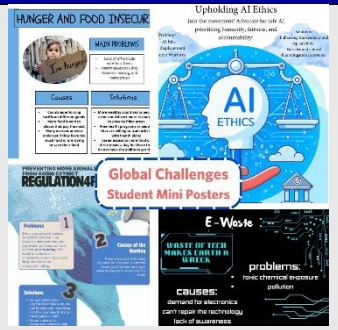
Xplorlabs Learning Experience

Tackling Sustainability through the Impact of E-Waste: Students will explore the issue of E-Waste in our country and globally and how it affects our efforts toward Sustainability Goals.

Instructional phases	Engage/Relevance	Explore	Explore/Explain	Experiment/Elaborate	Evaluate
Visual storyline					
Standards	**Principles of Applied Engineering** • TEKS 4C: The student uses appropriate tools and demonstrates safe work habits; identify industry safety terminology related to the personal work environment such as Occupational Safety and Health Administration (OSHA), American Society of Mechanical Engineers (ASME), and personal protective equipment (PPE); • TEKS: 5. The student describes the factors that affect the progression of technology and analyzes the potential intended and unintended consequences of technological advances. • TEKS 11E: The student creates justifiable solutions to open-ended real-world problems using engineering design practices and processes; identify or create alternative solutions to a problem using a variety of techniques such as brainstorming, reverse engineering, and researching engineered and natural solutions.				
Timing	1 class period	2 class periods	1-2 class periods	2-3 class periods	2-3 class periods
Guiding Questions	*"If everyone in the world lived like you, what would the planet look like in 50 years?"*	*"How can we invent innovative solutions to address major global challenges and create a sustainable future?"*	*"What is E-waste? How does it affect sustainability goals?"*	*"Are all parts of the phone "waste?"*	*"How can we better recycle and reclaim resources from e-waste?"*

Overview	This question, sets the stage for students as we began this learning experience. Students complete an entry ticket to gauge their thoughts about what sustainability is and what their future might be like. Following a short discussion, students watch a clip from the movie "Wall-e" which portrays a possible version of our future on planet Earth. Class discussion about "*Are we headed in this direction?" and " What do you think the biggest problems ahead are?" lead to c*ompleting a KWL (Know/Want to Know/Learn) Chart about "What is sustainability?" Student responses are recorded on sticky notes and displayed throughout the unit. At end of class, students are introduced to the UN Sustainable Development Goals to generate student thinking prior to the next lesson.	Students begin by exploring a variety of global challenges such as climate change, deforestation, pollution, healthcare access, artificial intelligence and cybersecurity, supply chain issues, e-waste, and others. They will choose 4 of these that interest them and identify problems, causes and possible solutions. They create a mini poster, in Canva, about one of the challenges they are most intrigued. *How are others approaching these problems?* Students will explore the UN Sustainability Goals and current efforts to develop solutions. Students play "Go Goals!" game to review and learn more about the UN Sustainable Development Goals. *"Which development goal would your mini poster help support?"*	Students focus on e-waste as a class. Students will explore what defines E-Waste using the Xplorlabs Cityscape Interactive to discover and define sources of e-waste *"How much e-waste do you have around you?"* Classes design a home e-waste survey/inventory to complete. This will be used to quantify discussions about the e-waste problem in this community. Class Discussion: E-Waste survey. Students will discuss the results of the E-waste surveys as a class. What were the takeaways for students? Students continue to explore the problem of e-waste using the Xplorlabs Extraction to E-Waste Pathway website.	Students complete a quick write based on the Info Graphic (linked below) *Can we make e-waste more sustainable?* Students tackle the problem by starting at the end and reverse engineer some ideas about e-waste, disassembling a cell phone to examine its components and their lithium-ion batteries. Students will safely disassemble an old cell phone, carefully laying out parts in layers and sketching for documentation to create an exploded view. (Safety procedures will be in place with some parts completed as demos.) *Can we reverse engineer the problem of e-waste? Why are Li-Ion batteries dangerous?* Students will look deeper at the problem by learning about the anatomy of a Li-ion battery and how we reclaim parts of the batteries for recycling.	Students will revisit the impact of technology on our lives in terms of smartphones and tablets and the waste they create. Students will explore two possible avenues of action for solving the e-waste problem. 1) The Right to Repair movement. Students will learn about the idea of "right to repair" as a means of sustaining the life of devices. Texas is not currently a Right to Repair state. What actions can we as consumers take to help give the people of our state options? Students will formulate a campaign to make Texas a Right to Repair state in 2026. 2) Students will research and develop a program for e-waste recycling in their school and possibly in the community. How can we work to safely dispose of e-waste and recycle the parts that are still usable? What would we need to plan an e-waste recycling drive and or education event?
Supporting Documents	THE 17 GOALS | Sustainable Development	Home - Go Goals! SDG board game SDG game Digital version of questions for game	Where Are Lithium-Ion Batteries? Cityscape | Xplorlabs The Science of Extraction to E-Waste | Xplorlabs	Compound Interest: The Chemical Elements of a Smartphone (compoundchem.com) iFixit: The Free Repair Manual Disposal — Battery Supply Chain	Solutions — Battery Supply Chain The Repair Association The right-to-repair movement is growing as wins stack up