguishes MEMORY from STORAGE. Ask questions like: - Which team managed to present all the information? - Which group forgot some student information? - Ask them to formulate their thoughts to conclude that because MEMORY is faster, smaller, and temporary and STORAGE is slower, larger, and permanent, for some processes MEMORY is preferred, and for others STORAGE. This could be done with a word-filling activity on a word or other training tool. **Step 3 (8 minutes) Pairing with memory and storage devices** ● Ask them to complete a table with the characteristics of Access speed, Capacity, and volatility for MEMORY (human memory) and for STORAGE (paper). This could be done through a matching quiz activity. Students can work in smaller groups of 2 people using computers. ● Then present the previous table replacing human memory with RAM and paper with the media storage (USB flash stick, hard disk SSD, cloud, etc.). Alternatively, complete the table with the help of all students through the use of an interactive tool (e.g. wordwall) for filling in the

	gaps of a phrase. **Step 4 (15 minutes): Discovering storage media through simulation** ● First explain to the students how, through the following simulation activity, they will act like a computer that searches for information **first in memory** and **then in storage media** (if necessary). Remind them that (main) memory is faster but smaller than storage media, a conclusion they reached with the previous activity. ● It aims to make students experience how to search for information in memory and storage media. At the same time, you want them to create a list of storage media in terms of their basic characteristics: access speed and capacity, as well as other information related to their usage, cost, etc. ● The activity involves dividing students into inclusive groups (ideally three members) and through micro-missions to discover the storage media. More specifically, each mission consists of two (2) parts: finding and collecting the storage medium (device) and finding and collecting the information tab for the same storage medium. *Note: Both the number of devices and information tabs must be equal to that of groups. If physical media is not available, replace it with photos of them.* ● Prepare the space of the room properly. On a desk located in the centre of the room, we place ***only*** the physical storage media (devices). The desk represents the main memory (RAM) of the computer. At a further point in the room, in the library, we place the information tabs of the storage media. The library represents secondary storage. *Note: If there is no library, create an array of desks in a row.* ● Explain the roles of team members and how they work. All team members will take on the role of the person searching for the device and information tab collaboratively. ▪ The 1st member searches for the device at the desk and when the person finds it, returns with it to the base of the group. ▪ The 2nd member searches for the information tab initially on the desk and if the person does not find it then searches for it in the library. When the person finds it, places it on the desk and returns to the base of the group. ▪ The 3rd member searches for the information tab on the desk and if the person finds it, returns to the base of the group. The micro-mission is completed when there is an information tab next to the device.

	• Assign the same task to all groups (e.g. Micro-mission: USB flash stick). Finding both the device and the information tab requires accessing **first the main memory** (desk) and **then the secondary memory** (library). At the end of the mission, students have collected the device (USB flash stick) and the information tab including clues about the speed of access, the capacity, the most common use of the device, and the cost of it. *Note: you can include additional information about the device in the information tabs such as the technology it uses (magnetism, electricity, light) and how it interfaces.* • Continue by assigning other missions (SSD, HDD, Cloud) not necessarily in the same order to each team. Encourage students to swap roles. At the end of all missions, students have in front of them all modern memory and storage devices with information regarding access speed, capacity, and other information such as its technology, cost, and usual use, etc. • Ask teams to complete a list/table showing in rows the storage media they collected, their images, and their feature values of Access Speed, Capacity, and additional information. *Note: you can provide them a pre-filled table in electronic format pre-filled for e.g. the first row filled with the USB flash stick, an image, and the relative information.* • Invite each group to present the other groups with a storage medium. One group member can be in the centre of the room and hold the storage media for everyone to see, while another member of the group can read the information about the medium/device. In this way, all media will be presented to the class. Through the fun way, students are invited to understand the differences and advantages of each memory and to be informed about the main storage media. **Step 5 (5 minutes): Group Reflection and Discussion** Discuss the results of the activities as a whole. Ask questions like: • What made it difficult for you to do the activities? • What was the most interesting discovery for you? • Is the role of primary memory different from secondary memory or not? Or Why is main memory needed and why storage? • The time it took you to get to the desk and the time to get to the library. What feature does it correspond to?

	• Do you think memory and storage are only related to PCs? Or can you think of similar examples of memory and storage in nature or other areas?
Teachers and students' Roles	**Teacher:** Presents initial examples to students and explains. With questions, he/she guides the conclusions to be drawn in each activity. It facilitates discussion and encourages students to reflect on their learning. **Students:** They actively participate in the activities, assume roles, and are invited to collaborate to come up with the synthesis and presentation of the answers. They assume the role of the processor through the simulation of memory access and storage media but also the presenter of information as a whole.
Evaluation/ Assessment	• Observe students whether and how they work and collaborate on each activity. • Guides students when there is a problem understanding the instructions of the activities. • It assesses whether students finally understand the purpose of each activity and whether they reach the desired conclusions.
TINKER Framework Integration	
How is the activity authentic learning?	The scenario is linked to real processes, such as the use of human memory and written notes but also the use of the main memory of computers. It offers collaboration, reflection, and practical application, creating an environment of authentic learning.
How is gender inclusiveness ensured?	The activity encourages collaboration **in mixed-gender teams**, promotes equal participation, and avoids gendered roles, ensuring all students contribute as both presenters and actuators. The language used is gender-neutral since stereotypes and personal pronouns associated with specific genders are avoided. The activities are implemented in mixed groups, with equal participation of all students at all stages. The project is based on collaboration and does not adopt gender stereotypes, while all students act as presenters and actors.

Considerations for level progression	As far as the first activity is concerned, an example could be presented that has to do with another natural analog, such as the phenomenon of energy storage in plants (photosynthesis effect) or e.g. in sports, the muscular memory of the human nervous system. As for the second activity, at a more advanced level, more detailed memory use could be made, either by introducing the concept of cache or by simulating time-delay and overflow situations.

Learning Scenario 6 - Exploring the Binary System and Digital Representations

Learning Scenario Information	
Title	Exploring the Binary System and Digital Representations
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Mathematics, Technology, Web Designing, Art
Learning Objectives	Upon completing this activity, the students should be able to: ● Convert Boolean numbers to the decimal system and vice versa ● Explain the concept of hexadecimal numbers and their relationship to binary numbers ● Explain the function of the ASCII table to represent characters in binary digits ● Analyse how the binary system and hexadecimal system are used for the colour palette in digital images ● Explain how the computer “language” is used to represent text, images, and sound in digital systems

Scenario Description	
Setting	You are asked to teach students how the binary system is used to represent characters and colours on computers and digital devices. Students find dealing with the binary system unnecessary, boring, and difficult, and they react negatively to dealing with it. To engage your students, try to involve them in activities that approach authentic problems, faced by software developers and application designers, within a collaborative and inclusive learning environment.
(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Pencils, Paper ● Learning Resources, Digital tools for programming and design
Activity	**Step 1 (10 minutes): Introduction to the binary system and conversions** ● Explain to the students the 2 states (0 1) that describe the binary system as opposed to the decimal system of ten states (0-9) ● Illustrate converting a decimal number to binary with some simple examples. Choose examples of 1, 2, 3, and 4 bits. e.g. (1 -> 1, 3 -> 11, 6 -> 110, 14 -> 1110) Note: Focus on the presentation of the numbers and not on how to convert them. ● For each example, confirm by converting the binary number to decimal. Note: Explain to the students that a smaller bit number is included in the number of more bits, e.g. 3 -> 11 can also be represented as **00**11 **(with 2** bits added on the left) ● Create groups of two people (preferred mixed-gender). Each team member will write on a piece of paper a decimal (from 1-15) and a 4-bit binary number and exchange it for conversions to be done by the other team member. Then the papers are returned, and each member must confirm the correctness of the conversions. ● Demonstrate with the use of a programming tool (e.g. python shell) how numbers 1,3,6,14 are converted to binary and vice versa. **Step 2 (10 minutes): Convert using a programming language** ● With the help of a programming environment (e.g. python shell), the teams convert specific examples from binary to decimal (use of **bin** function) and vice versa (use of **0b** prefix), giving students a real

	experience of using programming tools. The examples provided should be the same as in the previous step. ● They are also called with python shell and appropriate functions to convert from decimal to hexadecimal system (use of **hex** function) and vice versa (use of **0x prefix**) and from decimal to octal (use of **oct function)** and vice versa (use of **0o** prefix). ● There is a discussion about the need for other numerical systems -besides binary-such as octal and hexadecimal, and what is served. The debate should lead to the need to use systems that are easier for humans to read than the binary system. **Step 3 (10 minutes): Character representation** ● Then the groups of students are asked to construct a table that will present in columns (3) the numbers (65 to 90) in the systems decimal, binary, and hexadecimal. Each member will undertake the conversion of half the numbers. ● In the next step, they will create a new column with the capital letters of the Latin alphabet (A-Z). They have made their own ASCII table (actually the part of the ASCII table that deals with the capital letters of the Latin alphabet). ● Each group writes down on paper <u>its phrase</u> with the Latin letters e.g. group 1: TAP THE DOG, group 2: FEED THE CAT, and using the ASCII table converts the phrase to either hexadecimal or binary <u>(not decimal</u>). On which system is the new message shortest? ● Teams exchange their messages and decode the messages. Teams should be led to conclude that hexadecimal is more convenient and faster than binary. **Step 4 (10 minutes): Colour representation** ● Explain to the students in simple words the RGB colour model (Red, Green, Blue) and how each colour is obtained by combining the three colours. Explain how the shades for each colour are 256 and ask them to convert to binary. Lead them to conclude that it takes 8 bits to describe the shades of each base colour. ● Present them with an e.g. RGB (254, 100, 218): 1111 1110 0110 0100 1101 1010. Discuss how it is difficult to read in binary and ask them to convert it to hexadecimal: fe64da ● With the help of a colour picker (e.g. Google Colour Picker), students experiment with the representation of colours in the decimal system.

	From the colour palette, they choose the colour that everyone wants and find out what its hexadecimal value is. ● Then they are invited as a group to visit a simple website (e.g. google.gr or Yahoo.gr or one provided to them) and with the help of the browser's developer tools, to change the colours of words/phrases (colour) or areas (background colour). **Step 5 (5 minutes): Group Reflection and Discussion** Discuss the results of the activities as a whole. Ask questions like: ● What did you notice in converting decimal to binary numbers? ● How is a character represented in the ASCII table? ● How did colours change when you changed hexadecimal values in RGB? ● Where else can hexadecimal representation be used (RAM, MAC ADDRESSES, IP-V6)? ● What was the most interesting discovery for you?
Teachers and students' Roles	**Teacher:** Presents initial examples of all genders to students and explains. With questions, he/she guides the conclusions to be drawn in each activity. It facilitates discussion and encourages students to reflect on their learning. **Students:** Actively participate in activities, assume their responsibilities within the group to solve problems, and exchange ideas about binary representations. They assume the role of programmer and designer through the use of real programming and application design tools.
Evaluation/ Assessment	● Assess whether and how students work and collaborate on each activity. ● Assess whether programming tools make it difficult for students. ● Assess whether students finally understand the purpose of each activity. ● Self-assessment: Students evaluate the accuracy of their conversions and discuss any mistakes they made, learning from them. They also evaluate whether they managed to make proper use of programming and design tools.
TINKER Framework Integration	
How is the activity authentic learning?	The scenario is linked to real problems, such as the use of the binary system in the technologies that students use every day (e.g., computers, digital colours, ASCII codes). It offers collaboration, reflection, and practical application, creating an environment of authentic learning.

How is gender inclusiveness ensured?	The activity is implemented in mixed groups, with equal participation of all students at all stages. The project is based on collaboration and does not adopt gender stereotypes, while all students act like programmers and designers (web).
Considerations for level progression	Activities with more difficult conversions can be escalated. The conversion of a phrase to ASCII can be requested to be done with a programming tool.

Learning Scenario 7 - Making a short film

Learning Scenario Information	
Title	Making a short film
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Design and Development
Content domain (Integrated Subjects)	Informatics, Technology, Multimedia
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify and describe the role of at least three key technologies commonly used in film production. ● Demonstrate the ability to use basic video editing software to trim clips, add transitions, and adjust audio levels. ● Plan and produce a short film, including storyboarding, filming, and basic editing. ● Evaluate the effectiveness of different film techniques (e.g., camera angles, lighting, sound) in conveying a specific mood or message.

Scenario Description	
Setting	Making a short film: Is it an ordeal or a piece of cake? You want students to become familiar with efficient multimedia tools to make a short film. Students will understand the film-making process, undertaking the roles of director, sound engineer, and cameraman. In a gender-inclusive approach, students will realise the imprint of multimedia on their daily lives.
(Digital) Tools	● Computer/Laptop ● Projector ● Camera, microphone ● Video and voice processing platforms (such as Filmora, Clipchamp, Shotcut, Openshot)
Activity	**Step 1 (10 minutes): Introduction** The students watch a specific video (such as the one provided) that unveils concepts such as sound, video, subtitles, overture, and others. They then initiate a fruitful discussion about the video's information (https://www.youtube.com/watch?v=G2MeN8UFlR0). The discussion revolves around how a potent software, such as Filmora implements: - montage - video lighting - titles and subtitles adding - music background - transition effects **Step 2 (10 minutes): Know the components of a film** The teacher resorts to a specific short movie (such as the one provided) to explain the basic components of a movie, such as montage, sound-mixing, and adding subtitles. (https://www.youtube.com/watch?v=_qYgUEDKaNA). A constructive discussion on the video's information is conducted. The discussion is centred on how the processes mentioned above (montage, sound-mixing, and adding subtitles) are implemented in the respective short movie. **Step 3 (25 minutes): Make a short film** The teacher and the students make a short film about bullying based on the following scenario:

	School bullying incident Narrator: In the schoolyard, Maria sits alone on a bench reading a book. Some students approach her mockingly, while the crowd is the eye of the beholder. ____ Student 1: (mocking) Oh, look at Maria! Sitting alone again, brushing us aside as usual. Student 2: (laughing) Don't be mean, Anna! Maybe she's taking notes. Student 3: Are you the next big author, Maria? Maria: (avoiding eye contact) Leave me alone! Student 3: (sarcastically speaking) Of course! We're just trying to help you open up. Can't you see how kind we are? Student 2: (continuing) Maybe you'd like some company. Wouldn't it be an honour to hang out with us? Maria: (quietly) I don't want anything from you. Student 1: (pretending to be shocked) I'm so sorry! I didn't realise you were so independent! Student 2: (smirking) Maybe you've got some "secret mission" for the yard. ____ Narrator: Have you experienced something similar? How would you create a good school environment for Maria and other students? The teacher assigns roles to groups: GROUP ROLES Group A: Shooting process Group B: Generating scenes from the camera's material Group C: Editing scenes Group D: Putting the finishing touches (adding titles and subtitles), and integrating the final output into one movie project. The teacher and the students watch the final short film (after the editing and embellishment process).

Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator, guiding students to reach vital conclusions. In parallel, the educator acts as an "animator", fostering student engagement. **Students:** The students work in groups and adopt the roles respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	● The student's assignment completion extent reveals the degree to which the students have taken in the rudimentary knowledge. ● The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. ● The student's behavioural engagement is assessed through the student's overall participation in the learning process. ● The student's collaborative skills are assessed through the collaborative approach efficiency.
TINKER Framework Integration	
How is the activity authentic learning?	Movies, advertisements, and video clips are topics of high interest to students. The "short movie making" is a representative example. Therefore, even the title of the scenario is inspired by a topic that is familiar to all students. In parallel, the short movie's production that constitutes the core of the learning process is drawn from a common school incident. In this sense, the scenario has a strong real-world affinity, governed by authentic learning principles. Moreover, the short movie's production will follow the typical process used in real-world cases, proving the scenario's authentic learning potential.
How is gender inclusiveness ensured?	1. All students equally participate in the learning process. 2. Discussion is based on daily life experiences that all students are familiar with. 3. Learning resources are drawn from topics that interest all students.
Considerations for level progression	The learning scenario could incorporate design and development principles, drawn from other didactic units, to help students achieve their goals. In parallel, students below the age of 14 may need more time to assimilate concepts compared to students at the age of 14. In this sense, when this scenario is implemented in a class with students below the age of 14, the teacher should

	devote extra time to clarify concepts, emphasising various terms. Moreover, extra help might be provided to the groups to perform the tasks assigned.

Learning Scenario 8 - Modules-The cornerstone of Programming

Learning Scenario Information	
Title	Modules-The cornerstone of Programming
Age Level	12–14 years old
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Mathematics, Technology, Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand modular programming ● Divide a computer problem into Modules
Scenario Description	
Setting	You observe that some students are discussing their favourite coffee in the schoolyard. You realise that this is a golden opportunity to teach modules to students, through examples drawn from real-life experiences. Didactic paradigms will interest students of all genders.

(Digital) Tools	● Computer/Laptop ● Projector/ Whiteboard ● Pencils, Paper ● Learning Resources, Presentation, Digital tools for educational programming
Activity	**Step 1 (10 minutes): Introduction to Modules** Through daily-life routines, such as the coffee-making process, students realise the application of modules in their lives. In terms of a fruitful discussion, the teacher explains that modules constitute the key ingredient to modular programming. **Step 2 (10 minutes): Demonstrating Modules** To accentuate the need for modules, the teacher is demonstrating two programs, one without modules, and another with modules. Pythagorean theorem, geometrical concepts, and other mathematical calculations can be used to constitute the basis of the alternative programs. As an example, the calculation of the circle surface area could be implemented with and without modules. The educator points out the differences and the execution potential in all cases. **Step 3 (10 minutes): Modules in computer problems** Students are watching a presentation regarding the top-down approach, and the analysis of a large-scale problem, breaking it down into sub-problems, using modules. Real-life examples such as the water cycle, air pollution, immigration, climatic change, and other similar paradigms can be used to make students understand the application of the top-down approach to computer problems. **Step 4 (15 minutes): Performing my analysis** Students are divided into groups (preferred mixed-gender). A specific large-scale problem is assigned to each group. For instance, employees on the roll could be a representative example. Students should analyse the problem and divide it into modules. The educator initiates a discussion on each group’s analysis. In parallel, in terms of peer-to-peer review, one group evaluates the work of other groups.

Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator, guiding students to reach vital conclusions. In parallel, the educator initiates discussions and acts as an "animator", fostering student engagement. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities. They also work in groups.
Evaluation/ Assessment	● The student's analysis extent reveals the degree to which the students have taken in the rudimentary knowledge. ● The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. ● The student's behavioural engagement is assessed through the student's overall participation in the learning process. ● The student's collaborative skills are assessed through the collaborative approach efficiency.
TINKER Framework Integration	
How is the activity authentic learning?	Modules are based on real-life experiences. The "coffee-making process" is a representative example. Discussion is also facilitated through daily life paradigms. Also, each group evaluates the work of other groups in terms of peer-to-peer review.
How is gender inclusiveness ensured?	1. All students equally participate in the learning process. 2. Discussion is based on daily life experiences that all students are familiarised with. 3. Learning resources are drawn from topics that interest all students. 4. Students work in groups (preferred mixed-gender).
Considerations for level progression	The learning scenario could incorporate programming principles, drawn from other didactic units, to help students execute modules. In case students have former knowledge of programming (although it is not needed), more complex problems can be used to introduce modules. For advanced programming users, integrated and complex programs such as the entire payroll system, the logistics process of a company, and vendors' selection systems could be divided into modules. For less advanced programming users, more simple problems could be used drawn from simple mathematical concepts such as addition, fractions, and simple calculations.

Learning Scenario 9 - Online Art Exhibition

Learning Scenario Information	
Title	Online Art Exhibition
Age Level	11-14 years old
Duration	45 minutes
Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Informatics, Art, Design & Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Design and organise a class online exhibition ● Create digital content using a variety of digital tools ● Utilise online platforms to display and disseminate artwork ● Collaborate to achieve a shared goal
Scenario Description	
Setting	It's nearing the end of the school year, and it's the perfect time for students to present the artwork they made throughout the year. You want to facilitate an activity in which your students self-organise, dividing tasks and working collaboratively towards a common goal. You would also like them to explore digital tools for displaying cultural content such as digital city guides, cultural heritage, and online exhibitions. The aim is to provide an authentic opportunity for students to explore these topics in a way that is creative and meaningful to them.

(Digital) Tools	● Computers ● Camera ● Printer ● Students' artworks ● Optional: A device with audio recording capabilities Digital Tools: ● You will use 'Artsteps' (or another platform of your choosing) for the creation of the online exhibition. In preparation, it will be helpful to make a free account and familiarise yourself with the basic functions. https://www.artsteps.com/ ● Students will experiment with a variety of tools (e.g. word processor, Canva (https://www.canva.com/), online QR code generator)
Activity	In this activity, the students will collectively organise an online art exhibition to showcase the art they produced throughout the year. The teacher will provide initial guidance and instruction and will act as an 'advisor' for the rest of the process, providing support, posing questions, and solving queries. **Preparation:** ● Inform your students about the activity in advance and ask them to bring in artwork they have created throughout the year. ● Provide a list of online cultural resources for students to explore at home before the lesson, for example: ○ Artit: An online platform showcasing emerging artists (https://artit.net/exhibitions) ○ Mapping Ancient Athens: An interactive map of archaeological excavations in Athens (https://map.mappingancientathens.org/) ○ Google Arts & Culture: An extensive resource showcasing global arts and culture from museums and galleries, with games, AI, and AR tools. (https://artsandculture.google.com/) ○ Queer Zine Library: a DIY collective and volunteer-run mobile library presenting LGBTQIA+ zines and online exhibitions. (https://www.queerzinelibrary.com/miab) **Step 1 Introduction (5 minutes):** ● Introduce the concept of digital presentations of arts and cultural heritage. Invite students to share their experiences with online exhibitions or digital cultural resources.

	● Initiate a brief class discussion about the use of technology and new digital tools in cultural settings, using prompts such as: ○ *Would you rather view something digitally or in person? Why?* ○ *Do digital tools give us the freedom to be more creative?* ○ *What about accessibility and inclusivity?* ○ *Are tools like Google Arts & Culture effective for learning?* ○ *Do online platforms make it easier to access diverse cultural content?* **Step 2 Self-Organisation (10 minutes):** ● Give a brief walk-through of Artsteps, showing how to create a virtual exhibition space and upload content. ● Brainstorm the different elements students would like to include in their online exhibition and create a list of teams or roles the students will take on. Encourage them to think creatively about how they would like their exhibition to look. ● Some suggestions for teams are: ○ Space-Makers: create the virtual exhibition space in Artsteps and 'hang' the artworks in the space. ○ Artwork Selectors & Photographers: select and photograph the artworks to be displayed and upload them to the platform. ○ On-The-Spot Artmakers: the class may decide to include photographs or 'instant' artworks made in the classroom on the spot. ○ Writers: write short texts to accompany the exhibition or specific artworks. This could recall themes they covered in class or have a freer format, recording quotes from students during the activity or composing mini-stories or poems. ○ Communicators: create a newsletter for parents, or a digital poster with a QR code leading to the platform to be printed and displayed in the school. ○ Audio-Makers: record an audio accompaniment that can be embedded as background audio or as a step-by-step guided tour. This could range from a traditional 'guided tour' with explanations and reflections, to any other audio accompaniment. ○ Coordinators: coordinate activities between different teams, gather the files to be uploaded, and keep time. ● **Keep it creative, flexible, and realistic.** You aim to support your class to get the most out of the **process of self-organisation, collaboration, creation,**

	and experimentation, rather than a perfect result. Trial and error using new digital tools, researching how to do specific tasks independently (suggest asking Google or ChatGPT for help), and working without step-by-step instructions or a complete vision of the result are all welcome in this process. **Step 3 Exhibition-Making (25 minutes):** ● The students work in their teams (preferred mixed genders) on the tasks delegated in Step 2. They communicate and coordinate their activities, so the different elements are prepared in time to be uploaded onto the platform. ● Different tasks will involve experimentation with different digital tools such as Artsteps, word processors, Canva, cameras, and audio recorders. ● Your role in Step 3 is to facilitate a collaborative environment and to act as an 'advisor' in the creative process. Circulate among teams to provide support, resolve technical issues, and ask thought-provoking questions that draw the students' attention to some of the details in this process: ○ *Have you thought about the lighting and shadows when you're taking photos of the artworks?* ○ *How does the order of the displayed artworks change the story or meaning behind them?* ○ *How can design choices (e.g. font, layout, colours) change the message and tone of your poster?* **Step 4 Collective Review and Discussion (5 minutes):** Facilitate a class discussion for the class to share their experiences doing the activity: ● *What was the best part of the process? What was the most challenging?* ● *How did working in teams with different roles affect the outcome?* ● *What new skills did you develop or practice?* ● *How do digital platforms change the way art is experienced and shared?*
Teachers and students' Roles	**Teachers**: Facilitate inclusive class discussions, encourage collective working, and provide advice and technical support **Students**: Collectively design and develop the class exhibition, working collaboratively and experimenting with digital tools and creative presentations
Evaluation/ Assessment	Students are assessed on their active participation and teamwork during the activity, their creative contribution to the exhibition, the insights shared in class discussions and the development of collaborative skills.

TINKER Framework Integration	
How is the activity authentic learning?	This is an authentic task, offering students the chance to use their knowledge and skills to create an exhibition that can be shared with parents and the school community. They are introduced to existing online cultural resources, adopt various roles, and work towards the exhibition from different angles, reflecting how exhibitions are organised in the 'real world'. The students are challenged to self-organise and collaborate, working towards a common goal and reflecting on the process at the end of the activity.
How is gender inclusiveness ensured?	The activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles. The teacher provides diverse resources as an introduction to the topic, and the class reflects on whether online platforms promote diversity in cultural spaces.
Considerations for level progression	For more experienced students, provide less hands-on support and allow them to experiment independently. Ask reflective questions and go into more depth in the final reflection on the process and outcomes of the activity. A follow-up discussion about career options and professional tools for art and design would be suitable for older students. For younger or less experienced students, keep the activity simple. Display a smaller number of works, and limit the additional elements included (e.g. no text or poster, just an audio accompaniment).

Learning Scenario 10 - Our Digital Footprint

Learning Scenario Information	
Title	Our Digital Footprint
Age Level	12–14 years old
Duration	25 minutes
Informatics topic areas	Privacy, Safety, Security

Content domain (Integrated Subjects)	Informatics, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Describe the concept of digital footprint ● Identify and explain the potential risks associated with their online presence ● Evaluate the potential impact of their digital footprint on their lives ● Revise the privacy and security settings on their social media accounts
Scenario Description	
Setting	You notice some of your students posting photos and videos from their personal lives to their social media accounts. You want your students to realise the significance of their digital footprint on the Internet and its impact on privacy, safety, and security. You aim to use practical and inclusive examples to empower the students over the risks related to their online presence.
(Digital) Tools	- Computers/Laptops/Phones - Internet Access/Wi-Fi - Post-it notes/Paper - Pens/Pencils
Activity	**Introduction (5 minutes)** ○ Ask the students if they have heard about the term "digital footprint". Ask them what they think digital footprint means. ○ Define the term: ▪ *Digital footprint refers to the information and data people generate, through purposive action or passive recording, when they go online*. (Buchanan et al., 2018) ▪ Simply put, everything we do online leaves a trace that others can see. ○ Explain why it matters: The ways that whatever we post can affect our safety and future opportunities. (Vervier et al., 2017) **Discussion Starter (5 minutes)** ○ Share relatable examples: ▪ Ask the students to imagine if someone finds an embarrassing post years later. How would that feel? ▪ Ask the students how they can decide what to post online.

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Short Activity 1 (5 minutes)

This short activity can be performed either individually or in mixed-gender groups.
Provide each student/group with a post-it note or a simple piece of paper.
Ask them to write or draw things they have recently shared online (e.g. photos, comments, likes, etc.)
Highlight how these shape their digital footprint.
Discuss how they can reduce risky traces (e.g. by not sharing personal details)

Short Activity 2 (10 minutes)

Ask students to take out their phones or use a school device.
If for any reason this is not possible or some students do not have a phone device with them, connect with your computer or phone to one social media account that you have.
Guide the students to the account’s settings
Check privacy settings:

Who can see the posts?
Are location tags turned off?

Check security

Review passwords (are they strong?)
Enable two-factor authentication if available

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<tr><td>Teachers
and students’ Roles</td><td>
Teachers

Introduce the concept of the digital footprint
Facilitate discussions
Supervise and provide support for the activities
Encourage questions and provide clarifications when needed
Ensure inclusivity, making every student feel comfortable participating

Students

Participate actively in the discussions
Follow teachers’ instructions to check privacy and security settings on their social media accounts

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Evaluation/ Assessment	- Observe if students engage in the discussions and respond to the questions. - Note if they show interest and share personal insights when discussing the implications of a digital footprint. - Collect and review the post-it notes/papers and check if the students correctly identify items that contribute to their digital footprint.
TINKER Framework Integration	
How is the activity authentic learning?	This scenario lies in real-world applications by focusing on the students' digital safety and privacy. It aligns with the principle of Reflection, as this is described in the TINKER Framework. Students have the chance to think about and discuss their choices related to their social media presence and their future implications.
How is gender inclusiveness ensured?	This scenario promotes equality and gender inclusivity as it does not discriminate against the content that is uploaded online. It also encourages the teaming up of students in mixed-gender groups. It advocates for the active involvement of all students in the classroom, regardless of their gender.
Considerations for level progression	For students at a more beginner's level, one may: - Simplify the language used - Group students with their peers during the activities - Use visual aids (e.g. screenshots) For students with more advanced digital skills, the scenario may take the following adjustments: - Introduce more advanced concepts e.g. active vs passive footprint, data collection methods used by companies - Discuss other real-life implications, e.g. the way our digital footprint may influence college applications or work opportunities. - Expand activities, e.g. ask students not just to identify what they post, but what others post about them (comments, tagged photos) or check other third-party app permissions and revoke any unnecessary access.

Ireland

Ireland

Learning Scenario 1 - Building Solutions with Code

Learning Scenario Information	
Title	Building Solutions with Code
Age Level	12-14 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Mathematics, Coding (Short Course), Digital Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Design simple algorithms to solve everyday problems. ● Apply coding structures (loops, conditionals) in a small project. ● Collaborate with peers to create solutions using computational thinking.
Scenario Description	
Setting	Imagine your classroom as a tech start-up. You are leading a group of young software engineers (your students), and the challenge of the day is to help a local charity organise their food donations more efficiently. They need a digital system to sort items based on categories such as perishables, non-perishables, and expiration dates. Your job is to guide the students through the process of creating this simple system using programming concepts they've learned. You need to inspire your students to think of themselves as problem solvers. Start by discussing the real-world relevance of their task—helping a charity that ensures food reaches the right people on time. Guide them to brainstorm how coding can help automate this process. Then, lead them through the steps of designing a basic algorithm that sorts food donations.

(Digital) Tools	● Computer/Laptop or tablets ● Coding platforms (e.g., Scratch or Python-based environments like Trinket). ● Whiteboard for brainstorming. ● Markers for drawing flowcharts. ● Optional: Robots or programmable devices for hands-on activities (e.g., Lego WeDo https://education.lego.com/en-us/).
Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction to Algorithms and Programming Using a Real-Life Example** ● Explain to the students what an algorithm is and inform them about Ada Lovelace (Video provided) ● Start a group discussion on how they would sort food donations without computers. ● Use this discussion to introduce problem-solving and logical thinking. ● Encourage students to create flowcharts of steps on the whiteboard showing their ideas for sorting food items. ● Explain that just like following the steps on whiteboard, solving any real-life problem requires a clear sequence of instructions (an algorithm). ● Ask students to explain the processes step by step. Walk the students through the steps on the whiteboard, focusing on specific commands and clear directions for each step. ● Open the discussion how these directions are like programming a robot to follow our commands. **Step 2 Plugged Activity (25 minutes): Active Coding** ● Split students into small teams and assign them to create a simple program that automates the sorting process. ● Introduce the terms *loops* and *if statements.* Students should use **if statements** for separating different food categories and **loops** for repeated actions like checking multiple food items. ○ **Loops**: Explain that loops are used when a set of steps needs to be repeated (e.g., "checking multiple food items"). ○ **If Statements**: Discuss how if statements help the algorithm make decisions based on specific conditions (e.g., "to separate foods from different categories"). ● Using **Scratch** or **Python**, they will: ○ Write a program that asks for input (the type of food and expiration date) and sort it accordingly.

	• If your school has robots, you could ask the students to use their code to program the robots to physically sort objects based on their type.
	
	Step 3 (10 minutes): Group Reflection and Discussion
	• Bring the class together to reflect on the activity. Ask each group to share and compare their algorithms and their code and describe the challenges they faced. Encourage them to talk about how they used loops or if statements to improve the efficiency of their software program.
	• **Prompts for Discussion:**
	  ○ *"What steps in your algorithm and code worked best?"*
	  ○ *"How did you use loops to repeat actions, and did it make your algorithm and code more efficient?"*
	  ○ *"Did you use if statements to handle separation of types of food? Did they work as expected?"*
	  ○ *"How did you improve or debug your code and algorithm when the output was different than the expected?"*

Teachers and students' Roles	**Teachers**: Facilitate the discussion on real-world problem-solving. Guide students through the algorithm design process and assist them in understanding loops, if statements and other conditionals. Supervise the hands-on programming activities. Offer support during these coding activities, ensuring students understand key programming concepts. While working, pose additional reflective questions to reveal their thinking and push them to progress, finding their solutions when challenges arise. Encourage students to reflect on errors and adjustments. **Students**: Work collaboratively to brainstorm sorting methods while acting as programmers. As programmers, they will develop their algorithms as their solution for the problem and test these by writing code which implements their algorithm. Students are writing code to solve a real-life problem in this programming activity. They will present their final solutions to the class, explaining the logic behind their code.

Evaluation/ Assessment	● Observation: Monitor how students participate in group discussions and how well they work together to solve the problem. Evaluate each group's ability to design a clear and functional algorithm. Assess their use of loops and if statements. ● Code Review: Assess the functionality of each group's code and their understanding of loops, conditionals, and problem-solving. Observe each student's participation during the programming activity, paying attention to how they create and refine their code. ● Presentation: Students will explain their sorting program and demonstrate its use. Teachers will evaluate clarity and logic.
TINKER Framework Integration	
How is the activity authentic learning?	This scenario connects directly to the real-world issue of helping a charity manage donations. It reflects key principles of authentic learning, such as collaboration (students work in teams), real-world relevance (connecting coding to charitable work), and problem-solving (using algorithms to automate a sorting process).
How is gender inclusiveness ensured?	The activity promotes a gender-inclusive environment by ensuring that roles and tasks are shared equally among all students. Teacher also makes a reference to Ada Lovelace, and should avoid gendered stereotypes, such as assigning boys to tech-related tasks and girls to planning or organising roles. This activity should emphasise that coding and problem-solving are for everyone, regardless of gender.
Considerations for level progression	For younger or less experienced students (beginner level) who are new to coding, start by introducing basic programming concepts such as inputs, outputs, and simple conditionals in a drag-and-drop platform like Scratch. Use step-by-step instructions and guided practice. For older or more experienced students (advanced level), introduce more complex algorithms (e.g., using nested loops or data structures like lists). Challenge them to write more efficient code or explore alternative programming languages like Python.

Learning Scenario 2 - Creating Smart Traffic Lights: Exploring Algorithms and Control Systems

Learning Scenario Information	
Title	Creating Smart Traffic Lights: Exploring Algorithms and Control Systems
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Mathematics, Science, Technology, Engineering (STEM)
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify the basic programming concepts such as algorithms, loops, and conditionals. ● Apply these concepts to simulate a smart traffic light system, controlling its behaviour based on real-world conditions. ● Analyse how loops and conditionals can optimise the efficiency of control systems, such as traffic lights. ● Create a simple code to control traffic lights using an algorithm that can be scaled to larger, real-world scenarios.
Scenario Description	
Setting	Imagine you're introducing your students to the world of **smart cities** and automated systems. The topic for today is designing a basic algorithm for **smart traffic lights**. In many cities, traffic congestion is a problem. With the right algorithm, traffic lights can be programmed to reduce waiting time at intersections by using sensor data (e.g., detecting when cars arrive or leave). You will guide your students to create a basic algorithm using loops and conditionals to control traffic lights. The challenge is to ensure that traffic flows smoothly through an intersection. Students will use their abstract thinking to apply programming concepts and understand how they influence real-world systems.

(Digital) Tools	● Computer/Laptop or tablets
	● Coding platforms:
	    ○ Scratch for beginners
	    ○ Python for advanced students.
	● **Traffic light model** (physical or virtual) to visualise how traffic light cycles work.
	● Whiteboard for explaining traffic flow and control system logic.

Activity	**Step 1 - Unplugged Activity (15 minutes): Introduction to Control Systems and Algorithms**
	● Begin with a short discussion about real-world examples of control systems, such as traffic lights, elevators, or thermostats.
	● Explain how algorithms control these systems by making decisions (conditionals) and repeating tasks (loops).
	● Videos from LearnFree Youtube channel (https://www.youtube.com/@GCFLearnFree) can be used to introduce students to these basic concepts in an engaging way:
	    ○ for Algorithms; https://www.youtube.com/watch?v=kM9ASKAni_s
	    ○ for Sequences, Selections, and Loops; https://www.youtube.com/watch?v=eSYeHlwDCNA
	● Ask students:
	    ○ “How do traffic lights decide when to change from green to red?
	    ○ “How could they be smarter?”
	    ○ To help students understand how traffic lights are programmed to ensure safety at intersections, the short video below can be used. The video provides an overview of the complexities involved in programming traffic lights to manage traffic flow effectively. By watching this video, students can gain insights into the real-world application of algorithms in controlling traffic systems, which aligns with the scenario of designing safe intersections. https://www.youtube.com/watch?v=DP62ogEZgkI How Do Traffic Signals Work?
	● This introduces the idea of using sensors and conditionals in smart systems.
	
	Step 2 - Unplugged Activity (10 minutes): Planning
	● Ask students to work in pairs.
	● Ask them to design a simple traffic light control system on paper.
	● **Scenario:** Imagine a busy intersection with two directions of traffic (north-south and east-west). The traffic light needs to stay green long enough for

	cars to pass but switch when no cars are detected. Students should sketch the logic of the system: ◦ If no cars are detected in one direction, switch the light to green for the other direction. ◦ If cars are detected, keep the light green for a certain number of seconds. ● This encourages abstract thinking about how systems decide what actions to take. **Step 3 - Plugged Activity (20 minutes): Coding** ● Guide students in translating their unplugged plan into a basic code using Scratch or Python. ◦ Code a simple traffic light cycle using **loops** (e.g., repeat a sequence: green, yellow, red). ◦ Introduce a **conditional statement** to change the light based on car detection (e.g., a simulated sensor detects cars). ◦ Add a **variable** to simulate waiting time for traffic. The light remains green for a longer time if more cars are detected. ● Encourage students to test and adjust their system to ensure it functions smoothly. This step requires debugging and refinement, helping students think about optimisation.
Teachers and students' Roles	**Teachers**: Guide students in thinking about how traffic control works and how algorithms can automate decision-making. Facilitate understanding of loops and conditionals through real-life examples. Provide support during coding by suggesting ways to optimise their traffic light system. **Students**: Work collaboratively to design a control system using algorithms. Translate their design into code, testing and refining as needed. Engage in discussions about how to make their code more efficient or realistic.

Evaluation/ Assessment	• Observation: Monitor how students approach the problem of traffic control and apply loops and conditionals to solve it. • Code Review: Review students' code to ensure they correctly used loops and conditionals. Evaluate the flow of their logic in controlling the traffic lights. • Reflection: Have students write a short reflection on how control systems like traffic lights use algorithms and why it's important to optimise such systems in real life.
TINKER Framework Integration	
How is the activity authentic learning?	This learning scenario connects programming with a real-world problem: traffic control. Students can directly apply their knowledge of loops and conditionals to design a solution that is both relevant and applicable. They engage in **problem-solving, critical thinking, and abstract reasoning**, essential skills in both informatics and everyday life. The scenario also emphasises system optimisation, mirroring the challenges engineers face in designing efficient and responsive systems in smart cities.
How is gender inclusiveness ensured?	This scenario is designed to be inclusive by focusing on a universal, relatable problem (traffic control) that appeals to a broad audience. It encourages all students to take on the role of problem solvers, with no assumptions about prior knowledge or skill based on gender. The collaborative nature of the activity ensures that students of different backgrounds and skill levels can contribute equally.
Considerations for level progression	For younger or less experienced students (beginner level) who are new to coding, focus on a basic traffic light cycle with simple loops. Use Scratch or another block-based coding platform to make the concepts easy to grasp. For older or more experienced students (advanced level), challenge students to simulate more complex control systems with nested loops, multiple conditionals, or even integrate additional sensors (e.g., pedestrian crossings). They could also experiment with using Python to handle more sophisticated simulations.

Learning Scenario 3 - Daily Routines as Algorithms

Learning Scenario Information	
Title	Daily Routines as Algorithms
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Mathematics, Home Economics, English (sequential writing), Physical Education (sequences in movement)
Learning Objectives	Upon completing this activity, the students should be able to: ● Define an algorithm and explain its purpose in both digital and real-world contexts. ● Decompose a complex task into clear, sequential steps as a simple algorithm. ● Test an algorithm by following steps to determine if it works correctly. ● Evaluate the efficiency and clarity of different algorithms for similar tasks.
Scenario Description	
Setting	Imagine you're teaching a class about the fundamentals of **algorithms** and **how they are applied to solve everyday problems**. Instead of using code initially, you'll relate algorithms to students' daily routines to make the concept approachable and concrete. You'll help students create step-by-step algorithms for simple activities, like making a sandwich or getting ready for school, demonstrating that algorithms are instructions we use every day, not just in computers. Guide students through breaking down a common activity into clear steps to understand how algorithms work and why accuracy and clarity are important in creating successful instructions. You can get help from the examples in the (Digital) Tools section below to understand this setting better and while getting the students ready.
(Digital) Tools	● Index cards or paper for writing algorithm steps. ● Whiteboard for discussing steps and sharing examples. ● Optional: Laptops or tablets if students want to type and rearrange steps in a text editor.

	● Here is a sample to how the index cards can be structured and used for writing algorithm steps:
	1. **Title Card (Activity Name)**
	  ● Purpose: Introduces the activity the algorithm is for.
	  ● Example: "Making a Sandwich"
	2. **Input/Starting Conditions**
	  ● Purpose: Describes what materials or conditions are needed to start the process.
	  ● Example: "Bread, Peanut Butter, Jelly, Knife, Plate"
	3. **Step-by-Step Instructions**
	  ● Purpose: Break down the activity into individual steps.
	  ● Each step gets its own card with the following structure:
	    ○ Action: What to do
	    ○ Details: Any specific details needed for accuracy.
	    ○ Example: "Spread peanut butter on one slice of bread" Details: Use a generous amount and spread evenly.
	4. **Decision Points**
	  ● Purpose: Include cards for decisions that might change the course of the activity.
	  ● Example: "Do you want to cut the sandwich in half?"
	    ○ Yes: Proceed to cutting instructions.
	    ○ No: Skip the cutting instructions.
	5. **Output/End Result**
	  ● Purpose: Describes the outcome or end result of the activity.
	  ● Example: "Sandwich is ready to eat"
	6. **Exceptions/Edge Cases**
	  ● Purpose: Account for potential issues or alternative conditions that might arise.
	  ● Example: "What if there's no peanut butter?"
	    ○ Solution: Use butter or skip that step.
	7. **Conclusion/Finish**
	  ● Purpose: Marks the end of the activity and any clean-up or post-activity steps.
	  ● Example: "Clean knife and plate"
	● Here is an example for "Getting Ready for School" task:
	  1. **Title Card**: "Getting Ready for School"
	  2. **Input/Starting Conditions**: "Clothes, backpack, shoes, lunchbox"
	  3. **Step-by-Step Instructions**:
	    ○ **Step 1**: "Wake up at 7:00 AM"

	○ **Step 2**: "Brush your teeth" *Details: Use toothpaste and brush for 2 minutes.* ○ **Step 3**: "Get dressed in school uniform" ○ **Step 4**: "Pack your backpack" 4. **Decision Points**: ○ "Do you have your homework with you?" *Yes: Proceed to school. No: Go back to the desk.* 5. **Output/End Result**: "Ready to leave the house for school" 6. **Exceptions/Edge Cases**: ○ "What if I can't find my shoes?" *Look in the closet or ask a parent for help.* 7. **Conclusion/Finish**: "Put on shoes and coat, then leave home"
Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction to Algorithms** ● Start by discussing **what an algorithm is**: a series of steps to solve a problem or complete a task. ● Explain that algorithms are like detailed instructions we often use in daily life, whether we realise it or not. ● Use relatable examples such as a recipe or directions for tying shoes. **Step 2 - Unplugged Activity (5 minutes): Group Brainstorm** ● Ask students to think of simple, everyday tasks that could be broken down into a series of steps. ● Suggestions might include: ○ brushing teeth, ○ making a sandwich ○ preparing a school bag. ● Write these ideas on the board for reference. **Step 3 - Unplugged Activity (20 minutes): Creating an Algorithm for a Daily Routine** ● Divide students into pairs ● Ask each pair to select a common activity from the brainstorm list. ● Their tasks are: ○ **List the steps** involved in the activity as clearly as possible, focusing on order and detail. ○ **Write each step** on an index card or paper so they can easily add, remove, or rearrange steps as needed.

<table>
<tr><td></td><td>
<li style="list-style:none">
Test the algorithm by reading it aloud to another pair or following it themselves to see if the steps make sense and lead to the intended result.
Ask pairs to share one challenge they encountered in writing their algorithm and how they resolved it.
Step 4 - Unplugged Activity (10 minutes): Reflection and Discussion
Bring the class back together
Discuss:
How did it feel to write and test an algorithm for a simple task?
Were there steps that had to be modified or clarified?
Why might precision and detail matter in both real-life instructions and computer algorithms?
Conclude by relating this to computer science: Algorithms in computing must be as precise as possible to ensure the desired outcomes.
Students should understand that algorithms are critical in instructing machines, which cannot infer meaning from unclear instructions.
</td></tr>
<tr><td>Teachers
and students' Roles</td><td>Teachers: Introduce the concept of algorithms and facilitate a relatable discussion on real-world examples. Encourage students to think critically about the clarity of their steps and to see algorithms as more than just programming tools. Guide students in testing and refining their algorithms, prompting them to identify and solve issues they encounter.
Students: Engage actively in brainstorming, selecting, and decomposing a task. Write a clear, step-by-step algorithm for their chosen task and test its accuracy. Reflect on the experience, discussing how clarity and order are essential in both everyday life and computer science.</td></tr>
<tr><td>Evaluation/
Assessment</td><td>
Observation of Engagement: Observe students' participation in brainstorming, algorithm creation, and testing.
Algorithm Accuracy Check: Check the accuracy of the steps they've created, evaluating their ability to think sequentially and logically.
Reflection Questions: Ask students to reflect on questions like:
"What steps did you add or change to make your algorithm work?"
"How does creating an algorithm for a task change your understanding of instructions?"
</td></tr>
<tr><td colspan="2">TINKER Framework Integration</td></tr>
</table>

How is the activity authentic learning?	This activity demonstrates that algorithms are not just theoretical computer science concepts—they're embedded in daily life. By creating algorithms for tasks they already perform, students see the **real-world application** of abstract algorithmic thinking.
How is gender inclusiveness ensured?	Using common activities ensures all students have an equal level of familiarity, helping avoid any subject-based stereotypes or biases. The task choice is broad enough to engage diverse interests, making the activity inclusive and accessible.
Considerations for level progression	For younger students (for beginners), provide a simple task (e.g., brushing teeth) and pre-list the steps with some incorrect steps included. Have students identify errors and reorder the steps correctly, focusing on **sequence and clarity**. For older or more experienced students (advanced level), challenge them to write an algorithm for a multi-step process with conditional steps (e.g., "If my lunch bag is empty, then I pack it; otherwise, I check for water."). This could introduce them to **decision-making in algorithms** and add a layer of complexity.

Learning Scenario 4 - Exploring Data: From Collection to Insight

Learning Scenario Information	
Title	Exploring Data: From Collection to Insight (Continued in next scenario)
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Data and Information

Content domain (Integrated Subjects)	Mathematics, Science, Geography, Civic Education (critical data literacy)
Learning Objectives	Upon completing this activity, the students should be able to: ● Define key terms related to data, such as data, information, and database. ● Identify different data collection methods and evaluate their advantages and limitations. ● Organise and interpret a simple dataset to gain insights. Critique the potential impact of data biases and errors on real-world decision-making.
Scenario Description	
Setting	The activity takes place both outdoors and indoors. As a teacher, you're introducing students to **data and its importance** in making decisions, solving problems, and generating insights. Imagine your class is collaborating on a project to study the diversity of plant life on the school grounds. Students start outside, exploring the school grounds to observe and record data about plant diversity. Each student will contribute to a **shared dataset** by collecting and recording data about various plant types they observe around the school. Afterward, they return to the classroom to organise and enter the collected data into a shared digital spreadsheet. Your task is to help students understand how data collection works and why it's critical to consider how data can be processed to form useful information, as well as recognise the potential limitations and biases in data collection. Guide students through data collection, data entry, and analysis in a structured way that helps them see the entire process from raw data to useful insights.
(Digital) Tools	● Paper or data collection sheets for recording plant data (type, location, quantity, etc.). ● Spreadsheet software (e.g., Google Sheets or Excel) to organise and visualise data. ● Whiteboard for group discussions and reflection on data insights.

Activity	**Step 1 - Unplugged Activity (20 minutes): Introduction to Data Concepts**
	● Start with a brief overview of **data and information**.
	● Use real-world examples to explain how raw data can become meaningful information.
	● Discuss key terms like **data collection, dataset, database, and data bias** to ground students in the essential vocabulary.
	● Pose questions like:
	    ○ “Why is data useful?”
	    ○ “What might happen if data collection isn’t done carefully?”
	
	Step 2 - Unplugged Activity (25 minutes): Data Collection Exercise
	● Take students outside to gather data about plant diversity around the school grounds.
	● Divide students into pairs
	● Assign each pair a section of the grounds.
	● Provide them with data collection sheets to record **plant types, approximate numbers, and location**.
	● Ask students to record observations carefully, noting down exact descriptions without subjective assumptions.
	● Back in the classroom, let students enter their collected data into a shared spreadsheet, creating a **class dataset**.

Teachers and students’ Roles	**Teachers**: Introduce and explain basic data-related concepts. Facilitate the outdoor data collection and ensure students understand how to record observations objectively. Guide students in organising and interpreting the dataset to see patterns and discuss implications of their findings. **Students**: Participate actively in data collection, recording observations accurately and carefully. Enter data into a spreadsheet to create a class-wide dataset and engage in analysis activities. Reflect on data limitations and potential biases, sharing thoughts on how data impacts understanding and decision-making.

Evaluation/ Assessment	● **Observation of Participation:** Observe how accurately and carefully students record data, assessing their understanding of data collection integrity.
	● **Data Entry Quality Check:** Review the accuracy of entries in the shared dataset, assessing students’ ability to enter information precisely.
	● **Reflection Questions:** Ask students to respond to questions like:
	    ○ "What patterns did you notice in the data?"
	    ○ "How could missed data affect our conclusions?"

TINKER Framework Integration	
How is the activity authentic learning?	This activity connects directly to real-world applications, showing students how data is collected, analysed, and interpreted. The hands-on data collection and collaborative analysis represent how professionals handle and interpret data, making the learning experience authentic and applicable.
How is gender inclusiveness ensured?	The activity involves collaborative, outdoor data collection and classroom analysis, promoting universal relevance. By focusing on an activity involving nature and ecology, it engages a wide range of interests and ensures active participation from all students.
Considerations for level progression	For younger students (for beginners), focus on a simpler dataset (e.g., only noting plant type and location), and provide structured guidance in the data collection process, perhaps by having a checklist to aid accuracy. For older or more experienced students (advanced level), encourage them to think more critically about data biases and methodology. Challenge them to suggest additional data fields (e.g., height, colour) and discuss how they could improve the analysis. You could also introduce basic statistical measures (e.g., mode or median) to further interpret the dataset.

Learning Scenario 5 - Data Insights and Critical Evaluation

Learning Scenario Information	
Title	Data Insights and Critical Evaluation (Continuation of previous scenario)
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Data and Information

Content domain (Integrated Subjects)	Mathematics, Science, Geography, Civic Education (critical data literacy)
Learning Objectives	Upon completing this activity, the students should be able to: ● Analyse a dataset to identify patterns and insights. ● Discuss potential reasons behind observed data patterns. ● Evaluate the accuracy and limitations of the dataset. Understand the impact of data biases and errors.
Scenario Description	
Setting	Students are back in the classroom, working in groups to organise and analyse the data they collected during the previous lesson. They will interpret the dataset, identify patterns, and reflect on possible sources of errors and biases.
(Digital) Tools	● Spreadsheet software (e.g., Google Sheets or Excel) for data visualisation. ● Whiteboard or digital display for presenting findings. ● Data analysis templates or guides for support.
Activity	**Step 1 - Unplugged Activity (25 minutes): Data Analysis and Reflection** ● Show them how to organise the data to highlight patterns, such as most common or rare plant types. ● As a class, discuss potential **insights** like: ○ What plant types are most common ○ Possible reasons why certain plants grow in particular areas ● Emphasise the importance of **accuracy** in data entry and the potential **implications** of incorrect or biased data, such as assuming a location has low diversity because not all plants were recorded. **Step 2 - Unplugged Activity (20 minutes): Discussion on Data Bias and Integrity** ● Conclude with a discussion on data bias and data integrity. Ask students to consider questions like: ○ “What if certain types of plants were missed during collection?” ○ “How would that affect our understanding of plant diversity on school grounds?” ● Help them see that while data provides valuable insights, **methodological choices** impact the quality and reliability of these insights.

Teachers and students' Roles	**Teachers:** Guide students in organising data, facilitate discussions, and explain data interpretation techniques. Prompt students to consider possible biases and data limitations. **Students:** Work collaboratively to analyse the dataset, create graphs or tables, interpret findings, and present insights to the class. Reflect on potential improvements in data collection.
Evaluation/ Assessment	● **Participation Observation:** Observe how students engage in data analysis, ensuring they work collaboratively and thoughtfully. ● **Data Analysis Quality Check:** Review the organisation and presentation of findings, assessing whether students accurately identified data patterns and considered possible biases. ● **Reflection Questions:** Ask students to respond to questions such as: ○ "What patterns did you notice in the data?" ○ "How could errors in data collection have affected our findings?"
TINKER Framework Integration	
How is the activity authentic learning?	The activity mirrors real-world data analysis tasks, involving collection, interpretation, and critical evaluation. Students engage in problem-solving, similar to how data scientists or researchers work.
How is gender inclusiveness ensured?	The collaborative nature of the activity ensures equal participation, while the environmental theme appeals broadly across interests. Encouraging mixed-gender groups promotes inclusivity.
Considerations for level progression	For younger students (for beginners) provide structured analysis templates, guiding questions, and simpler datasets. For older or more experienced students (advanced level), introduce more complex datasets, advanced statistical concepts (e.g., mean, median, mode), and require independent analysis projects or presentations.

Learning Scenario 6 - Design Your First Game: Learning Basic Programming

Learning Scenario Information

Title	Design Your First Game: Learning Basic Programming
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Programming
Content domain (Integrated Subjects)	Mathematics, Technology, Art, English (for storytelling)
Learning Objectives	Upon completing this activity, the students should be able to: ● Apply basic programming constructs (variables, loops, conditionals) to design a simple game. ● Explain how programming is used to control game mechanics like character movement or scoring. ● Collaborate with peers to solve coding problems and test their game designs. ● Reflect on the process of coding and debugging as part of creating a functional game.
Scenario Description	
Setting	You are teaching a group of students who are eager to learn how to create their own video game. Some students have expressed interest in games they've played, wondering how characters move, how scores are calculated, and what happens when they press buttons. This presents an opportunity to introduce programming concepts in a relatable and interactive way. Guide your students to explore the basics of programming through Scratch, a block-based programming language. You'll lead them through designing a simple game where they control a character that collects objects on the screen to score points. The challenge is for students to come up with their own ideas on what makes a good game while learning how code shapes the mechanics behind it.
(Digital) Tools	● Computer/Laptop or tablets. ● Coding platforms (e.g., Scratch or similar block-based programming tool like Blockly). ● Projector for demonstration.

	● Optional: Whiteboard and markers for brainstorming/ to sketching game ideas before coding.
Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction and Objective Setting** ● Begin by asking students what kind of games they like to play. ● Engage them by showing a simple game in Scratch and explaining how the code controls the character. ● Ask, “What do you think the code looks like behind this game?” and “How can we make our own version of this?” **Step 2 - Unplugged Activity (10 minutes): Game Design** ● Give students a few minutes to sketch out their own game idea on paper. ● Encourage them to think about basic mechanics, such as: ○ How the character moves ○ What happens when objects are collected ○ How the score is updated. ● This helps students conceptualise before diving into coding. **Step 3 - Plugged Activity (25 minutes): Programming** ● Guide students through the process of coding their game in Scratch: ○ Show them how to create a character (sprite) and make it move using arrow keys. ○ Introduce variables to keep track of the score. ○ Add conditionals to check when the character collects an object (e.g., if sprite touches an object, increase score by 1). ○ Use loops to continuously check for input (e.g., as long as the game is running, keep moving the character and checking for collisions). ● Encourage students to test and debug their games as they go, working collaboratively in pairs to solve problems.
Teachers and students’ Roles	**Teachers**: Facilitate discussions on game mechanics and programming concepts. Provide step-by-step guidance for using Scratch and debugging issues that arise. **Students**: Engage in sketching their game design and coding it by using Scratch. Collaborate with classmates to solve coding challenges, offering peer feedback. Test each other’s games and suggest improvements.

Evaluation/ Assessment	● Observation: Assess students' participation in group work and their engagement in problem-solving. ● Game Demo: Each student or group will demonstrate their game to the class. They should explain the mechanics they programmed and how the game functions. ● Peer Feedback: Have students play each other's games and offer constructive feedback on what worked well and what could be improved. ● Reflection: Ask students to write a short reflection on what they learned about programming and problem-solving during the activity.
TINKER Framework Integration	
How is the activity authentic learning?	This learning scenario connects programming with a real-world application: creating a game. Students can directly see the results of their coding decisions, which mirrors the real-world use of programming in the gaming industry and other interactive media. The lesson incorporates **collaboration, creativity, and real-world problem-solving**, all of which are core principles of authentic learning. Students are encouraged to think critically and use trial and error to create something tangible (their game).
How is gender inclusiveness ensured?	The scenario is designed to be inclusive by promoting open-ended game design. All students, regardless of gender, are encouraged to participate in every aspect of the process, from creative design to coding. The collaborative nature of the activity encourages teamwork across diverse groups, and the focus on game creation allows students to explore themes and styles they find personally engaging, avoiding gender stereotypes.
Considerations for level progression	For younger or less experienced students (beginner level) who are new to coding, focus on simple movement and scoring mechanics. Guide students step-by-step to ensure they understand basic programming constructs like loops and conditionals. For older or more experienced students (advanced level), introduce more complex game mechanics such as timers, multiple levels, or advanced interactions between objects. Encourage advanced students to explore adding animations, sound effects, or creating a game with multiple characters.

Learning Scenario 7 - Guardians of Personal Data: Exploring Privacy and Security

Learning Scenario Information

Title	Guardians of Personal Data: Exploring Privacy and Security
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	CSPE (Civic, Social, and Political Education), Technology, Ethics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify key elements of personal data and why they need to be protected. ● Analyse real-life situations where personal data is vulnerable to breaches or misuse. ● Develop strategies to improve personal and group data security using offline and online methods. ● Apply cybersecurity best practices in various contexts, understanding their importance in preventing data theft.
Scenario Description	
Setting	As a teacher, you are introducing your students to the world of **personal data security**, where they will learn to recognise how everyday actions—both online and offline—put their personal data at risk. Imagine a scenario where your students have been asked to participate in a school-wide data collection project (e.g., a survey on school preferences or after-school activities). Suddenly, there's concern that sensitive data (such as names, email addresses, and even personal interests) may have been misused by outsiders. Your job is to guide them through understanding **what data is sensitive, how it can be protected, and how to safeguard** it in future projects. You will facilitate discussions on real-world examples of data breaches and lead your students in creating their own **data protection strategies**—both for their personal information and their school's data.
(Digital) Tools	● Whiteboard for brainstorming. ● Paper and pens for offline data scenarios. ● Post-it notes for group activities. ● Optional: Digital projector to show examples of real-life data breaches.

Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction to Personal Data and Privacy** ● Begin with a brief discussion on personal data 1. what it is, 2. why it is valuable, 3. how it can be used or misused. ● Ask students to name examples of personal data (e.g., home addresses, school emails, photos, health information). Write these on the whiteboard. ● Introduce the concept of data privacy and data security**.** Highlight the difference between the two: **1.** Privacy relates to keeping information private **2.** Security relates to protecting it from theft or misuse. ● You can use examples from the news (like data leaks or identity theft cases) to bring the concepts to life. **Step 2 - Unplugged Activity (10 minutes): Data Protection Scenario** ● Split the students into small groups ● Give each group one of fictional data breach scenarios below or similar: 1. A student's email gets hacked because they used a weak password. 2. A social media account is compromised due to oversharing personal information. 3. A group project file containing sensitive school data is lost after being left on a public computer. ● **Task:** Each group must **analyse the situation** and come up with **three steps** that the student(s) in the scenario could take to **prevent the data breach**. ● This might include 1. Using stronger passwords 2. Sharing only necessary information 3. Regularly backing up important files on secure devices. ● Let the groups share their findings with the entire class, fostering a broader discussion about **what behaviours lead to breaches and how they can be avoided**. **Step 3 - Plugged Activity (15 minutes): Human Firewall** ● This is a kinesthetic activity that helps students visualise **how to protect data from unauthorised access**. 1. Select a student to act as a "hacker" trying to access a box (symbolising personal data) in the middle of the room. 2. Other students act as the "firewall", tasked with physically guarding the box from the hacker.

	3. Each “firewall” student holds a post-it note representing a data protection strategy (e.g., two-factor authentication, secure passwords, encryption, etc.). 4. They must block the “hacker” by explaining how their strategy prevents the hacker from accessing the data. 5. The “hacker” tries different approaches to “breach” the firewall, while the rest of the class helps the firewall students by suggesting better protection strategies. ● After the activity, let students discuss what they learned about layering security measures and why having multiple defences (like a firewall) is more effective than relying on just one. **Step 4 (10 minutes): Group Reflection and Discussion** ● Bring the class together to reflect on the activity. Ask each group to share and compare their scenario and firewall. Encourage them to talk about and describe the challenges they faced. ● Reflection Questions ○ **Personal Awareness:** What types of personal data do you share online without realising it? ○ **Lessons Learned:** What surprised you the most about online privacy and security from today’s lesson? ○ **Behavioural Change:** What specific changes will you make to your online behaviour to protect your personal data? ○ **Data Breaches:** How would you explain the importance of privacy settings to a younger student or a family member? ○ **Real-Life Application:** Can you recall any news stories about data breaches? How might better security practices have prevented them? ● **Prompts for Discussion:** ○ *“Why is personal data valuable to companies and hackers?”* ○ *“Why is it important to have multiple security measures (like passwords, two-factor authentication, and encryption)?”* ○ *“What responsibilities do schools, companies, and governments have in protecting personal data?”* ○ *“How do trust and responsibility affect decisions about sharing personal data online?”* ○ *“How might data privacy become even more important as technology advances (e.g., AI, smart devices)?”*

Teachers and students' Roles	**Teachers**: Facilitate the discussion on personal data and lead the unplugged scenario analysis. Guide the students in the kinaesthetic "Human Firewall" activity, ensuring that they understand the importance of each security measure. Encourage students to engage critically with each scenario and think of **creative, practical solutions**. **Students**: Work collaboratively in groups to analyse data breach scenarios and suggest solutions. Participate in the "Human Firewall" activity, either as a protector of data or a hacker trying to gain unauthorised access. Reflect on how their own digital practices may leave them vulnerable and what steps they can take to improve their data security.
Evaluation/ Assessment	● Group Discussion and Presentations: Monitor group discussions during the unplugged activity and assess how well students identify risks and propose valid solutions. ● Participation in Human Firewall: Evaluate how actively students engage in the Human Firewall activity, both as "hackers" and "firewalls." Assess their ability to explain the importance of each protection strategy. ● Reflection: Have students write a brief reflection or summary of what they learned about data security and what changes they will make in their own digital practices.
TINKER Framework Integration	
How is the activity authentic learning?	This scenario directly connects to real-life applications of privacy and security, allowing students to simulate situations they may face in their daily lives, such as weak passwords or oversharing personal information. The unplugged and human activities encourage **abstract thinking** about how to layer protections both online and offline.
How is gender inclusiveness ensured?	The scenario is designed to be inclusive by involving group work and physical activity, which ensures that students of all genders and learning styles can actively participate. The chosen scenarios do not target specific groups but address universal digital security issues.
Considerations for level progression	For younger students who are less familiar with digital security, simplify the scenarios by focusing on basic concepts like password security and identifying phishing attempts. Offer more guided questions to help students think critically. For older or more experienced students (advanced level), you can introduce more complex scenarios, such as corporate data breaches or the role of **cyber laws** in

	protecting personal data. These students can be tasked with researching actual cybersecurity practices and laws (e.g., GDPR) and suggesting improvements for broader systems.

Learning Scenario 8 - Understanding Networks: How Devices Connect and Communicate

Learning Scenario Information	
Title	Understanding Networks: How Devices Connect and Communicate
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Networks and Communication
Content domain (Integrated Subjects)	Technology, Science, Civic Education (digital citizenship)
Learning Objectives	Upon completing this activity, the students should be able to: ● Define key networking terms such as network, protocol, IP address, and server. ● Differentiate between types of networks (e.g., LAN vs. WAN) and explain the purpose of each. ● Illustrate how data is transmitted across a network using both physical and wireless means.

	• Analyse common network structures and describe how devices communicate within these structures.
Scenario Description	
Setting	As a teacher, you are introducing students to the fundamental concept of **networks** and how communication happens between devices. Imagine the students are part of a school project to set up a small, simulated network that connects different devices in their classroom, allowing them to send data (messages) to each other. However, they must first learn how these networks function, the importance **of network protocols**, and how data is securely sent across connections. Guide the students in setting up a **network simulation** and lead them in hands-on exercises that illustrate different types of networks, protocols, and device roles (e.g., client vs. server). This will help them understand how network communication works, why it's important, and how they use these systems daily.
(Digital) Tools	• String/yarn and paper slips for creating a physical network representation. • Markers to label devices and define protocols. • Whiteboard or digital screen for visuals of network topologies (e.g., LAN, WAN, client-server). • optional: Laptops/tablets to demonstrate how devices interact on an actual network, such as by simulating file-sharing or data transfer.
Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction to Networking Concepts** • Start with a brief overview of **networks** and their significance in connecting devices to communicate with each other. • Introduce students to basic terms like **network, protocol, client/server, IP address, and router**. • Illustrate the difference between LAN (Local Area Network) and WAN (Wide Area Network) using simple diagrams. • Highlight real-life examples, like a school network (LAN) versus the internet (WAN). **Step 2 - Unplugged Activity (15 minutes): Hands-On Physical Network Simulation** • Split students into small groups. • Distribute string/yarn and paper slips. • Explain that: ○ The string represents a network cable

	○ Each paper slip represents a device with a unique "IP address." ● Assign each group a specific network setup, such as a star network or a bus network. ● Ask students to arrange the devices (paper slips) in the specified pattern. ● Students will simulate data transfer by sending messages (written on paper slips) through the network. ○ For example, one student writes a message (data) and sends it down the “network cable” to the next device, representing a basic data packet transfer. ● After each simulation, discuss the pros and cons of each network type**,** ask students how they might improve communication efficiency if they were network designers. **Step 3 - Unplugged Activity (10 minutes): Protocols and Data Flow in Networked Communication** ● Transition into a discussion about network protocols—the rules that define how data is transmitted across networks. ● Explain protocols like TCP/IP (Transmission Control Protocol/Internet Protocol) in simplified terms: TCP ensures data integrity, while IP handles addresses and routing. ● Using the same network setups, each group now incorporates a protocol step (e.g., check that all data is received correctly, ensure each device gets an address) in their simulation. ● For example, they may have one student “act” as TCP, confirming that each message reaches the destination without loss. This can include verifying that the message is “read” (acknowledged) and “responded to” (retransmission if not received correctly). **Step 4 - Unplugged Activity (10 minutes): Class Reflection and Application** ● Have each group present their setup and protocol simulation, sharing what worked well and any challenges they encountered. ● Facilitate a discussion on how networks and communication systems are essential to everyday life (e.g., Wi-Fi, streaming, online learning) and how understanding these networks can enhance digital responsibility.

Teachers and students' Roles	**Teachers**: Introduce key networking concepts and guide students through the physical simulation activity. Aid as students simulate network protocols, ensuring they understand how each "role" (e.g., device, protocol) functions. Encourage students to think critically about network structures and troubleshoot communication challenges. **Students**: Participate actively in group work, setting up and simulating network types and protocols. Take on different "roles" within the network, such as a device, protocol enforcer, or data packet, to fully understand how networks operate. Reflect on what they learned about networks, share insights with the class, and relate networking concepts to real-world examples.
Evaluation/ Assessment	● **Group Activity Observation:** Observe how well each group sets up their network and follows protocols to assess their understanding of data flow in different network structures. ● **Peer Presentations:** Each group will present their network simulation, explaining their protocol and any issues they encountered. Assess their ability to articulate the purpose and function of different networks and protocols. ● **Reflection Questions:** Have students answer a few questions at the end, such as: ○ What was the main difference between the network types? ○ Why is a protocol necessary for effective communication? ○ What challenges do real networks face?
TINKER Framework Integration	
How is the activity authentic learning?	The activity is grounded in real-world concepts, showing students how networks and communication systems form the backbone of digital interaction. The unplugged simulation and protocol enforcement directly apply to real-world communication protocols and network designs.
How is gender inclusiveness ensured?	This activity involves collaborative group work, hands-on simulation, and role-play, encouraging active participation from all students. The scenario and discussions are universally applicable, relating to everyday digital experiences, ensuring inclusivity and relevance across different student backgrounds and interests.
Considerations for level progression	For younger students (for beginners), focus on the basic network structures (star, bus, ring) and the idea of protocols without requiring in-depth understanding of TCP/IP. Provide more structured guidance, like using simpler protocols (e.g., a simple confirmation message instead of TCP verification).

	For older or more experienced students (advanced level), introduce more complex networking concepts, such as **DNS (Domain Name System) or NAT (Network Address Translation)**, or discuss how routers manage network traffic. Encourage these students to propose improvements to their network setups, simulating real-world network management.

Learning Scenario 9 - Understanding Online Privacy and Security: Protecting Personal Data

Learning Scenario Information	
Title	Understanding Online Privacy and Security: Protecting Personal Data
Age Level	12-15 years old (Junior Cycle Students)
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Civic, Social and Political Education (CSPE), Technology, English (for discussions and reflections)
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify key concepts related to online privacy, safety, and security, such as personal data, encryption, and secure passwords. ● Analyse the potential risks to personal data when interacting with online systems, including social media and websites. ● Apply strategies to protect their personal information online, such as creating strong passwords and recognising phishing attacks. ● Evaluate how privacy settings and security measures help in reducing the risk of data breaches.
Scenario Description	

Setting	Imagine you're teaching your students about **online privacy and security**. Every day, they interact with online platforms—whether it's using social media, watching videos, or playing games. However, many students are unaware of how much personal information they are sharing and the potential risks involved, such as identity theft or data breaches. You will guide your students through an activity where they learn how to protect their personal data, recognise risks like phishing, and explore how to use privacy settings effectively. This will involve teaching them how to apply critical thinking to their online behaviours and build **autonomy** over their personal security.
(Digital) Tools	● Computer/Laptop or tablets with internet access for interactive simulations (e.g., phishing quizzes, password strength tests). ● Whiteboard for demonstrating how encryption and privacy settings work. ● Worksheet to guide students through steps to secure their online accounts.
Activity	**Step 1 - Unplugged Activity (10 minutes): Introduction to Privacy and Security** ● Start with a discussion on what privacy and security mean in an online context. ● Ask students how they use the internet and what types of personal information they think they share (e.g., email, birthday, location). ● Explain key terms like **personal data, encryption, secure passwords, and phishing**. ● Use real-world examples (e.g., a news article about a recent data breach) to help students relate the abstract concepts of privacy and security to their everyday activities online. **Step 2 - Unplugged Activity (10 minutes): Risk Analysis** ● Divide students into small groups and provide them with fictional online scenarios (e.g., signing up for a new social media account, receiving an email about winning a prize). ● **Task:** In their groups, students must identify potential **risks** to personal data in each scenario (e.g., sharing too much personal information, clicking on a suspicious link). ● They will discuss what security measures they would take to protect their information (e.g., enabling two-factor authentication, using strong passwords). ● This step focuses on abstract thinking and decision-making. **Step 3 - Plugged Activity (15 minutes): Interactive Simulation**

	- Guide students through an online interactive simulation or quiz on identifying phishing emails and testing password strength. - Have students visit a phishing detection quiz (many cybersecurity websites offer free tools for this) where they evaluate if an email is real or a phishing attempt. Discuss common **red flags** to look for (e.g., spelling mistakes, suspicious URLs). - Have students use an online password strength tester to evaluate the strength of their current passwords. Teach them how to create strong, secure passwords using a mix of letters, numbers, and special characters. - Show students how to navigate the privacy settings of a popular social media platform (e.g., setting an account to private, limiting who can see their posts). **Step 4 (10 minutes): Group Reflection and Discussion** - Bring the class together to reflect on the activity. Ask each group to share and compare their risk analysis and simulation. Encourage them to talk about and describe the challenges they faced. - Some Take-Home Messages **Personal Data Awareness:** Understand what personal data is and how easily it can be shared online. **Online Risks and Threats:** Recognise common online risks like phishing, identity theft, and data breaches. **Protection Strategies:** Use strong passwords, enable two-factor authentication, and adjust privacy settings to stay secure. **Critical Thinking Online:** Be cautious when interacting with unknown links, emails, and online requests for personal information. **Privacy as a Habit:** Make privacy a part of daily online behaviour by regularly reviewing account settings and security practices. **Prompts for Discussion:** *“Have you ever experienced or heard about someone falling for an online scam? What happened, and how could it have been prevented?”* *“What personal data do you share when signing up for a new social media platform? How can you limit this information?”* *“What are the red flags that indicate an email might be a phishing attempt?”* *“What settings would you change to make your account safer?”*

	○ *"What specific steps will you take after this lesson to improve your online privacy and security?"*
Teachers and students' Roles	**Teachers**: Introduce the key concepts of privacy, safety, and security in an accessible way. Guide students in analysing potential online risks and help them think critically about their online behaviour. Facilitate the interactive activity, helping students understand how to use privacy settings and recognise phishing attempts. **Students**: Work collaboratively to identify risks in online scenarios. Apply what they have learned by participating in phishing detection quizzes and testing their password strength. Take responsibility for their online safety by adjusting their privacy settings and adopting secure practices.
Evaluation/ Assessment	• **Observation:** Monitor students' group discussions during the unplugged activity to assess their understanding of risks and security measures. • **Quiz Results:** Use the phishing quiz results to evaluate how well students can identify security threats. • **Reflection:** Ask students to write a short reflection on how they will change their online behaviour after the activity, identifying specific actions (e.g., creating stronger passwords, being cautious about sharing personal information).
TINKER Framework Integration	
How is the activity authentic learning?	This scenario connects directly to students' daily experiences online, helping them protect their personal data. They engage in real-world problem-solving by evaluating privacy risks and taking steps to enhance their online security. The activity encourages critical thinking, self-regulation, and responsibility, which are essential components of online behaviour. By testing their knowledge with phishing detection quizzes and password strength tools, students directly apply abstract concepts like encryption and security protocols in a real-world context.

How is gender inclusiveness ensured?	The lesson is inclusive as it avoids stereotypical roles and promotes equal participation for all students, regardless of their prior experience with technology. The scenarios and activities are designed to be neutral, with a focus on shared online experiences that are relevant to everyone. The collaborative nature of the lesson ensures all voices are heard, and students are encouraged to help each other in a supportive environment.
Considerations for level progression	For younger or less experienced students (beginner level), introduce simple concepts such as creating strong passwords and using basic privacy settings. Use block-based quizzes or drag-and-drop activities for younger or less experienced students. For older or more experienced students (advanced level), encourage them to explore **two-factor authentication**, encryption protocols, or even simulate a **data breach recovery plan**. They could also explore more complex privacy settings in different social media platforms or email services to understand data privacy regulations like GDPR.

Italy

Italy

Learning Scenario 1 - Algorithm in nature: discovering the Fibonacci sequence

Learning Scenario Information	
Title	Algorithm in nature: discovering the Fibonacci sequence
Age Level	11-12 years old (6th- 7th grade)
Duration	45 minutes
Informatics topic areas	Algorithms, Programming, Modelling and Simulation
Content domain (Integrated Subjects)	Mathematics, Science, Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify the Fibonacci sequence and explain its occurrence in natural patterns. ● Create a simple algorithm in Scratch to generate the Fibonacci sequence. ● Model Fibonacci patterns visually, connecting mathematical principles to natural phenomena.
Scenario Description	
Setting	You're teaching a class of 11- to 12-year-olds and want to spark their curiosity about the natural world while introducing foundational programming concepts. Fibonacci patterns are everywhere—sunflowers, pinecones, and shells. How can you help your students connect this beautiful sequence to math, science, and computing? To make it accessible and engaging, you'll guide them through creating their own Fibonacci sequence algorithms in Scratch, encouraging collaboration, creativity, and inclusivity. What should you do to ensure all students actively participate and learn effectively?
(Digital) Tools	● Laptops or tablets with Scratch installed or accessible online. ● Printed images of sunflower heads, pinecones, and seashells.

	• Graph paper, rulers, coloured markers for creating Fibonacci spirals. • Pre-made Scratch templates for beginners.

Activity	**Step 1 (10 minutes): Introduction to the Fibonacci sequence**
	• **Hook**: Begin by showing students an image of a sunflower head. Ask, "Have you ever noticed the patterns in sunflower seeds? Today, we're going to uncover the secret behind this pattern!"
	• **Explain the Fibonacci Sequence**:
	  ○ Write the first few numbers on the board (0, 1, 1, 2, 3, 5, 8…).
	  ○ Explain the rule: "Start with 0 and 1. Add the last two numbers to get the next one."
	  ○ Ask students to calculate the next three numbers in the sequence as a quick exercise.
	• **Real-World Examples**: Show printed or digital images of Fibonacci patterns in nature (sunflower heads, nautilus shells, pinecones). Explain how these natural phenomena follow the Fibonacci sequence.
	
	Inclusivity Strategies:
	• Use visual aids (images, diagrams) to ensure accessibility for visual learners.
	• Engage the whole class by asking questions and encouraging group responses.
	
	Step 2: Developing a Fibonacci algorithm (20 minutes)
	Part 1: Unplugged Algorithm Exploration (10 minutes)
	• **Algorithm as a Recipe**:
	  ○ Ask: "What steps would you follow to explain the Fibonacci sequence to a friend who's never heard of it?"
	  ○ Write the steps on the board:
	    ▪ Start with two numbers: 0 and 1.
	    ▪ Add the two numbers to get the next number.
	    ▪ Repeat the process to create the sequence.
	• **Pair Work**:
	  ○ In pairs, students verbally explain the algorithm to each other, reinforcing understanding.
	  ○ One student explains; the other follows along to write the first 10 Fibonacci numbers.
	
	Part 2: Plugged Activity in Scratch (10 minutes)
	• **Setting Up Variables**:
	  ○ Guide students to create two variables in Scratch: Num1 and Num2.

	◦ Demonstrate initialising Num1 to 0 and Num2 to 1. • **Creating a Loop**: ◦ Walk students through adding a "repeat" block to calculate Fibonacci numbers. ◦ Explain that the block will: ▪ Display the current value of Num1. ▪ Add Num1 and Num2, updating Num1 and Num2 for the next iteration. • **Testing the Program**: ◦ Students test their Scratch program to generate and display the first 10 Fibonacci numbers. ◦ Encourage debugging: What happens if the loop doesn't work? How can they fix it? **Differentiation**: • Beginners: Provide a partially completed Scratch template with pre-built variables and loops. • Advanced: Challenge students to extend the program to display Fibonacci numbers up to 100. **Step 3 (10 minutes): Designing the Virtual Museum** **Part 1: Geometric drawings (5 minutes)** • **Drawing the Fibonacci Spiral**: ◦ Provide graph paper and ask students to draw squares with side lengths corresponding to Fibonacci numbers (e.g., 1x1, 2x2, 3x3). ◦ Students connect the corners of the squares with curved lines to create a spiral. • **Exploring Proportions**: ◦ Explain how the ratio of successive Fibonacci numbers approaches the **Golden Ratio (1.618)**, a key concept in nature and art. **Part 2: Digital Spiral Creation (5 minutes)** • **Programming a Spiral in Scratch**: ◦ Challenge advanced students to modify their Fibonacci program to draw spirals. ◦ Guide them to use "pen" blocks in Scratch, adjusting angles and lengths based on Fibonacci numbers. **Step 4 (5 minutes): Sharing Results** • Groups present their Scratch programs or spirals to the class.

	• Each pair explains how their algorithm or drawing reflects Fibonacci patterns.
	
	Reflection:
	• Ask students:
	  ○ "What surprised you about the Fibonacci sequence?"
	  ○ "How do you think knowing this pattern could be useful in other areas?"

Teachers and students' Roles	**Teachers:** • Facilitate discussions about natural patterns and assist with Scratch programming. • Rotate among groups to support collaboration and troubleshoot technical issues. **Students:** • Work in pairs, taking turns coding and debugging. • Collaborate to draw Fibonacci spirals and present their work to the class.
Evaluation/ Assessment	- **Observation**: Evaluate group collaboration and engagement during discussions and activities. - **Scratch Program**: Assess the functionality of the algorithm created by each group. - **Visual Models**: Review Fibonacci spirals for accuracy and creativity.
TINKER Framework Integration	
How is the activity authentic learning?	Authentic learning emphasises real-world connections, where students explore patterns found in nature, linking mathematical concepts to their environment. The learning process is hands-on, incorporating both physical drawings and digital coding activities, which encourage active problem-solving. An interdisciplinary approach brings together math, science, and informatics, providing a meaningful context that makes learning relevant and applicable to students' daily lives. This approach fosters critical thinking and helps students see the practical application of their learning in the real world.

How is gender inclusiveness ensured?	To foster gender inclusiveness, activities are designed to promote collaboration and ensure balanced participation. By pairing students and rotating roles, such as coder and debugger, all individuals have an equal opportunity to engage in the learning process. Inclusive materials are used, with diverse visual examples that avoid reinforcing stereotypes in role assignments. The approach also incorporates multiple modalities, offering both visual (e.g., drawings) and tactile (e.g., coding, graphing) activities, ensuring that various learning styles are accommodated and every student feels represented and included.
Considerations for level progression	- **Beginner Level:** Provide Scratch templates with pre-built variables and loops for ease of use. - **Advanced Level:** Challenge students to modify their algorithm to generate other mathematical sequences or draw Fibonacci spirals in Scratch.

Learning Scenario 2 - Building a digital map for safe routes

Learning Scenario Information	
Title	Building a digital map for safe routes
Age Level	12-14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Networks and Communication, Design and Development
Content domain (Integrated Subjects)	Geography, Technology, Civic Education

Learning Objectives	Upon completing this activity, the students should be able to: ● Identify and assess safe walking or biking routes within their community. ● Use digital mapping tools to create a visual representation of safe routes. ● Analyse safety features (e.g., lighting, crosswalks) and incorporate them into their digital map. ● Present their findings to promote community safety awareness.
Scenario Description	
Setting	As a geography or technology teacher, you want your students to explore how they can contribute to community safety. Students will identify safe routes in their neighbourhood, focusing on areas like street lighting, crosswalks, and visibility. They'll work in small groups to gather information and create a digital map that highlights these safe routes. To make the map inclusive, the routes should account for diverse needs, including those of children, elderly people, and individuals with disabilities. *What can you do to guide students through the process of collecting, organising, and representing data on a digital map?*
(Digital) Tools	● Computers or tablets with internet access ● Mapping software (e.g., Google My Maps, ArcGIS Online, or Mapbox) ● Cameras or mobile phones to take pictures of identified routes ● Access to a safe walking/biking area around the school for fieldwork
Activity	**Step 1 (15 minutes): Introduction to community safety and mapping** ● Begin with a whole-class discussion to help students understand the importance of safe walking and biking routes in their community. Ask open-ended questions like, *"What makes a route safe?"* and *"Why is it important for everyone, including children, elderly people, and individuals with disabilities, to have access to safe routes?"* ● Show examples of digital maps, such as Google My Maps or ArcGIS Online, and demonstrate how they represent data visually. Highlight features like markers, labels, and layers. ● Provide a quick tutorial on the mapping tool you'll use, covering basic functions like adding pins, descriptions, and photos. Ensure all students have a chance to try these features briefly before moving to the next step.

	Step 2 (30 minutes): Fieldwork and data collection
	● Divide students into small groups, assigning each group a specific area near the school to investigate.
	● Provide students with worksheets or checklists to guide their data collection, including categories such as:
	    ○ Presence of safety features (e.g., crosswalks, traffic signals, streetlights).
	    ○ Accessibility considerations (e.g., wheelchair ramps, wide sidewalks).
	    ○ Potential hazards (e.g., broken sidewalks, high-traffic areas).
	● Students walk their assigned route, taking notes and photos of key locations. Encourage them to observe the route from different perspectives, such as imagining themselves as a child, elderly person, or someone with mobility challenges.
	● Have them mark locations on their worksheet where improvements are needed, such as adding a pedestrian crossing or fixing damaged sidewalks.
	
	Step 3 (30 minutes): Building the digital map (30 minutes)
	● Back in the classroom, students use the mapping tool to digitally plot their findings. Each group creates a layer or set of markers for their assigned route.
	● For each marker, students add:
	    ○ A description of the safety feature or hazard.
	    ○ Suggestions for improvement if applicable.
	    ○ Photos taken during their fieldwork to provide visual context.
	● Encourage groups to make their maps accessible by considering diverse needs, such as labelling wheelchair-accessible paths or highlighting quieter routes that might be better for young children.
	● For more advanced students, suggest adding layers to their map, such as differentiating between safe and unsafe areas or showing alternate routes for different needs.
	
	Step 4 (15 minutes): Presentation and feedback
	● Each group presents their digital map to the class, explaining why they selected certain routes as safe and highlighting any areas of concern or suggested improvements.
	● As part of the feedback process, classmates and teachers can ask questions, offer suggestions, and discuss patterns or trends they notice across the maps. For example, are certain areas consistently marked as unsafe? What solutions could the community consider?

	● If time allows, brainstorm as a class how the maps could be shared with local stakeholders, such as city planners, school administrators, or community safety groups. **Optional extension activities:** ● Advocacy letter: Students write a letter to local government officials, including their digital maps and suggestions for improving community safety. ● Advanced data analysis: For older students, analyse patterns in the data collected, such as identifying neighbourhoods with fewer safety features or areas with higher risks.
Teachers and students' Roles	**Teachers**: - Provide guidance and support during fieldwork to ensure safety. - Facilitate discussions to help students connect their findings with broader community safety and inclusivity goals. - Assist students in troubleshooting digital tools and encourage creativity during the mapping process. **Students**: - Collaboratively gather and analyse data during fieldwork. - Use critical thinking and problem-solving skills to evaluate safety features and accessibility. - Present their findings effectively, fostering communication skills and civic engagement.
Evaluation/ Assessment	● Data collection: Thoroughness and accuracy of the safety features identified, including diverse considerations like accessibility and visibility. ● Map design: Creativity, clarity, and functionality of the digital map, ensuring it effectively represents safe routes and is user-friendly. ● Presentation: Engagement and ability to explain the map's features, highlighting key safety elements and improvements needed for inclusivity. ● Participation: Collaboration and contribution during group work, ensuring each member actively participates in the research and map creation process.
TINKER Framework Integration	
How is the activity authentic learning?	The activity embodies authentic learning by engaging students in a real-world issue that directly impacts their daily lives and community. By identifying and assessing safe walking and biking routes in their neighbourhood, students apply their

	knowledge to a meaningful and practical task, connecting classroom concepts to their local environment. The fieldwork component allows students to gather first-hand data, analyse real safety features, and propose tangible solutions, making the learning process deeply relevant. Moreover, creating a digital map using tools like Google My Maps or ArcGIS Online mirrors real-world practices in urban planning and community advocacy, providing students with valuable digital skills that have practical applications. Sharing their findings with peers and potentially local stakeholders further reinforces the activity's authenticity, as students see how their work can contribute to community safety and awareness.
How is gender inclusiveness ensured?	Gender inclusiveness is woven into the activity by fostering collaborative group work, where all students are encouraged to contribute equally to the project. Mixed-gender groups ensure diverse perspectives during fieldwork and analysis, reducing the potential for biases in identifying safety features or hazards. The activity also emphasises inclusivity in design, prompting students to consider the needs of all community members, including those of different genders, ages, and abilities. For example, students are asked to think about wheelchair accessibility, well-lit areas for night-time safety, and routes that are safer for children or elderly individuals. By encouraging a broader perspective on safety and accessibility, the activity highlights how equitable solutions benefit everyone, promoting inclusivity across the board.

Considerations for level progression	• **Beginner Level:**
	  ○ Provide a pre-made map template with basic markers, so students focus on adding descriptions and photos. Simplify mapping tool instructions to avoid overwhelming younger or less experienced students.
	• **Advanced Level:**
	  ○ Challenge students to analyse patterns in the map data (e.g., identifying areas where safety features are lacking) and suggest ways the community could enhance safety. They could also add layers to the map to show different route options for various needs (e.g., wheelchair accessibility).

Learning Scenario 3 - Creating an online safety quiz for schoolmates

Learning Scenario Information	
Title	Creating an online safety quiz for schoolmates
Age Level	11 years old (6th grade)
Duration	45 minutes
Informatics topic areas	Privacy, Safety, Security, Human-Computer Interaction
Content domain (Integrated Subjects)	Technology, Social Studies
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify safe online practices, including protecting personal information and respecting others' privacy. ● Design age-appropriate quiz questions to promote online safety awareness. ● Create an interactive online quiz using a digital tool to educate their peers about online safety.
Scenario Description	
Setting	You're a technology teacher tasked with helping 11-year-old students understand and promote online safety. Students will create an interactive quiz on safe online practices to share with younger peers. By engaging in this collaborative activity, they will learn to think critically about online privacy, safety, and respectful behaviour. How can you guide them to create a meaningful and engaging tool while ensuring inclusivity and teamwork?
(Digital) Tools	● Laptops or tablets with internet access. ● Quiz creation tools (e.g., Google Forms, Kahoot!, Quizizz). ● Online resources on internet safety (e.g., Be Internet Awesome). ● Icons or free images from sources like Unsplash or Canva.

Activity	**Step 1. Introduction to online safety (10 minutes)** ● **Class discussion**: ○ Start by asking students: ▪ "What do you do to stay safe online?" ▪ "Have you ever seen something unsafe or unkind online?" ○ Discuss the importance of safe practices such as: ▪ Keeping personal information private. ▪ Using strong passwords. ▪ Avoiding suspicious links. ▪ Communicating respectfully. ● **Why it matters**: ○ Explain that younger students often need extra guidance in online safety. Highlight how the quiz will help spread awareness in an engaging way. ● **Interactive example**: ○ Show a short online safety video or play an example quiz to demonstrate how quizzes can make learning fun. ● Introduce concepts such as **two-factor authentication (2FA)** and **password management** and **examples of phishing scams**. **Step 2. Quiz planning and question design (15 minutes)** ● **Group work**: ○ Divide students into small groups and assign each group one online safety topic, such as: ▪ **Group 1**: Protecting personal information. ▪ **Group 2**: Recognising cyberbullying and reporting it. ▪ **Group 3**: Avoiding phishing scams. ▪ **Group 4**: Creating strong passwords. ● **Brainstorming**: ○ Each group brainstorms 3–4 quiz questions. ○ Encourage them to create a mix of question types: ▪ Multiple-choice. ▪ True/false. ▪ Scenario-based questions (e.g., "What would you do if…?"). ● **Guided support**: ○ Circulate to provide guidance, ensuring questions are clear, age-appropriate, and tied to the learning objectives. ***S*tep 3 Creating the Quiz (15 minutes)**

	- **Digital quiz creation**:
	  - Students use tools like Google Forms, Kahoot!, or Quizizz to input their questions.
	  - Show students how to add features such as:
	    - Multiple answer options.
	    - Explanations for correct answers.
	    - Icons or visuals to make the quiz more engaging.
	- **Collaboration and division of tasks**:
	  - Assign roles within groups (e.g., inputting questions, selecting images, proofreading).
	  - Rotate roles to ensure inclusivity and active participation.
	
	Step 4. Testing and feedback (5 minutes)
	- **Peer testing**:
	  - Groups test each other's quizzes in a quick round, providing feedback on clarity and usability.
	  - Students discuss whether the questions are engaging and easy to understand for younger peers.
	
	- **Final edits**:
	  - Groups incorporate feedback to finalise their quizzes.

Teachers and students' Roles	**Teachers:** - Facilitate discussions, provide examples of good quiz questions, and guide groups to ensure content accuracy and inclusivity. - Monitor group dynamics to ensure all students participate equally. **Students:** - Work collaboratively to brainstorm, design, and create quiz questions. - Test quizzes and provide constructive feedback to peers.
Evaluation/ Assessment	- Participation: Observe students' engagement and teamwork during group activities. - Content Quality: Evaluate the relevance and clarity of the quiz questions. - Quiz Design: Assess creativity and the use of visuals to make the quiz accessible and engaging. - Collaboration: Use a rubric to assess teamwork, ensuring that all students contribute meaningfully.

TINKER Framework Integration	
How is the activity authentic learning?	This activity embodies authentic learning by addressing a real-world issue that students encounter daily—online safety. By designing a quiz for their younger peers, students apply their knowledge in a meaningful context, reinforcing the importance of safe online behaviours while contributing to their school community. The process of creating, testing, and sharing the quiz gives students a hands-on opportunity to explore topics like privacy, respectful communication, and cyberbullying. They are not merely learning about these concepts in isolation but are tasked with solving a practical problem: how to educate others effectively. This fosters critical thinking, creativity, and collaboration, essential skills for navigating both digital environments and real-world challenges. Additionally, by involving their peers in the school-wide use of the quiz, students experience the impact of their efforts first hand, deepening their understanding of the relevance and importance of their work.
How is gender inclusiveness ensured?	The activity is designed to promote gender inclusiveness by ensuring equal participation and avoiding stereotypical roles. By rotating tasks within groups—such as question writing, digital input, and visual design—all students, regardless of gender, have the opportunity to develop a range of skills. Topics like cyberbullying and respectful communication inherently promote empathy and understanding, addressing behaviours that affect everyone, while fostering mutual respect across genders. The inclusion of visual and interactive elements accommodates diverse learning styles, ensuring accessibility for all participants. The collaborative nature of the activity encourages every student to voice their ideas, reinforcing a supportive and inclusive classroom environment where everyone's contribution is valued equally. These strategies not only support gender equality but also prepare students to engage thoughtfully and inclusively in both digital and real-life interactions.
Considerations for level progression	**Beginner Level**: ● Provide pre-written question templates and a step-by-step guide to using the quiz tool. ● Focus on selecting and editing premade questions rather than creating new ones. **Advanced Level**: ● Challenge students to add branching logic to quizzes, where answers lead to different follow-up questions.

	• Include more complex scenarios that require critical thinking about digital safety.

Learning Scenario 4 - Design your own fitness tracker

Learning Scenario Information	
Title	Design your own fitness tracker
Age Level	12-13 years old
Duration	45 minutes
Informatics topic areas	Human-Computer Interaction, Design and Development
Content domain (Integrated Subjects)	Physical Education, Health Science, ICT

Learning Objectives	Upon completing this activity, the students should be able to: ● Evaluate features of fitness trackers and how they collect and display data. ● Design a prototype for a personalised fitness tracker interface. ● Reflect on the impact of wearable technology on health and fitness. ● Collaborate in teams to integrate multiple perspectives into their designs.
Scenario Description	
Setting	Imagine a tech company has asked your class for ideas to create a new fitness tracker designed specifically for kids. Students will analyse existing fitness trackers and design an interface that tracks health metrics like steps, sleep, or hydration in an engaging and user-friendly way. Guide students to explore the features of fitness trackers and think about what metrics are most useful for kids their age. Challenge them to design an interface that's both functional and visually appealing.
(Digital) Tools	● **Plugged:** Google Slides, Canva, or Figma for interface design ● **Unplugged:** Printable templates of screens, markers, and paper
Activity	**Step 1 (10 minutes): Introduction** ● **Discussion**: Show examples of popular fitness trackers and how they function (e.g., tracking steps, sleep, and hydration). Include examples designed by diverse teams to showcase role models from different genders and backgrounds. ● **Brainstorming**: Guide a class discussion: ❖ What features would make a fitness tracker engaging for kids? ❖ How can it encourage healthy habits for people our age? ❖ What fun or creative features could make the tracker unique? Use sticky notes or a shared digital whiteboard for students to jot down ideas and cluster them into themes (e.g., health metrics, gamification, design). **Step 2 (25 minutes): Interface Design** Students form small, gender-balanced teams to create their designs, ensuring that all voices are heard and contributions are valued. **A. Empathy and user-centric thinking (5 minutes)** ● Each team selects a "user persona" for their tracker (e.g., a sporty child, a gamer, or someone who needs reminders to stay hydrated).

	● Teams discuss the needs and preferences of their persona, encouraging empathy-driven design. **B. Sketching and designing (15 minutes)** ● Teams use printable templates, markers, and paper to sketch three key screens of their fitness tracker: ○ **Home Screen**: Overview of daily progress (e.g., steps, water intake). ○ **Activity Log**: Detailed tracking of one specific metric (e.g., sleep graph, hydration). ○ **Motivational Feature**: Gamified elements like badges, challenges, or personalised avatars. ● Encourage creativity with prompts: ○ "What colours and icons would appeal to kids?" ○ "How can we make the tracker fun and inclusive for all users?" ○ "What features would ensure fairness, like inclusive avatars and settings for different abilities?" **C. Optional digitalisation (Advanced Teams, 5 minutes)** ● For groups ready for a challenge, introduce online tools like **Canva** or **Figma** to digitise their designs, with guidance on using simple drag-and-drop features. **Step 3 (10 minutes): Presentation and Reflection** **Team Presentations (5 minutes):** ● Each team shares their prototype with the class, describing how their tracker supports health goals and engages users. ● Peers give constructive feedback on creativity, inclusiveness, and practicality. **Class Reflection (5 minutes):** ● Discuss: ○ *"What did you learn about designing technology for others?"* ○ *"What are the ethical implications of collecting health data, and how can we ensure privacy?"* ● Emphasise gender inclusion in feedback, such as how the designs cater to diverse needs or preferences.

Teachers and students' Roles	**Teachers**: - Facilitate brainstorming and encourage all students to contribute ideas. - Rotate among teams to support inclusivity and critical thinking. - Provide examples of real-world diverse tech design teams to inspire students. **Students**: - Collaborate in teams, respecting and valuing all contributions. - Creatively design prototypes and incorporate feedback to improve them. - Reflect on the ethical and inclusive aspects of wearable technology.
Evaluation/ Assessment	● Creativity: Evaluate how imaginative and visually engaging the designs are, focusing on originality and appeal to the target age group. ● Usability: Assess whether the interface is intuitive and user-friendly, making health tracking easy and enjoyable for children. ● Inclusiveness: Review how well the designs address the diverse needs and preferences of users, including considerations for gender, abilities, and cultural differences. ● Teamwork: Observe how effectively teams collaborate, ensuring equitable participation and respect for diverse ideas. Look for evidence of shared decision-making and active listening. ● Critical Thinking and Ethical Awareness: Evaluate students' reflections on the ethical use of wearable technology, such as privacy concerns and responsible data usage, and their ability to integrate this understanding into their designs. ● Presentation Skills: Assess how clearly and confidently teams articulate their ideas, explaining the rationale behind their designs and responding to peer feedback.
TINKER Framework Integration	

How is the activity authentic learning?	The activity leverages authentic learning by connecting students to real-world challenges and trends in wearable technology. By designing a fitness tracker for their peers, students actively engage with health-related topics that are relevant to their age group, such as physical activity, hydration, and sleep. The collaborative aspect fosters teamwork and communication, as students integrate diverse perspectives to create functional and engaging designs. This process encourages critical thinking, problem-solving, and creativity, providing students with a meaningful and context-rich learning experience.
How is gender inclusiveness ensured?	The activity emphasises gender inclusion by fostering an equitable and participatory learning environment. Students are introduced to stories of diverse fitness tracker designers, showcasing role models from various genders and backgrounds to inspire all participants. Tasks are distributed evenly among team members, ensuring everyone contributes to technical, creative, and presentation aspects. Inclusive language and guidance help challenge stereotypes, encouraging students to see technology and design as fields accessible and engaging for everyone. The activity also incorporates diverse needs and preferences into the designs, promoting empathy and inclusion.
Considerations for level progression	● **Beginner Level:** ○ Provide pre-drawn screen templates with simple layouts (e.g., a single home screen) so students can focus on adding features like step counters, hydration reminders, or motivational badges. Offer a list of example features to choose from and provide printed icons or stickers for easy visual representation. Simplify instructions for design tools, and allow students to work primarily on paper if digital tools feel overwhelming. ● **Advanced Level:** ○ Challenge students to design a complete fitness tracker prototype with interconnected screens (e.g., home screen, goal tracker, and settings page). Encourage them to analyse user needs, such as accessibility for children with disabilities, and incorporate advanced features like customisable avatars or gamification elements. Students can digitise their designs using tools like Figma, adding interactive elements to simulate a real app experience. Include ethical reflection by asking students to address data privacy concerns and inclusivity in their designs.

Learning Scenario 5 - Exploring gender representation in media

Learning Scenario Information	
Title	Exploring gender representation in media
Age Level	12-14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Responsibility and Empowerment, Digital Creativity
Content domain (Integrated Subjects)	Social studies, Language, Arts, Media studies, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify and analyse representations of gender in various media formats (e.g., advertisements, films, video games). ● Critically evaluate how media portrayal can reinforce or challenge gender stereotypes. ● Create a media project that promotes inclusive and diverse representations of gender.
Scenario Description	
Setting	As a media studies or social studies teacher, you're guiding students through an exploration of how gender is represented in the media they encounter daily. From movie characters to social media ads, these portrayals influence ideas about gender roles. Students will work in small groups to analyse a media sample, identifying gender stereotypes and discussing their impact. Each group will then create their own media project, such as a poster or short video, that offers a more balanced and

	inclusive representation of gender. *How can you help students develop critical media literacy while encouraging creativity and inclusivity?*
(Digital) Tools	● Computers or tablets with internet access ● Video or image editing software (e.g., Canva, Adobe Spark, iMovie) ● Projector or screen for displaying media examples ● Printed images or examples of diverse media portrayals (ads, movie posters, social media)
Activity	**Step 1 (20 minutes): Introduction to Gender Representation** ● **Warm-Up Discussion (5 minutes):** Begin with an open-ended question: *"What types of media do you interact with daily (movies, games, ads, social media)?"* Follow up with: *"How do you think these media influence how people think about gender roles?"* Write key ideas on the board. ● **Examples and Analysis (10 minutes):** Show a series of curated media examples: ○ A popular movie poster featuring traditional gender roles. ○ A video game screenshot with a stereotypical male or female character. ○ A social media advertisement that either reinforces or challenges gender norms. For each example, ask guiding questions: *"What is being communicated about gender here? What stands out about the visuals, language, or character roles?"* ● ***Quick Pair Activity (5 minutes):*** ○ *Students pair up to briefly discuss one piece of media they've encountered recently that left an impression regarding gender roles. Have a few pairs share their observations with the class.* **Step 2 (30 minutes): Media Analysis in Small Groups** **Group Formation (5 minutes):** Divide students into groups of 3-4. Assign each group a type of media (e.g., movie posters, video game covers, social media ads). Provide physical or digital examples for each group to analyse .

	Guided Analysis (20 minutes): Each group uses a worksheet with the following prompts: ● *What gender roles are depicted?* ● *What stereotypes, if any, are present?* ● *How are clothing, colours, or actions used to represent gender?* ● *Does the media challenge or reinforce traditional gender norms?* Groups record their observations, ensuring everyone contributes. **Quick Share-Out (5 minutes):** Each group briefly presents one key finding from their analysis. Encourage them to connect this to real-world implications (e.g., *"This ad suggests that only women are responsible for housework, which could reinforce outdated stereotypes."*). **Step 3 (30 minutes): Creating an inclusive media project** ● **Brainstorming Ideas (10 minutes):** Groups brainstorm concepts for their media piece, aiming to break stereotypes and promote inclusivity. Provide guiding questions: ○ *Who do you want to represent?* ○ *What message about gender do you want to convey?* ○ *How can you show diversity (e.g., body types, abilities, cultural backgrounds)?* ● **Media Project Creation (20 minutes):** Using tools like **Canva**, **Adobe Spark**, or drawing materials, groups design their project. Examples include: ○ A digital poster with characters of various genders and roles. ○ A short video highlighting gender inclusivity in everyday scenarios. ○ A storyboard for an ad campaign that challenges stereotypes. Provide support and circulate to answer questions, ensuring all group members are contributing. **Step 4 (10 minutes): Presentation and reflection** **Group Reflection and Discussion** ● **Group Presentations (7 minutes):** Each group presents their project to the class, explaining: ○ What stereotypes they aimed to challenge.

	○ How their work promotes inclusivity. ○ What they learned during the process. **Class Discussion and Feedback (3 minutes):** Open the floor for feedback. Encourage students to highlight positive aspects and suggest improvements: ● *"I love how your poster included diverse characters!"* ● *"What made you choose this message?"*
Teachers and students' Roles	**Teachers**: - Prepare media examples that are age-appropriate and relevant. - Facilitate discussions to ensure respect and inclusivity. - Support students during the project creation phase, offering technical or creative guidance. **Students**: - Actively participate in group discussions and analysis. - Collaborate creatively to design their media project. - Reflect critically on their learning and share insights.
Evaluation/ Assessment	● *Media Analysis:* Ability to identify and critique stereotypes in the assigned media. ● *Media Project:* Creativity, inclusivity, and clarity of the intended message. ● *Presentation:* Engagement and ability to articulate ideas. ● *Participation:* Collaboration and contribution during group work.
TINKER Framework Integration	
How is the activity authentic learning?	This activity embodies authentic learning by connecting students with real-life issues related to gender representation in media, allowing them to analyse and create content that directly impacts their understanding of societal norms. Through hands-on tasks such as analysing advertisements, films, or social media posts, and subsequently designing their own inclusive media projects, students engage in problem-solving and critical thinking that prepares them for real-world applications.

	Collaboration in small groups fosters teamwork, communication, and the sharing of diverse perspectives, while the process of creating media pieces with intentional inclusivity builds practical skills in media literacy and design.
How is gender inclusiveness ensured?	Gender inclusiveness is central to the activity, as students are encouraged to recognise and critique stereotypes in the media they consume and to represent diverse identities in their projects. By incorporating portrayals of different genders, body types, abilities, and backgrounds into their media designs, students are guided toward creating equitable and inclusive content. Teachers support this process by fostering respectful discussions and challenging students to think beyond traditional norms, ensuring a safe and inclusive learning environment where all perspectives are valued. This dual focus on authentic engagement and inclusivity equips students with the awareness and skills needed to challenge bias and promote diversity in the media landscape.
Considerations for level progression	• **Beginner Level:** ◦ Provide pre-selected media examples with clear stereotypes for easier analysis. ◦ Use basic tools like **Canva templates** or pre-made poster frames. ◦ Focus discussions on identifying stereotypes rather than complex intersections. • **Advanced Level:** ◦ Include media that addresses intersections of gender with race, age, or socio-economic status. ◦ Challenge students to use advanced tools (e.g., creating a 30-second ad video or infographic). ◦ Discuss broader implications, like how media impacts societal norms or policies.

Learning Scenario 6 - Scratching the surface of storytelling

Learning Scenario Information	
Title	Scratching the surface of storytelling
Age Level	11 years old (6th grade)

Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Digital Creativity
Content domain (Integrated Subjects)	Language Arts, Computer Science, Technology
Learning Objectives	Upon completing this activity, the students should be able to: ● Create an interactive digital story using Scratch that demonstrates a narrative structure. ● Explain basic programming concepts, such as loops, conditions, and sequences. ● Collaborate with peers to design a cohesive and visually engaging interactive story. ● Demonstrate how storytelling and programming intersect to produce creative, digital narratives.
Scenario Description	
Setting	You are a middle school teacher introducing your students to storytelling through programming. Your task is to help them develop narrative and technical skills by using Scratch to create interactive digital stories. In this lesson, students will learn how to design characters and settings, program simple movements, and integrate dialogue or interactive elements that bring their stories to life. The classroom is diverse, with students who may be more familiar with storytelling but less confident in coding—and vice versa. **What should you do?** Your role is to ensure that all students feel equally supported and inspired, promoting collaboration, inclusivity, and creativity throughout the activity.
(Digital) Tools	**Plugged activities:** ● Computers or tablets with Scratch installed or accessible online. ● Pre-designed Scratch templates for beginners (optional). **Unplugged activities:**

	- Storyboarding templates with space for sketches and written notes. - Markers, pencils, and paper for brainstorming and drafting ideas.
Activity	**Session 1 (45 minutes): Storyboarding and designing in scratch** **Warm-Up brainstorming (5 minutes) – Unplugged activity** - Introduce the topic with a fun group activity: - Ask students to describe their favourite stories or brainstorm a unique storyline in pairs. - Write a few examples on the board to inspire creativity. **Storyboarding (15 minutes) – Unplugged activity** - Hand out storyboard templates and guide students to draft their digital story: **Scene 1:** Introduction of the main character and setting. **Scene 2:** Introduction of the problem or goal. **Scene 3:** Resolution or interactive decision point. **Designing in scratch (25 minutes) – Plugged activity** **Introduction to Scratch (10 minutes):** - Walk students through basic Scratch features, such as adding sprites, backgrounds, and dialogues. - Demonstrate simple programming blocks, such as "when clicked," "say," and "move." **Story setup (15 minutes):** - Students begin creating characters and settings in Scratch, importing images or customising pre-built sprites. - They program basic interactions, such as a character introducing themselves or moving across the screen. **Session 2 (45 minutes): Programming and presentation** **Programming interactive stories (30 minutes) – Plugged activity** **Mini programming workshop (10 minutes):** - Teach students how to add interactivity to their stories, such as using "if-then" blocks for decision-making or adding sound effects.

	○ Example: "If the user clicks the treasure chest, the character finds gold." 2. **Interactive story development (20 minutes):** ○ Students program their stories scene by scene, incorporating animations, dialogue, and simple interactions. ○ Encourage collaboration by assigning roles: ▪ **Coder:** Focuses on the technical aspects. ▪ **Designer:** Refines visuals and layouts. ▪ **Story Developer:** Polishes the narrative and dialogue. **Presentation and feedback (15 minutes) – Unplugged activity** ● Host an interactive "Story Showcase" where students present their Scratch projects to peers. ● Encourage classmates to engage with each other's stories by clicking through interactive elements. ● Facilitate feedback using prompts: ○ "I loved the way your character reacted when…" ○ "It would be cool if the story included…"
Teachers and students' Roles	**Teachers:** ● Facilitate discussions and demonstrate Scratch tools. ● Provide individualised support during programming activities. ● Promote equitable participation by rotating creative and technical tasks. **Students:** ● Collaborate in pairs or groups to design and program their digital stories. ● Experiment with Scratch features to bring their narratives to life. ● Share their projects and reflect on their learning process.
Evaluation/ Assessment	**Observation:** Monitor students' participation and collaboration during activities. **Product assessment:** Use a rubric to evaluate the creativity, interactivity, and functionality of the Scratch projects. **Reflection:** Facilitate a discussion where students share what they learned about programming and storytelling.
TINKER Framework Integration	

How is the activity authentic learning?	This activity introduces students to real-world applications of storytelling and programming, blending creativity and technology in a meaningful way. By creating digital stories, students engage in problem-solving, collaboration, and design processes similar to those used by professional game designers and digital storytellers. The project culminates in a tangible product—a Scratch story—that students can proudly share with peers and family, reinforcing their understanding of programming concepts and creative storytelling.
How is gender inclusiveness ensured?	To ensure inclusivity, students rotate roles within their groups, allowing all participants to engage in both technical programming and creative design. The activity avoids reinforcing stereotypes by encouraging diverse storylines and characters, ensuring both boys and girls feel represented and valued. By highlighting diverse role models in the fields of storytelling and programming, the activity also inspires students to imagine future possibilities in creative technology fields.
Considerations for level progression	**For beginners:** Provide step-by-step Scratch tutorials or templates to help students build confidence with the platform. **For advanced students:** Encourage them to add more complex programming elements, such as loops, timers, or multiple interactive decision points.

Learning Scenario 7 - Sustainable city planner

Learning Scenario Information	
Title	Sustainable city planner
Age Level	12-13 years old (7th – 8th grade)
Duration	45 minutes
Informatics topic areas	Modelling and Simulation, Design and Development

Content domain (Integrated Subjects)	Geography, Environmental Science, Mathematics
Learning Objectives	Upon completing this activity, the students should be able to: ● Identify key components of a sustainable city (e.g., green spaces, renewable energy, efficient transport). ● Create a basic model of a city using digital tools or physical materials. ● Simulate the impact of sustainable planning decisions on energy usage, pollution, and quality of life. ● Reflect on how urban planning impacts communities and the environment.
Scenario Description	
Setting	Your town's mayor has asked for your class's help to design a new, sustainable city plan. As "City Planners," students will model and simulate how to design an eco-friendly city by balancing residential, commercial, and natural spaces. They will evaluate the impact of their designs on energy efficiency, pollution, and liveability. Ask students: *"What makes a city a great place to live? How can we ensure our cities are eco-friendly?"* Challenge them to design a city that balances human needs with environmental conservation.
(Digital) Tools	● **Plugged:** Minecraft Education, SimCity, Tinkercad, or Google Sheets for modelling and simulation. ● **Unplugged:** Grid paper, coloured markers, building blocks, and cut-outs of roads, parks, and buildings.
Activity	**Step 1 (10 minutes): Introduction** ● **Authentic Context:** Discuss what makes cities sustainable, using examples like bicycle lanes, renewable energy, and efficient transportation. ● **Gender Inclusion:** Share stories of diverse urban planners and architects who have designed innovative cities. **Steps:** 1. Ask students, *"What problems do big cities face today? How can we solve these problems?"*

	2. Show examples of sustainable cities (e.g., Copenhagen, Singapore) and highlight key features like solar panels or public transport. **Step 2 (15 minutes): City Planning and Design** ● **Collaboration:** Divide students into small teams and assign each a city-building challenge, such as reducing pollution or maximising green spaces. ● **Scaffolding:** Provide templates or guidelines for city layouts, including required components like homes, schools, and parks. **Steps:** 1. Teams brainstorm and draft a city layout using grid paper or a digital tool. 2. Students assign spaces for residential, commercial, and recreational areas, ensuring their design minimises environmental impact. **Step 3 (15 minutes): Simulation and Analysis** ● **Plugged Activity:** Use tools like SimCity or spreadsheets to simulate energy consumption, traffic patterns, and pollution levels. ● **Unplugged Activity:** Use markers and cut-outs to visualise how resources flow and how decisions affect the city's sustainability. **Steps:** 1. Teams test their designs through simulations or scenarios, such as adding more green spaces or switching to renewable energy. 2. Analyse outcomes like reduced emissions or improved quality of life. **Step 4 (5 minutes): Reflection and Presentation** ● **Articulation:** Teams present their city plans, explaining how their decisions impact the environment and the community. ● **Reflection:** Encourage peer feedback and group discussion on the strengths and weaknesses of each design. **Steps:** 1. Students describe their planning priorities and the trade-offs they made. 2. Conclude by asking: *"What real-life steps can cities take to become more sustainable?"*

Teachers and students' Roles	**Teachers:** • Explain key features of sustainable cities and guide discussions. • Provide tools and templates for designing city models. • Assist with simulations and help students interpret results. • Offer constructive feedback during presentations. **Students:** • Collaborate to design and simulate a sustainable city plan. • Analyse the environmental and societal impact of their decisions. • Present their findings and reflect on how urban planning affects daily life and the planet.
Evaluation/ Assessment	Observe teamwork and creativity during the design phase. Assess city models for balance, sustainability, and innovation. Use presentations and simulations to evaluate understanding of sustainability concepts and trade-offs.
TINKER Framework Integration	
How is the activity authentic learning?	This activity immerses students in the real-world challenge of urban planning. They apply modelling and simulation to test ideas and analyse outcomes, mirroring tasks performed by urban planners. Collaboration encourages teamwork as students design and refine their city plans. Reflection fosters critical thinking, as students evaluate how their choices impact energy, pollution, and liveability.
How is gender inclusiveness ensured?	Highlighting diverse urban planners ensures representation and inspires all students. Collaborative teams with rotated roles promote equal participation, while a mix of digital and physical tools accommodates diverse learning styles. Inclusive activities create a supportive space for all students to engage in designing solutions for sustainable cities.
Considerations for level progression	**For beginners:** Provide pre-drawn layouts with simple scenarios to modify, such as adding green spaces or public transport. **For advanced learners:** Challenge students to simulate complex scenarios, such as population growth or energy crises, and analyse their impact on sustainability.

Learning Scenario 8 - Virtual museum of gender and identity

Learning Scenario Information

Title	Virtual museum of gender and identity
Age Level	12-14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Digital Creativity, Human-Computer Interaction
Content domain (Integrated Subjects)	Social Studies, Technology, Art
Learning Objectives	Upon completing this activity, the students should be able to: ● Research and analyse diverse contributions of individuals of different genders across various fields. ● Use digital tools to create a virtual exhibit that represents inclusivity and diverse identities. ● Develop and present their exhibit to share knowledge on gender and identity in an interactive format.
Scenario Description	
Setting	As a social studies or arts teacher, you want students to explore how people of different genders and identities have contributed to society in fields like science, technology, art, and sports. Through this project, students will create a “virtual museum” with exhibits that represent these diverse figures. They will research notable people, select images, create captions, and design a user-friendly virtual museum. The project will help students think critically about gender representation and learn digital creativity skills. *How can you encourage students to create an inclusive and informative digital resource for their peers?*

(Digital) Tools	● Computers or tablets with internet access ● Digital tools for creating virtual museums or presentations (e.g., Google Slides, Padlet, Canva, or Wakelet ● Access to online resources for research on historical and contemporary figures
Activity	**Step 1 (20 minutes): Introduction to Gender Representation and Research** ● Kick-off Discussion: Begin with an open discussion where students brainstorm what comes to mind when they think of the terms "gender" and "identity." Highlight that gender is diverse and includes men, women, non-binary people, and individuals of various backgrounds. ● Examples and Inspiration: Share a multimedia presentation featuring individuals from different genders and identities who have contributed significantly to various fields. Examples could include Frida Kahlo (art), Alan Turing (computing), Katherine Johnson (science), Megan Rapinoe (sports), and Marsha P. Johnson (activism). Discuss their achievements and challenges they faced due to gender or identity. ● Project Overview: Explain that students will work together to create a “Virtual Museum of Gender and Identity,” researching notable figures and designing interactive digital exhibits. Emphasise inclusivity and creativity in their work. **Step 2 (40 minutes): Research and Content Creation** **Group Organisation**: Divide students into small groups or pairs and assign each a specific category, such as science, art, technology, sports, or activism. Each group will select 2-3 figures to research who represent diverse genders and identities. ● **Guided Research**: ○ Encourage students to use reliable online resources, such as educational websites or digital encyclopaedias. Teachers can provide a list of suggested figures or platforms to guide students. ○ Students should gather the following for each figure: ■ A brief biography ■ Key achievements and contributions ■ Challenges faced due to their gender or identity (if applicable) ■ Visual elements like photos, portraits, or artwork

	○ Teach students to use inclusive and respectful language in their captions. **Step 3 (20 minutes): Designing the Virtual Museum** ● Using Digital Tools: Introduce students to tools like Google Slides, Padlet, Canva, or Wakelet. Demonstrate basic features such as adding images, arranging text, and creating interactive elements (e.g., clickable links, embedded videos). ● Building the Exhibit: Each group designs their museum exhibit by: ○ Arranging their research findings in an engaging and visually appealing layout. ○ Incorporating captions and labels that highlight the significance of each figure's contributions. ○ Adding interactive elements, such as clickable "Did You Know?" sections or multimedia components (e.g., video clips, audio snippets). ● Focus on Inclusivity: Encourage groups to ensure their designs and narratives are accessible and inclusive, considering readability and visual clarity for diverse audiences. **Step 4 (10 minutes): Presentation and reflection** ● **Group Presentations**: Each group presents their virtual exhibit to the class. They explain their design choices, highlight key insights from their research, and discuss what they learned about the contributions of individuals from various genders and identities. ● **Class Feedback**: Allow time for classmates and teachers to ask questions or provide constructive feedback. This can include suggestions on enhancing inclusivity or interactivity. ● **Reflection**: Conclude with a brief discussion on the importance of representation and how recognising diverse identities helps foster inclusivity in society.

Teachers and students' Roles	**Teachers**: - Facilitate discussions and guide students in understanding the significance of gender and identity in society. - Support students in conducting research and using digital tools effectively. - Monitor group progress to ensure respectful and accurate representation of all figures. **Students**: - Collaborate in groups to research and design their exhibits. - Practise critical thinking by analysing how the achievements of individuals are influenced by their identity and context. Take responsibility for ensuring their exhibits are informative, inclusive, and engaging.
Evaluation/ Assessment	● Research quality: Inclusivity and accuracy of content, ensuring diverse gender representation and respectful language. ● Exhibit design: Creativity, clarity, and inclusivity of the visual presentation, enhancing the viewer's understanding of the exhibit. ● Presentation: Engagement and ability to clearly articulate ideas about gender inclusivity and identity, demonstrating a deep understanding of the topic. ● Participation: Collaboration and contribution during group work, ensuring equal involvement and effective teamwork.
TINKER Framework Integration	
How is the activity authentic learning?	The "Virtual Museum of Gender and Identity" activity is authentic learning because it connects students to real-world issues of gender representation and identity in society. By creating a digital museum exhibit, students are simulating the work of museum curators, artists, and historians, applying interdisciplinary knowledge in a meaningful context. They conduct research to understand diverse gender identities and their contributions to various fields, which directly reflects real-world curatorial and educational practices. This project not only requires students to think critically about gender but also equips them with digital literacy skills as they design interactive and visually engaging exhibits. The task fosters civic awareness and

	empowers students to create educational content that promotes inclusivity, making it a relevant and authentic learning experience.
How is gender inclusiveness ensured?	Gender inclusiveness is ensured throughout the "Virtual Museum of Gender and Identity" activity by focusing on the representation of diverse gender identities and fostering equitable participation among all students. The project encourages students to explore a broad spectrum of gender experiences, including non-binary, transgender, and gender-fluid identities, alongside traditional male and female figures. By assigning roles such as researcher, designer, and presenter without reinforcing gender stereotypes, the activity ensures equal involvement for all students, regardless of their gender. The content students research and present is centred on individuals who have contributed to society while challenging gender norms, further emphasising inclusivity. This approach not only raises awareness of gender diversity but also promotes a classroom environment where all students can participate equally and learn about the importance of inclusive representation.
Considerations for level progression	● **Beginner Level:** Provide a list of suggested figures for research and pre-made templates for the virtual exhibit to simplify the design process. ● **Advanced Level**: Challenge students to include multimedia elements (e.g., video clips, audio recordings) and ask them to add more context about how societal attitudes toward gender and identity have evolved over time.

The Netherlands

The Netherlands

Learning Scenario 1 - App the gap

Learning Scenario Information	
Title	App the gap
Age Level	12-14 years old
Duration	45 minutes
Informatics topic areas	Design and Development, Programming
Content domain (Integrated Subjects)	Informatics
Learning Objectives	Upon completing this activity, the students should be able to: ● Develop technical skills: Understand the basics of app development. ● Promote ethical awareness: Explore how technology reflects and shapes social values. ● Foster problem-solving: Identify and address real-world issues. ● Encourage creativity and teamwork: Work collaboratively to design innovative solutions. ● Apply user-centred design principles to app development.
Scenario Description	
Setting	You are excited to inspire students to become ethical app developers by engaging them in authentic problem-solving activities that align with social values. Through collaboration and hands-on development, they will learn to integrate social values into their design while solving real-world problems.
(Digital) Tools	● Computers/laptops ● Thunkable or MIT App Inventor ● Internet access

| Activity | **Step 1 (10 minutes): Introduction and Discussion on Socially Impactful Apps**
● **Introduction**: Begin with a discussion about how apps can positively influence society. Show examples of impactful apps such as: Calm (meditation), Woebot (mental health chatbot), Too Good To Go (food waste reduction), EcoBuddy (tracking sustainable habits). Or even Khan Academy (learning resources), Duolingo (language learning).
● **Stimulate the discussion by giving your student some questions like:** What makes an app socially impactful? How do these apps promote values like inclusivity, accessibility, or sustainability?
● Introduce the concept of ethical design—how apps must consider user privacy, cultural respect, and accessibility - You can start watching this video

Step 2 (10 minutes): Problem Identification and Brainstorming
● Split your students in teams of 3–4.
● Choose a Social Issue: Teams select an issue relevant to their community or interests (e.g., promoting mental health in teens, increasing recycling rates, helping students with learning difficulties).
● Guided Brainstorming: Each team defines: Target audience: Who will use this app? - Core features: What will the app do to address the issue? - Social values: What values (e.g., inclusivity, sustainability) will the app promote? Encourage students to consider diverse user perspectives, ensuring their app serves a broad audience.

Step 3 (15 minutes): App Prototyping
● Introduction to Development Tools: Provide your students with: a)a brief tutorial on platforms like Thunkable or MIT App Inventor (you can find some good examples online) and b) how to create interactive elements (e.g., buttons, forms, animations).
● Activity - Building a Prototype: Teams develop a simple, functional prototype of their app. Each app should include key features like gamification, information sharing, or user engagement. This phase should encourage iterative design—test and refine ideas during development.

Step 4 (10 minutes): App Presentation and Reflection
● Each team presents their app prototype to the class. Presentations should include: a) The problem the app addresses, b) Key features and how they align with the social issue, c) Ethical considerations integrated into the |

	design. ● Reflection Questions to stimulate the discussion: How does your app reflect social values and promote positive behaviour? What challenges did you face, and how did you overcome them? What ethical considerations guided your choices? Include reflection prompts, such as: Does your app consider the needs of users of all genders? Or How does your app promote inclusivity?
Teachers and students' Roles	**Teacher**: Prepare the materials for students. Provide technical assistance and feedback as needed. Stimulate the discussion with some questions. **Students:** They act as socially-conscious innovators, identifying community challenges, brainstorming creative solutions, and collaboratively designing app prototypes that integrate ethical and inclusive values.
Evaluation/ Assessment	Some elements can be used for the assessment: ● Innovation and Relevance: Does the app idea creatively address the chosen issue? ● Technical Progress: Is the prototype functional and user-friendly? ● Ethical Integration: Are social values thoughtfully incorporated into the design? ● Collaboration and Presentation: Did the team work effectively and communicate their ideas clearly?
TINKER Framework Integration	
How is the activity authentic learning?	This scenario fosters authentic learning by connecting classroom activities with real-world challenges, inspiring students to see themselves as agents of positive change in their communities.
How is gender inclusiveness ensured?	The scenario can be considered gender inclusive by ensuring that all students, regardless of their gender identity, feel represented, valued, and empowered throughout the activity. In Particular, they can use inclusive language. Additionally, teachers can present examples of apps created by diverse developers, including women and non-binary individuals, to demonstrate that app development is a field for everyone. For example: Girls Who Code or GoldieBlox, a STEM-focused app and brand for girls.
Considerations for level progression	Community Feedback: Share prototypes with peers, teachers, or community members for feedback.

	Further Development: Encourage students to refine their apps based on feedback and potentially publish them.

Learning Scenario 2 - Code your game

Learning Scenario Information	
Title	Code your game
Age Level	12 - 14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Programming, Design and Development
Content domain (Integrated Subjects)	Art, technology, Social Science
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the meaning of Algorithms and how they can be used in programming a simple game. ● Analyse how game elements like rules, player interactions, and goals work together to create an experience. ● Use software like Scratch or Terminal Two to modify and improve an existing game. ● Design a process based on the users and personas.
Scenario Description	
Setting	In this engaging activity students can learn programming concepts in a fun and interactive way, practicing game design, by collaboratively modifying game mechanics based on a provided game model and by using the free tool Scratch. Students will step into the role of "Game Designers for Change" tasked with

	modifying an existing game to improve its mechanics or adapt it for a new purpose, such as making it more engaging, inclusive, or challenging. Working in small groups, they will modify the game's code, test their changes, and present the impact of their new mechanics.
(Digital) Tools	● Laptops ● Internet access
Activity	**Session 1** **Step 1 (10 minutes): Introduction to Game Mechanics** ● Play or demonstrate a short game (e.g., Pong in Scratch), stimulate the discussion asking them: What makes this game fun or challenging? And discuss basic mechanics: objectives, rules, controls, feedback, and progression. ● Explain the task to your students: they will modify at least one game mechanic in a provided game model. Examples might include: adjusting player movement speed or abilities, changing how the score is calculated, introducing new rules, obstacles, or levels. ● Reflect on the code, analyse with your students how the algorithm is written. **Step 2 (15 minutes): Exploring the Game Model** ● Provide each group with a simple pre-designed game in Scratch. Examples: a basic platformer where a character collects coins, a pong game where players hit a ball back and forth. ● In their groups, students discuss: What they like about the game. What mechanic they want to change and why. **Step 3a (20 minutes): Modifying the Game Mechanics** ● Groups work together to modify their game using the chosen software. Examples of modifications: adding a timer to make the game more challenging, introducing random events (e.g., obstacles or power-ups), creating new player interactions, such as cooperation or competition… **Session 2** **Step 3b (10 minutes): Modifying the Game Mechanics** ● Groups work together to modify their game using the chosen software. Examples of modifications: adding a timer to make the game more challenging, introducing random events (e.g., obstacles or power-ups),

	creating new player interactions, such as cooperation or competition, **Step 4 (20 minutes): Playtesting and Iteration** ● Testing: Groups playtest their modified games to ensure functionality and assess the impact of their changes. ● Iterate: If necessary, students make further adjustments to improve the gameplay experience. **Step 5 (15 minutes): Presentation and Feedback** ● Showcase: Each group presents their modified game, explaining: the original game mechanic, the change they made and why, the impact of the change on the gameplay. ● Class Feedback: Peers and the teacher provide constructive feedback, focusing on creativity, execution, and the player experience.
Teachers and students' Roles	**Teacher**: The teacher assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. Teacher Support: The teacher circulates to provide guidance, troubleshoot code, and encourage problem-solving. **Students**: The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	You can evaluate the functionality and creativity of the code changes. Also the assessment of teamwork and group dynamics during the activity can be evaluated such as the reflection phase.
TINKER Framework Integration	
How is the activity authentic learning?	This scenario combines technical skill development with creativity, fostering an authentic and engaging learning experience. Mimics the iterative process of professional game design, encourages choice and creativity in modifying a game and reflects real-world team dynamics in software development.

How is gender inclusiveness ensured?	The scenario is gender inclusive because it employs strategies to ensure that all students, regardless of their gender identity, feel represented, valued, and engaged. Some suggestions about how to be more gender inclusive are: a) adoption of gender-neutral and inclusive terms avoiding expressions that imply gender stereotypes, b) during the introductory phase, present examples of game designers and innovators from various gender identities (e.g. Brenda Romero, Anna Anthropy or Hideo Kojima). Some phases of the learning scenario are particularly helpful to foster gender inclusion and particularly, the character and Narrative Design (students can modify characters or narratives to make them more representative of gender diversity, avoiding stereotypes encouraging the creation of non-binary or gender-fluid characters), the modification of game dynamics (groups can introduce new rules that promote collaboration instead of competition and mechanics can be designed to reflect values like inclusivity and mutual respect)
Considerations for level progression	Host a mini-tournament where groups play each other's games and vote on categories like "Most Creative Mechanic" or "Best Player Experience."

Learning Scenario 3 - Cybersecurity Quest: Defend the Digital World!

Learning Scenario Information	
Title	Cybersecurity Quest: Defend the Digital World!
Age Level	13-14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Privacy, Safety, Security
Content domain (Integrated Subjects)	Social Science
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand basic principles of secure passwords, phishing detection, and data breach responses.

Scenario Description	
Setting	You want to introduce your students into the world of internet security. Students will engage in a gamified, collaborative experience to learn about cybersecurity threats, safe online practices, and data protection strategies. By participating in a role-playing "quest," they will work in inclusive teams to solve cybersecurity challenges and build awareness campaigns, addressing real-world cyber risks. Students become "Cyber Guardians" tasked with defending a fictional city, "DigiTown," from a cyberattack. Each team must: ● Investigate cybersecurity breaches (e.g., phishing, ransomware, weak passwords). ● Solve a series of challenges to "secure" DigiTown's systems. ● Create a data protection guide tailored for DigiTown's residents.
(Digital) Tools	● Laptops ● Internet access ● Simulation Tools: Use online platforms like PhishSim for phishing challenges or password strength testers for immediate feedback. ● Creative Tools: Canva or Adobe Spark for designing posters and presentations. Coding and Problem-Solving Tools: Scratch or Python for creating basic cybersecurity solutions or simulations.
Activity	**Session 1** **Step 1 (20 minutes): Introduction** ● Introduce the topic of cybersecurity and the relevance of the topic by watching this video with your students. You can set together a common vocabulary. **Step 2 (25 minutes):- Introducing the games** ● Scenario: DigiTown is under attack by a group of hackers called "Shadow Hackers." Students are "Cyber Defenders" tasked with protecting the citizens' data. ● Brief explanation: Why cybersecurity is important (short, relatable real-world examples like data theft or phishing). ● Split your students in 3 or 4 mixed-gender teams (4–5 students). Each team tackles 3 mini-challenges related to cybersecurity. Roles: each student takes on a role within the team, such as: the Analyst: Investigates the problem and identifies vulnerabilities, The Strategist: Designs solutions and plans for

	prevention, The Communicator: Prepares educational materials and presents findings, The Developer: Implements solutions using coding or digital tools. **Session 2** **Step 3 (30 minutes): Activity - Cybersecurity Challenges** ● ***Challenge 1:*** Secure the Passwords (10 minutes) Task: Create 3 secure passwords for different accounts (social media, banking, email). Activity: Follow guidelines like length, numbers, symbols, and random words. Verification: The teacher provides immediate feedback with examples of weak and strong passwords. ● ***Challenge 2***: Spot the Phishing (10 minutes) Task: Analyse 3 simulated emails and identify which one is a phishing attempt. Activity: Students look for red flags (e.g., grammar errors, suspicious links, urgent requests). Verification: Quick group discussion with the teacher to review findings. ● ***Challenge 3***: Respond to a Data Breach (10 minutes) Task: Create a quick response plan for a cyberattack that has affected DigiTown. Activity: Decide on immediate steps, such as: Informing citizens, updating passwords, implementing additional protections. Output: Write the plan on a worksheet and share it with the group. **Step 4 (15 minutes): Self-reflection** ● Flash Presentation: Each team presents their protection plan or quick guide in 1 minute to the class. ● After completing missions, teams reflect on their strategies and lessons learned. Students can complete a group reflection, answering questions like: What new cybersecurity skills did you learn? How did your team collaborate, and what could be improved? How will you apply this knowledge in your own digital life? ● They receive feedback from peers and teachers and iterate on their final guide or campaign.

Teachers and students' Roles	**Teacher:** The teacher guides students through the activities, asks probing questions to stimulate critical thinking, and creates a supportive learning environment. **Students:** They actively listen to the introduction, participate in discussions, and work collaboratively to solve the cybersecurity challenges.
Evaluation/ Assessment	- Collaboration and Inclusion: Equal participation and effective teamwork. - Problem-Solving Skills: Creativity and practicality of solutions. - Cybersecurity Knowledge: Demonstrated understanding of threats and defences. - Presentation Quality: Clarity and engagement in the final guide and campaign. - Reflection: Insightfulness of their reflections on the learning process.
TINKER Framework Integration	
How is the activity authentic learning?	This scenario leverages the authentic learning framework by connecting students' learning to real-world contexts, encouraging them to solve meaningful problems collaboratively, and allowing them to impact their immediate community while gaining valuable digital literacy skills.
How is gender inclusiveness ensured?	This gamified, authentic learning scenario combines real-world skills, collaboration, and creativity, ensuring an engaging, inclusive, and impactful educational experience for all genders. The storyline emphasises diverse heroes and avoids gender stereotypes in role assignments. For instance, leadership and technical roles are presented as open and equally accessible to all. Finally, activities include a mix of technical, creative, and communicative tasks, catering to varied interests and strengths across genders.
Considerations for level progression	You can stimulate your students to go deeper and reason about how cybersecurity, information and democracy are intertwined watching this video with your students.

Learning Scenario 4 - Data Detectives - Analysing Real-World Data

Learning Scenario Information	
Title	Data Detectives - Analysing Real-World Data

Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Data and Information
Content domain (Integrated Subjects)	Art, technology, Social Science
Learning Objectives	Upon completing this activity, the students should be able to: ● Collect, organise, analyse, and interpret real-world data sets to address a relevant question or problem
Scenario Description	
Setting	You are excited to introduce your students into the world of Data. It might be a complex topic but with this activity you will engage them in a "real world" activity and applying critical thinking they will analyse real world data to promote their data literacy skills.
(Digital) Tools	● Laptops ● Internet access Access to local open data or to OurWorldindata
Activity	**Step 1 (10 minutes): Introduction** ● Introduce your students to data sets, types of data, and the basics of data analysis. ● Present the activity showing them some local data (e.g. weather data, school survey results, or sports statistics) or data from the website Our World in data. ● Stimulate the discussion by asking some meaningful questions to your students (here some examples of the possible questions: How does air quality change throughout the year in our city? What factors influence students' preferred learning methods? Is there a relationship between exercise frequency and academic performance? Can you see any differences?...) **Step 2 (10 minutes): Initial task design**

	● Split your students in small groups (max 3-4 per group) ● Each group will brainstorm and identify a question or problem they are curious about, related to their lives or community. ● Each group will gather data from existing sources (e.g., government websites, school records, ourWorld in data) **Step 3 (15 minutes): Data analysis and group working** ● Groups work together to download, clean, organise, and analyse their data using tools like Google Sheets, Excel, or Python for basic visualisations and statistics (if you can support them with Python) and discuss their findings collectively. ● Students work in teams in designing a short presentation of their findings. **Step 4 (10 minutes): Sharing and reflection** ● Students present their findings through reports, infographics, or presentations to peers, teachers, or even local stakeholders (e.g., city planners, school administrators). ● Teams test their interpretations by sharing findings with others and revisiting their conclusions based on feedback. ● After presenting, students can be stimulated to reflect by answering some questions like: What did you learn about interpreting data and making decisions based on it? How might your findings help others or inform real-world decisions? What would you do differently if given another chance?
Teachers and students' Roles	**Teacher**: The teacher prepares the data sets for the introduction and assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. The teacher circulates to provide guidance, support students in finding the datasets they need, and encourage problem-solving. **Students**: The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.

Evaluation/ Assessment	- Data Literacy: Ability to collect, clean, organise, and analyse data. - Critical Thinking: Strength of the question, analysis, and conclusions. - Collaboration: Contribution to team tasks and peer interactions. - Creativity and Communication: Effectiveness in visualising data and presenting findings. - Reflection: Ability to articulate learning and challenges faced.
TINKER Framework Integration	
How is the activity authentic learning?	By engaging students in meaningful, collaborative, and tool-based tasks with connections to real-world problems, this scenario exemplifies authentic learning, making the learning process relevant, engaging, and impactful. This scenario is grounded in tasks that mirror how data is used in real life, such as analysing trends, identifying patterns, and solving meaningful problems. Students identify and investigate a meaningful question or problem. The process involves curiosity-driven exploration and critical thinking, mimicking the inquiry processes used by researchers and data analysts.
How is gender inclusiveness ensured?	The scenario is gender inclusive because it is designed to ensure equitable participation and representation, breaking down potential barriers that might exclude or disadvantage any gender. By allowing flexibility in topic choice, ensuring equitable group dynamics, and avoiding stereotypes, the scenario fosters a supportive environment where all genders feel valued and empowered to engage meaningfully in the learning process. Particularly, Students can choose a question or issue they are passionate about, which allows for diverse interests across all genders. For example, a team might explore topics like environmental issues, sports, or health—offering entry points that appeal to a wide range of preferences and experiences. This avoids reinforcing gender stereotypes about what topics students “should” find interesting. Additionally, instruction is scaffolded to ensure all students, regardless of prior experience, feel confident in using tools for data management.
Considerations for level progression	For a second step, students can collaborate to design their own research questions (can be centred on gender inequalities/perceptions) , develop a data collection tool (questionnaire, surveys, interviews), collect data at school and analyse the data.

Learning Scenario 5 - Spot the fake

Learning Scenario Information	
Title	Spot the fake
Age Level	14-16 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Data and information, Responsibility and Empowerment
Content domain (Integrated Subjects)	Math, Social science, English
Learning Objectives	Upon completing this activity, the students should be able to: ● Understand the meaning of misleading data, correct data and how data can be correctly used to reinforce information ● Understand and apply concepts of mis- and disinformation in context ● Construct knowledge around conspiracy theories, mis- and disinformation using a satirical conspiracy theory as an example. ● Evaluate how operates and create connections between how mis- and disinformation is spread.
Scenario Description	

Setting	The activity is designed to introduce students to the concept of data, information and fake news. Students will be introduced to several pranks, creating connections to mis- and disinformation while watching a set of videos from TEDed. Before the intervention find on line some of the most misleading and well done hoaxes (we warmly suggest: the DHMO parody, or the Drop bear,)
(Digital) Tools	● Projector and laptop
Activity	**Session 1** **Step 1 (20 minutes): Introduction** ● Share only the term "post-truth" (without the definition) with your students on the board or projector. You can use the definition: when objective facts are less influential than personal beliefs and emotion (Oxford Dictionary); relating to a situation where people are more likely to accept an argument based on their emotions and beliefs, rather than one based on facts (Cambridge Dictionary). ● In partners or small groups, ask students to come up with their best guess on what the term means or describes. Share out from groups and capture ideas. Then, have students reflect on their guesses: Why or how did they come up with this guess? What have they seen or noticed that informed this guess? What experiences do they have that informed this guess? ● Share ideas briefly as a whole group or class. Then, share the full description and definition. Close this part of the activity watching with your students this video. **Step 2 (25 minutes): Activity** ● Split your students in small groups (2-4) ask the group to have a look at the provided hoaxes (pay attention: they don't know if they are true or false information). **Session 2** **Step 3 (20 minutes): Presentation** ● Ask your students to illustrate the content and to share with others if it is true/false and why. **Step 3 (25 minutes): Group Reflection and Discussion** ● Analyse together the "fake news" and discuss with them how they can

	identify misleading/fake info. ● You can also watch together one of these videos (Video 1, Video 2, Video 3)
Teachers and students' Roles	**Teachers:** - Guide the students through the initial examples - Assist them in writing their lists of actions and elements to create the function. - Supervise each activity, encouraging students to reflect on patterns. **Students**: - Act as debunker
Evaluation/ Assessment	● Observe student participation during each activity phase and how they interact between them. ● Evaluate each group's ability to design a well detailed function with a clear description of patterns.
TINKER Framework Integration	
How is the activity authentic learning?	The activity is based on concrete examples of what is information and how we can spot viral fake news.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles
Considerations for level progression	You can invite the groups to generate some hoaxes/misleading information/true information about a common topic through AI (copilot/ ChatGPT/...) and ask their classmates to identify them.

Learning Scenario 6 - The 200 words challenge - poet edition

Learning Scenario Information	
Title	The 200 words challenge - poet edition
Age Level	12-14 years old
Duration	45 minutes

Informatics topic areas	Digital Creativity, Design and Development
Content domain (Integrated Subjects)	Art, Literature, Language
Learning Objectives	Upon completing this activity, the students should be able to: ● Interpret a project brief and meet the design specifications for a project. ● Use creativity to express themselves, solve a problem, or generate a new idea. ● Use the design process to generate useful or imaginative solutions for problems. Use new software
Scenario Description	
Setting	In this teaching activity you can introduce your students to the use of some software to create meaningful contents in which text and images are together. You can launch a poem and use free online software (e.g. Adobe Express, Canva,...)
(Digital) Tools	● Projector and laptops for students

Activity	**Step 1 (10 minutes): Introduction** ● Introduce your students to the concept of Visual literacy and give them some practical examples with some critical questions to stimulate them in the creative part of this activity. You can start with: **Decode Infographics**. Today, infographics abound online. Knowing how to make sense and critically analyse them remains important. How do these share information or emotions? What's our own reaction to them? **Weave Stories.** You can combine text, images, and other elements to tell a story. **Step 2 (25 minutes) activity:** ● Stimulate your student, working in pairs, to design a poem composition to express their feelings, dreams and fears through images and words (not less and not more than 200 words). Ask them to use generative AI for their images (not less and not more than 4) **Step 3 (10 minutes) sharing and reflection:** ● Ask to share one or more poems and then to share what they ask to AI for generating the images. Stimulate your student to analyse the images generated and how they meet/don't meet the expectations and their feelings.
Teachers and students' Roles	**Teachers:** - Guide the students through the initial definitions and examples - Assist them in the activity. - Supervise each activity, encouraging students to reflect on patterns. **Students**: - Act as poets
Evaluation/ Assessment	● Observe student participation during each activity phase and how they interact between them. ● Evaluate each group's ability to design a well detailed story
TINKER Framework Integration	

How is the activity authentic learning?	The activity is based on concrete examples of how they can use software and AI with a critical approach to AI.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles.
Considerations for level progression	**Beginner Level:** ● Learn basic software tools for adding text and images. ● Focus on simple designs and expressing basic ideas. **Intermediate Level:** ● Experiment with combining text and images creatively. ● Emphasise expressing emotions and refining designs. **Advanced Level:** ● Use advanced design features to enhance compositions. ● Focus on originality and peer feedback for improvements.

Learning Scenario 7 - The code crackers

Learning Scenario Information	
Title	The code crackers
Age Level	12-14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Algorithms, Human-Computer Interaction - unplugged activity
Content domain (Integrated Subjects)	Physical education

Learning Objectives	Upon completing this activity, the students should be able to: ● Understand binary code: Learn how to convert between binary and decimal systems. ● Apply knowledge to real-world scenarios: Explore how binary is used in technology, including text encoding, image representation, and file storage. Develop critical thinking: Solve challenges using binary concepts in an authentic context.
Scenario Description	
Setting	In this engaging activity students will take on the role of "Digital Forensics Specialists" tasked with decoding binary messages as part of a fictional investigation. Through this immersive experience, they will learn how binary systems underpin modern technology and practice applying binary logic to solve practical problems. Teachers will engage students in learning binary code by connecting it to real-world applications such as digital communication, media storage, and encryption.
(Digital) Tools	● Computers/laptops, ● Binary conversion charts, ● Calculators, interactive coding platforms (e.g., Blockly, Scratch), multimedia resources
Activity	**Session 1** **Step 1 (20 minutes): Introduction to Binary Code** ● Present the question: How does a computer understand your name or favourite song? And show examples of binary code in real life (e.g., ASCII for text, pixel representation for images). ● Discuss why binary (0s and 1s) is the foundational language of computers. ● Basics of Binary: Explain the binary number system and its base-2 structure. TO facilitate this part you can watch this video together. **Step 2 (5 minutes): Problem Framing and Role Assignment** ● Tell students they are "Digital Forensics Specialists" working on a high-tech investigation. A mysterious binary-encoded message has been intercepted, and their job is to decode it and uncover clues. ● Divide students into small groups, ensuring collaborative problem-solving.

	Step 3a (20 minutes): Hands-On Binary Challenges ● Launch the challenge 1: Text Decoding and provide a binary-encoded message (e.g., "01001000 01000101 01001100 01001100 01001111" = "HELLO"). Students use ASCII charts to decode the text and uncover the first clue. **Session 2** **Step 3b: Hands-On Binary Challenges (25 minutes)** ● Launch the challenge 2: Image Representation. Introduce binary representation in images (e.g., black = 0, white = 1). Students create or decode a binary image (e.g., a simple smiley face). ● Introduce the challenge 3: Encryption Simulation. Demonstrate how binary is used in simple encryption (e.g., XOR operations). Students encode a message using a provided key and challenge another group to decrypt it. **Step 4: Application and Reflection (20 minutes)** ● Discuss real-world uses of binary, such as in file storage (text, images, videos), communication protocols, and cybersecurity. You can give some questions to your students (e.g. "How does binary allow your phone to send a photo to a friend?" Why is binary crucial in secure online transactions? What surprised you about binary and its applications? How might learning binary be useful in future careers? What challenges did you face, and how did you overcome them?
Teachers and students' Roles	**Teacher:** The teacher assumes the role of facilitator helping students to do the activity and supporting them in the metacognition phase. **Students:** The students assume the roles of "listener", and "executor" respectively, paying attention to the teacher, and actively participating in the learning activities.
Evaluation/ Assessment	The positive student's emotional engagement is assessed through the student's willingness to get involved in the learning activities. You can also evaluate: a) technical Understanding: Accuracy in decoding binary messages and completing challenges, b)Collaboration: Effective teamwork and problem-solving during group activities and c) Critical Thinking: Ability to connect binary concepts to real-world applications.
TINKER Framework Integration	

How is the activity authentic learning?	This scenario bridges foundational knowledge of binary code with its significance in the digital world, fostering engagement and real-world relevance. The Binary decoding is framed as part of a practical, engaging challenge. Students work in teams, simulating real-world tech problem-solving environments and activities linked directly to how binary is used in everyday technologies.
How is gender inclusiveness ensured?	The scenario is gender inclusive because it intentionally ensures that all students, regardless of gender identity, feel represented, valued, and supported. Here are specific strategies and elements that make this scenario gender inclusive: include examples of real-world computer scientists and technologists from various genders and backgrounds, such as: Ada Lovelace: Pioneer in programming, Timnit Gebru: Advocate for ethical AI and Alan Turing: Innovator in computation and codebreaking. Additionally, the scenario offers challenges that appeal to diverse interests, such as: art-focused tasks like binary pixel art, problem-solving tasks like encryption simulations and social themes like decoding inclusive message
Considerations for level progression	An advanced math lesson can be included: Introduce binary arithmetic (addition, subtraction) for students interested in deeper exploration. Additionally, an intersection with history can be done suggesting to the students of conducting research the history of binary systems and their role in early computing.

Learning Scenario 8 - The rap generator

Learning Scenario Information	
Title	The rap generator
Age Level	13-15 years old
Duration	45 minutes

Informatics topic areas	Algorithms
Content domain (Integrated Subjects)	Mathematics, Technology, Music and Art
Learning Objectives	Upon completing this activity, the students should be able to: ● Define and understanding of Functions ● Define what patterns are and how do they work The link between patterns and functions
Scenario Description	
Setting	The activity is designed to introduce students to the concept of function, pattern and algorithm.
(Digital) Tools	● Projector and laptop ● The RAP box - one box for group of students, each box will contain: sheet of papers, a list of words they can use to compose the text of the rap song and a set of instruments they can use to create the melody of the song (pen, spoons, paper tubes but you can suggest them to use their hands also). ● Pens, Pencils ● One Working Sheet per group to write the patterns and actions done in two columns and with an additional column to write the complete function at the end of the activity.
Activity	**Step 1 (10 minutes): Introduction to Pattern and Functions Using Real-Life Examples** ● Introduce your students to the concept of “algorithm” watching this video together. Explain to the students the meaning of “function and patterns” and how they are linked to the concept of algorithm. You can start from some daily activities and you can write the steps of the chosen function on the whiteboard. ● Ask your students to tell you what they do each day and ask them to explain the process step by step. Write the steps on the whiteboard → if needed you can give them suggestions: set the table for the dinner, pack the backpack, have a shower… ● Explain that a **function is a single action, that you can easily do over and**

	over again, made by some well defined and repeated steps. - recall the actions done and described by one of your students. **Step 2 (20 minutes): Understanding** ● Show to the students a piece of a RAP lyric you previously prepared. A typical rap song follows a pattern of alternating verses and choruses. These in turn consist of lines, which break down to individual words and finally to syllables. A line equals one musical bar, which typically consists of four beats, setting limits to how many syllables can be fit into a single line. Verses, which constitute the main body of a song, are often composed of 16 lines. You can play a short 16-line RAP previously prepared by you. ● Ask each group of students (in this activity a group of two or three is good) to create their RAP sequence using the contents of the box. In the meantime they can also fill in the working paper writing the list and sequence of actions (sing/play/take/beat) in one of the columns + the list and sequence of elements (word xy/pencil/stick) in the other one. **Step 3 (15 minutes): Group Reflection and Discussion** ● Introduce the terms *function* and *pattern* in a more technical way: ○ **Function:** a block of code that defines **a sequence of steps or commands**, such as movement - recall the sequence of actions done to create the sun-catcher. ○ **Pattern**: Introduce the term by analysing the differences in your sun-catchers (e.g. 2 red beads each 2 buttons or a spacer each 3 nuts and 2 charms…) and also in the actions done to introduce them to identify similarities between decomposed problems.. ● Ask your students to find in their RAP piece the patterns (both elements and actions) and discuss them together. You can reflect with your students on the inclusivity of their lyrics and change some of them if needed. ● Ask each group to write in the third column the “Function of my RAP” putting together in sequence the actions and the elements. You can discuss and comment together one or two examples from them.
Teachers and students’ Roles	**Teachers:** - Guide the students through the initial examples - Assist them in writing their lists of actions and elements to create the function. - Supervise each activity, encouraging students to reflect on patterns. **Students**: - Act as creator of the RAP.

	- As coders they write a function to design the RAP sequence
Evaluation/ Assessment	● Observe student participation during each activity phase and how they interact between them. ● Evaluate each group's ability to design a well detailed function with a clear description of patterns.
TINKER Framework Integration	
How is the activity authentic learning?	The activity uses hands-on activities. Students explore and design a function and a set of patterns in a tangible environment, making the abstract concepts more concrete.
How is gender inclusiveness ensured?	This activity encourages collaboration in mixed-gender teams, promotes equal participation, and avoids gendered roles, promotes the use of arts in coding and encourages different creative languages throughout the RAP music.
Considerations for level progression	You can invite the groups to work together and design the algorithm of a RAP containing the 16-line pieces of each group.