WP 4.2 Skeleton of lesson plans for Interdisciplinary Pedagogical Micro-Units (IPUs) in each area of study along with technological tools to be incorporated

Teaching Procedure

Lesson Topic	***A central theme that ties multiple subjects together. This theme provides the context for learning and should be broad enough to encompass various disciplines (e.g., sustainability, space exploration, technological innovation, cultural diversity). It acts as a unifying thread throughout the lesson.***
Phenomenon	The global crisis of electronic waste: billions of outdated electronic devices such as mobile phones, laptops, and batteries are discarded every year, many ending up in landfills or shipped to low-income countries.
Grade Level	Students 13-15 years old
Learning Objectives	By the end of this 90-minute lesson, students will be able to: • **Define and Explain E-Waste:** Describe what electronic waste is and give examples of e-waste (old phones, computers, batteries, etc.), explaining why it is a growing problem globally and locallyewastemonitor.info. • **Environmental Impact:** Understand and summarize the environmental and health impacts of improper e-waste disposal (toxic substances, pollution of soil and water)https://populationeducation.org/3-reasons-to-teach-high-schoolers-about-e-waste-and-ideas-on-how-to-do-it/, and the importance of recycling/upcycling electronic devices. • **Digital Responsibility:** Demonstrate digital literacy by identifying how to responsibly manage the lifecycle of personal electronic devices – e.g. safely wiping personal data from a device and finding where and how to recycle or dispose of gadgets. • **Civic Engagement:** Recognize the roles of individuals, communities, businesses, and government in addressing e-waste (such as laws requiring e-waste recycling and local programs). Evaluate how they as students can contribute to solutions (e.g. participating in or organizing an e-waste collection drive). • **21st Century Skills:** Collaborate in teams to synthesize information from science, technology, and civic perspectives, and create a group product (e.g. a poster or mini-campaign plan). In doing so, practice critical thinking, creativity, communication and teamwork.
Learning Outcomes	Students will apply scientific, civic, and digital knowledge to evaluate the e-waste problem. Students will synthesize interdisciplinary information to co-create a persuasive awareness tool.

Subjects Integrated

- Environmental Science: E-waste as an environmental issue (pollution, resource use, recycling).
- Digital Literacy: Responsible use of technology, managing digital devices' lifecycle, using digital tools for research and creation.
- Arts: To present their understanding of e-waste

Materials

- Projection & Audio: Computer and projector (or interactive whiteboard) to show a short video on e-waste. (Example: "The Circuit: Tracking Down America's E-Waste" investigative video, 8 minutes, or another age-appropriate video explaining e-waste and its impacts.) Speakers for audio.
- Internet Access (optional): If available, for student research or for using online tools. (Alternatively, prepare printed fact sheets with key data about e-waste – global statistics, local recycling info, health impacts, etc.)
- Stationery: Poster paper or chart paper (one per group) and markers, or computers/tablets for each group if creating a digital poster/infographic (using a tool like Canva or Google Slides).
- Sample E-Waste Items: (Optional) A few old electronic devices or components (e.g. an old mobile phone, a spent battery, a broken keyboard) to demonstrate and spark discussion.
- Sticky notes or index cards: For students to jot down ideas, or for an exit-ticket activity.
- Whiteboard and markers: To write brainstorming notes, key terms (like "e-waste"), and to note group findings during discussion.
- Handouts: Any worksheets for guiding the project (for example, a planning template or checklist for the poster content), and a short case study or article excerpt if needed (for instance, a brief story of e-waste in a place like Agbogbloshie, Ghana – to provide real-world context).
- Assessment tool: Simple rubric for the group project (for teacher use), and possibly a device (teacher's phone/tablet) to run a quick quiz (e.g. a Kahoot! quiz on e-waste facts) if planned.

Prerequisite Skills

- Basic Environmental Concepts: Students should have a basic understanding of what "recycling" is and why it's generally good (taught in earlier grades or Primary Environmental Studies). Familiarity with the idea of pollution and that some waste can be harmful to the environment.
- Introductory ICT Skills: Since lower secondary students have an ICT course (about 2 periods/week), they are expected to have basic digital skills – e.g. using a web browser, creating a simple digital document or slide. They should also know basic internet safety (like not sharing personal data publicly), which will be reinforced when talking about wiping data from old devices.
- Group Work Experience: Students have prior experience working in pairs or small teams on simple tasks, so they understand how to cooperate, share ideas, and divide roles (the teacher may have to remind them of good group practices).
- Language: Sufficient proficiency in the language of instruction to comprehend the video (if the video is in English, consider subtitles or provide a summary in Greek). Students should be able to read and understand short informational texts (appropriate for ages 12–15).

Seating Arrangements

- Whole Class: At the lesson start, students sit facing the projector/board for the introduction and video.
- Groups: For the main activity, arrange desks into groups of 4–5 students each (if not already in clusters). Ensure each group has a clear workspace for poster-making or a device to work on. A flexible seating approach is ideal – students move chairs to gather in circles or around tables. This encourages interaction and easy sharing of materials.
- Movement: During brainstorming, students might post sticky notes on a wall or the board (ensure space for this). During the presentation phase, have groups come to the front or have students walk around if doing a gallery walk to see each other's posters.
- Note: Make sure the seating allows the teacher to walk around to facilitate group work. If the classroom is small, consider using corners or the hallway for groups to spread out during the project phase.

Time	Total: 90 minutes (two standard class periods of 45 minutes each).
Assessment	How are you going to assess students' learning objectives? Formative? Summative? Both? For instance, conduct a quick formative assessment to gauge understanding. This could be: • An exit ticket where students write a one-sentence answer to a question (e.g., "Name one way both science and art contributed to today's lesson theme"). • A mini-quiz with 2-3 short questions covering each subject's contribution. • A think-pair-share discussion question that students first answer individually, then discuss with a partner (teacher listens in to assess understanding). Peer review if a small product was created (students swap work and give one positive comment related to each subject area).

Lesson Steps

Introduction 10 Minutes	• Hook Question (Whole Class): Begin by asking: "What do you do with your old or broken electronics?" (Examples: a phone that doesn't work, last year's tablet, an old game console, etc.) Give students a moment to think, then invite a few responses. Write keywords on the board (e.g. "throw it away?", "keep in a drawer", "give to cousin", "recycle?"). This sparks interest by making the topic personally relevant. • Follow-up Questions: "Have you ever heard of electronic waste or e-waste? What do you think that means?" Take a couple of volunteer answers. Acknowledge guesses and introduce the term formally: E-waste = discarded electronic devices or components. Explain that even leaving an old phone in a drawer means it's potentially e-waste in the making. • Real-World Context (Teacher Input): Briefly share a striking fact to show why e-waste is an important issue. For example: "Globally, we generated about 53.6 million tons of e-waste in 2019 (that's like 350 cruise ships worth of electronics!), but only about 17% was recycled. The rest often ends up in landfills or shipped to poorer countries, causing pollution." Also mention any local context: "In Cyprus, like all EU countries, we have laws to collect and recycle e-waste so it doesn't harm the environment. But many people still don't know what to do with their gadgets." This connects to civic and science aspects (law and pollution). • Learning Goals: Tell students that in this lesson they will be investigators and problem-solvers. They will learn why e-waste is a big deal (environmental science), what we can do with our devices (digital literacy), and how we as citizens can help fix the problem (civic responsibility). Write the driving question on the board: "How can we reduce electronic waste and its impacts in our community?" This question will guide the lesson, and students will come back to it in their project. • (Optional mini-activity): Show & Tell: If you have a sample old device (e.g. an ancient cell phone or a dead laptop battery), show it to the class. Ask, "What's inside this? What might happen if I just throw it in the trash?" Use this to segue into the next video/activity by highlighting curiosity or misconceptions (e.g., "Many electronics contain harmful materials like lead or mercury that can leak into soil. Let's find out more from an expert video.").
Activity 1 (Watch Video)	Video (8 min): Play a short, engaging video that illustrates the journey and consequences of e-waste. For example, "The Circuit: Tracking Down America's E-Waste" – which follows trackers placed in "recycled" electronics and shows how they end up in dumps in other countries. (Alternatively, use a simpler explainer video suitable for 12–15 year olds.) Before starting, prompt students: "Watch for what surprises you – where does our e-waste go, and what problems can it cause?" This focus question will help them pick out key points. Think-Pair-Share (5 min): After the video, give students a minute to jot down 1–2 surprising or important things they learned. Then have them quickly share with a partner ("What was one shocking thing you noticed?"). Finally, discuss it as a class: • "Were you surprised by what happens to e-waste in the video? How did it make you feel?" (Students might mention seeing people burning electronics or huge piles of junk, etc.) • "What environmental or health problems were shown?" (Expected answers: toxic smoke, pollution of rivers, health issues for workers, etc.) • "Do you think it's fair that some countries end up with others' e-waste? Why or why not?" (This brings in a civic ethics angle – fairness, global responsibility.) • "According to the video, why is e-waste shipped overseas in the first place?" (Possible answer: cheaper to dump or labor is cheaper, lax regulations – tie to economic/civic factors.) As students respond, highlight multiple perspectives: scientific (chemicals and health), civic (fairness, laws like the Basel Convention mentioned if applicable), digital/economic (consumer culture of always getting new devices, etc.). Gently correct misconceptions.

Setup Groups: Now that students understand the problems, transition to solution mode. Form groups of 4–5. (If students have assigned group roles like note-taker, timekeeper, etc., remind them to use them. If not, quickly assign or let them choose roles to ensure participation.)

Brainstorm Task: Give each group a piece of chart paper or a shared digital document. Ask them to brainstorm “What can we do about e-waste?” for a few minutes. Encourage all ideas, personal actions, school or community actions, tech innovations, laws, etc. They can organize ideas in three columns: “Personal/Digital Actions”, “School/Community Actions”, “Laws/Industry Actions” which correspond loosely to individual (digital literacy), civic/community, and broader civic/tech solutions. Example prompts to guide them: “How can we personally reduce e-waste?” (e.g. use devices longer, repair them, not upgrade phone every year), “How can our school help?” (e.g. host collection bins, awareness campaign), “What rules or technology changes would help?” (e.g. companies designing easier recycling, government enforcing recycling).

Jigsaw Info Sharing: To enrich their brainstorm, provide each group with a small info card or fact sheet focusing on one perspective (if feasible):

Setup Groups: Now that students understand the problems, transition to solution mode. Form groups of 4–5. (If students have assigned group roles like note-taker, timekeeper, etc., remind them to use them. If not, quickly assign or let them choose roles to ensure participation.)

Activity 2: (Group Brainstorm – Solutions and Perspectives (10 minutes)

Brainstorm Task: Give each group a piece of chart paper or a shared digital document. Ask them to brainstorm “What can we do about e-waste?” for a few minutes. Encourage all ideas, personal actions, school or community actions, tech innovations, laws, etc. They can organize ideas in three columns: “Personal/Digital Actions”, “School/Community Actions”, “Laws/Industry Actions” which correspond loosely to individual (digital literacy), civic/community, and broader civic/tech solutions. Example prompts to guide them: “How can we personally reduce e-waste?” (e.g. use devices longer, repair them, not upgrade phone every year), “How can our school help?” (e.g. host collection bins, awareness campaign), “What rules or technology changes would help?” (e.g. companies designing easier recycling, government enforcing recycling).

Jigsaw Info Sharing: To enrich their brainstorm, provide each group with a small info card or fact sheet focusing on one perspective (if feasible):
Group 1: Environmental facts (e.g. stats on pollution from e-waste, specific toxic elements in e-waste).
Group 2: Digital/tech facts (e.g. tips for extending device life, concept of data wiping and why it’s important, perhaps mention how much rare materials are in phones to connect to science).
Group 3: Civic facts (e.g. “Cyprus has a system (WEEE Cyprus) for e-waste recycling greendot.com.cy
, EU laws ban e-waste in landfills, etc.” or examples of other countries or youth activism on e-waste).
Group 4: (if more groups) Economic/business angle (e.g. concept of circular economy, companies like Apple’s recycling robot Daisy, or how consumer demand for new gadgets fuels e-waste).
Give groups ~5 minutes to read their snippet and add ideas from it to their brainstorm sheet. Encourage them to talk: “What did our card say? Let’s summarize and see if it gives us new ideas for solutions. The teacher circulates to assist with any difficult concepts on the cards and to ensure they stay on task.

Share Key Points: After brainstorming, ask each group to share two best ideas they came up with. Go round-robin. As they share, the teacher (and class) listens to diversity of ideas. On the board, list a few categories or circle common themes. Likely categories: Reduce/Reuse, Proper Recycling, Awareness/Education, Laws & Enforcement, Innovative Technology. Emphasize that solving e-waste requires action from individuals (us), communities (our school, city), and authorities (laws/companies) – a mix of all their ideas. This discussion segues into the project: creating something to address e-waste at the personal and community level (which they as students can influence).

Activity 3: (Project Activity – “E-Waste Action Campaign” Creation (25 minutes)

Task Introduction: Explain that each group will now create a short project to synthesize what they’ve learned and propose a solution or raise awareness. The chosen format is a poster (physical or digital) for an “E-Waste Action Campaign.” They’ll imagine they are leading a campaign to reduce e-waste in their school or neighborhood. The poster should educate and motivate others to act.

Activity 3: (Project Activity – "E-Waste Action Campaign" Creation (25 minutes)

- Poster Guidelines: Write or display the requirements:

1. Title/Slogan: A catchy slogan or title (e.g. "Think Before You Upgrade" or "E-Waste: Let's Recycle Tech!") something that grabs attention (they can use Generative AI Tools).
2. Describe the Problem: 1-2 facts or statements about why e-waste is a problem (environmental impact) for example, "Old electronics leak toxic chemicals into our water if thrown in trash" or "The world produces over 50 million tons of e-waste each year!".
3. Call to Action – Solutions: Specific actions people should take. Encourage at least one personal/digital action (like "Donate or repair instead of trashing your gadget" or "Clear your data and bring your old phone to the e-waste bin at school"), and one community/civic action (like "Join our school e-waste collection drive on Friday" or "Recycling e-waste is required by law – do your part"). If applicable, include local info (e.g. "Use the green e-waste bins – located near our school gate every Monday" or "Call the municipality for electronics pick-up").
4. Visuals: An illustration or digital image that reinforces the message (they can draw a pile of electronics, a recycling symbol, etc., or if digital, maybe find an open image online).
5. Multi-perspective content: Remind them to cover science (the why – environment/health), digital (what to do with devices/data), and civic (community or rule aspect). Essentially, the poster should answer: "What is e-waste and why care?" and "What can you do about it?"

Planning (5 min): In groups, students discuss and plan their poster. Suggest they divide tasks: e.g., two members think of text content (facts/actions), one sketches layout, one comes up with slogan, etc. Circulate to each group at this stage to ensure they have a solid plan. Listen for inclusion of key points – prompt them if, say, a group forgot an environmental fact: "Have you included why e-waste is dangerous? What's one harm you saw in the video?" or if they forgot a civic action: "Will your poster tell people where to recycle? How will you get them to act?".

Creation (15-20 min): Groups create their posters.

- If using paper: provide markers, colored pencils. Encourage neat writing and maybe a quick rough sketch first.
- If using digital tools: have them use an app like Canva, PowerPoint, or Google Slides to design a one-slide poster. (If devices are limited, they could draft on paper and one group member might finalize digitally after class as an extension, but ideally hands-on now.)
- Teacher continues to circulate, answering questions and managing time ("10 minutes left – by now you should be finishing your text and decorating.").
- Ensure that quieter students have a role (maybe writing a section or looking up an extra fact from a textbook or approved site if internet is available).
- If some groups finish early, have them practice a 1-minute explanation of their poster or add an extra element (e.g. a drawn border of small icons of phones, etc., or translating the slogan into Greek to be bilingual).

Technical note: If any group has trouble with content, the teacher can supply a quick fact or remind them of something from the video/class discussion. For example, if they can't recall a statistic, allow them to use a prepared info sheet or even quickly search the web (with supervision) for "e-waste facts 2025" etc. This builds digital research skills in a guided way.

Activity 4: Group Presentations & Peer Sharing (15 minutes)

Presentation Setup: Each group will present their poster to the class. Decide on presentation format based on time:

- If time is somewhat tight, do a gallery walk: Groups hang up or display their posters around the room. Half the students stay with their poster as "presenters/explainers," while the other half rotates to view each poster, then swap.
- If time allows, do formal mini presentations: Each group comes to the front, holds up their poster (or projects it, if digital), and one or two members briefly explain it. Aim for ~2 minutes per group.

Guidance for Presentations: Encourage presenters to cover: the main message of their poster (slogan), one key problem fact they featured, and the actions they're urging. The teacher can prompt with questions after each presentation:

- To the class: "What did you learn from this poster that was unique?"
- To presenters: "Why did you choose that slogan? How do you think it will persuade people?" or "How do your solutions help with the e-waste problem?"

Peer Feedback: After each presentation or during the gallery walk, invite a quick round of applause and one positive comment from a student audience member: e.g. "I liked how Group 2's poster had a clear list of places in our town to recycle – I never knew that!" This builds a supportive environment and reinforces learning points (others might not have included that info, so the whole class benefits).

This summary provides an understanding on the interdisciplinary of the phenomenon: that solving e-waste involves science (understanding the problem), digital literacy (knowing how to handle devices), and civic action (engaging others, following rules, community effort).

Closing (Wrap-up Reflection)

In closing, the teacher reinforces how this lesson's approach exploring a real problem from multiple angles reflects the integrated nature of knowledge. E-waste was not just a science issue or a tech issue or a civics issue: it was all of them at once.

The teacher might share a final reflective thought: "Think about the next time you see a new gadget or throw something away remember our lesson. Each of you has the power to make small changes that add up. As active citizens in a digital world, your choices matter." This reinforces the idea that learning is meant to influence real-life behavior, a key goal of civic and environmental education.

Finally, commend the class for their active participation: "You worked creatively as teams and came up with fantastic solutions. Keep that curiosity and teamwork spirit it's exactly how we solve big problems in the real world!" Encourage students to stay informed and perhaps even suggest that interested students take the initiative to propose the class's campaign idea to the school administration (if feasible, e.g., set up an e-waste collection bin on campus). This empowers students and provides a sense of closure that their work could live beyond the classroom.

Further Reading:

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