

Information and Communication Technologies Overview

Up to this point, we have been discussing the Project ProBase Learning Units in general terms. The following points will be specific to *Information and Communication Technologies*.

Enduring Understandings and Essential Questions

The *Information and Communication Technologies* Learning Unit focuses on four of the nine enduring understandings. As they complete *Information and Communication Technologies*, students will understand:

1. that technological progression is driven by a number of factors, including individual creativity, product and systems innovation, and human wants and needs.
4. how technological systems work, the components of those systems, and how they fit into the larger technological, economic, and social systems.
9. how to utilize a variety of simple and complex technologies.

The essential questions addressed in each learning cycle will be correlated to the learning cycle objectives.

Learning Cycle Two:

1b. What social, cultural, and political pressures lead to the need or want for new technologies?

Learning Cycle One:

1e. What are the fundamental processes/principles used to develop new technologies?

Learning Cycle One, Three:

4a. What are the systems and subsystems involved in the various contexts of technology?

Learning Cycle Two:

4b. What are the key elements of the various technological systems and what are the relationships between these systems?

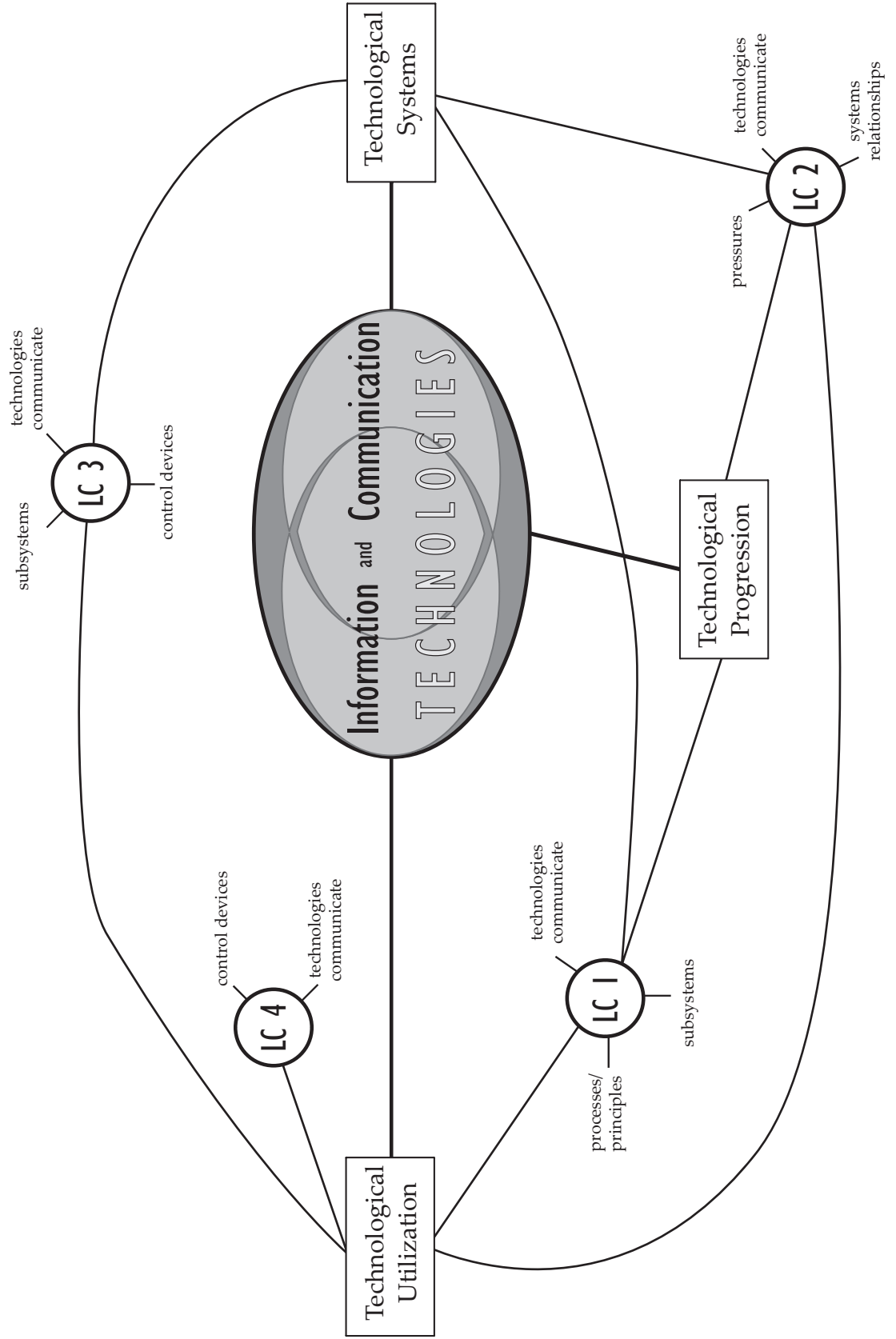
Learning Cycle Three, Four:

9a. How are technologies used to control devices and systems?

Learning Cycle One, Two, Three, & Four:

9b. How do technologies communicate with one another and provide information to humans?

Information and Communication Technologies Learning Unit Concept Map



Information and Communication Technologies Learning Unit Materials List

Learning Unit Consumables (based on a class size of 28 students)

Qty.	Item	LC	Notes and Recommended Options
4	3/8" Wooden dowel rods	Prelim	
2	Sheets of red paper	Prelim	
2	Sheets of white paper	Prelim	
28	1.5" x 5" pieces of sheet metal	Prelim	
4	Blocks of wood for support	Prelim	
	Colored pencils	Prelim	
	Colored dot stickers	Prelim	
28	Blindfold (do not reuse, must be fresh for each student)	Prelim	
3 ft.	1" x 4" Wood	1	
63	Small wood screws or fasteners	1	
14	C Batteries	1	
21	4" long strips of ferrous metal	1	
7	7" long strips of ferrous metal	1	
140 ft.	22-30 gauge insulated wire	1	
28	Large pieces of paper	1	
27-30	LEDs	1	
4-5 pkg.	Brass fasteners	1	
9-10	10" x 4" Cardboard pieces	1	
9-10	4" x 1.5" Cardboard pieces	1	
	Speaker wire	1	
	Aluminum foil	1	
9-10	6 V Batteries (lantern batteries)	1	
	Masking, double-sided, and duct tape	1, 3, & 4	
14	Large iron nails	1 & 2	
	Sandpaper	1 & 2	
7	10' - 20' Telephone cord	2	

Learning Unit Consumables cont'd

7	28 gauge magnet wire	2	
14	AA Batteries	2	
350'	24 gauge insulated wire	2	
7	Plastic bottles or large plastic pipes	2	
7	9 V Batteries	2, 3 & 4	28 meters

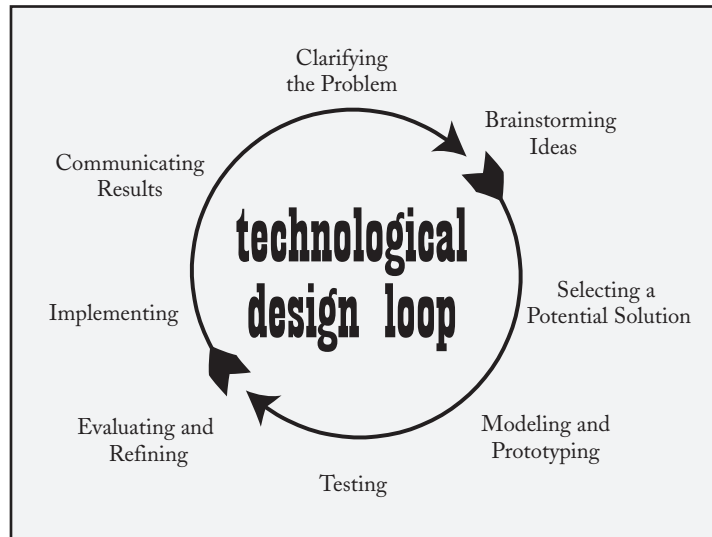
Learning Unit Equipment

Qty.	Item	LC	Notes and Recommended Options
4	Center punches	<i>Prelim</i>	
4	International alphabet chart	<i>Prelim</i>	
2	The Navajo Code (found in Appendix)	<i>Prelim</i>	
1	Musical keyboard or children's xylophone	<i>Prelim</i>	
7	Walkie-talkie sets	<i>Prelim</i> , 3	www.radioshack.com
1	Flashlights	<i>Prelim</i> , 4	
4	Hammers	<i>Prelim</i> , 1	
7	Morse code charts	<i>Prleim</i> , 1	
14	Rulers	1	
	Screwdrivers	1	
	Utility knives	1	
28	Copies of ASCII chart	1	
80	Alligator clips	1 & 2	
14	Drawing compasses	1 & 2	6" - 8" Diameter capability
	Scissors	1 & 2	
	Wire strippers	1 & 2	
14	Telephones	2	
7	300 Ω Resistors	2	
7	German diodes	2	
7	47k Ω Resistors	2	
7	Crystal earplugs	2	

Learning Unit Equipment cont'd				
Qty.	Item	LC	Notes and Recommended Options	
2-3	Soldering guns	2		
	Solder	2		
	Grounding rod	2	Optional	
7	Magnetic field view cards	3	Search "magnetic field viewer card" on the Internet	
	Microwave oven (not plugged in)	3		
	Small tape or CD player (with a cassette or CD)	3		
	Iron	3		
	Piece of machinery with a large electric motor	3	e.g., vacuum, drill press, router, table saw	
56	1k Ω resistors	3 & 4		
7	BASIC Stamp HomeWork boards™	3 & 4	www.parallax.com	
7	BASIC Stamp serial programming cables™	3 & 4	www.parallax.com	
7	7-Segment displays	3 & 4	www.parallax.com	
56	Jumper wires	3 & 4		
	BASIC Stamp Editor version 2.1™	3 & 4	www.parallax.com	
7	Piezoelectric speakers	4	www.parallax.com	
7	Push-button sensors	4	www.parallax.com	
7	Photocells	4		
7	0.01 μF Capacitors	4		
7	220k Ω Resistors	4		

THE ProBase DESIGN MODEL

As a constructivist, problem-based curriculum, the ProBase Learning Units offer a variety of opportunities for students to engage in design activities. The ProBase Learning Units have been developed for upper high school technology education students. It is assumed that students engaging in the ProBase curriculum possess some prerequisite knowledge and skills regarding engineering design. If students do not have previous experience in this area, it may be necessary to provide a brief introduction to design-based problem solving. It is suggested that you use the following design model adapted for the ProBase curriculum from *Standards for Technological Literacy* (International Technology Education Association, 2000/2002).



If you see a need to introduce the design-based problem solving process, it is suggested that you do so in a constructivist manner using a simple design problem. For example, you might have your students use the model presented above as they design a cover for a book or CD. You should attempt to use media beyond paper and pencil such as modeling clay, Styrofoam™, Balsa wood, or cardboard. Other simple design ideas include designing paper airplanes, a package for their favorite snack, a marketing flyer for a new product, an ergonomic handle for a shaving razor, or prototype cardboard seat or a model of other furniture pieces.

Information and Communication Technologies Unit Calendar

Week	Day 1	Day 2	Day 3	Day 4	Day 5
1	Course Introduction; Preliminary Challenge	Preliminary Challenge	Preliminary Challenge	Preliminary Challenge	Intro to Primary Challenge; Enduring Understandings
2	Learning Cycle 1 - <i>Exploration I</i>	Learning Cycle 1 - <i>Exploration I</i>	Learning Cycle 1 - <i>Exploration I</i> <i>Reflection I</i>	Learning Cycle 1 - <i>Exploration II</i>	Learning Cycle 1 - <i>Exploration II</i> <i>Reflection II</i>
3	Learning Cycle 1 - <i>Engagement</i>	Learning Cycle 2 - <i>Engagement</i>	Learning Cycle 2 - <i>Engagement</i> <i>Reflection</i>	Preparing for the Primary Challenge	Learning Cycle 2 - <i>Exploration I</i>
4	Learning Cycle 2 - <i>Exploration I</i> <i>Reflection I</i>	Learning Cycle 2 - <i>Exploration II</i>	Learning Cycle 2 - <i>Exploration II</i> <i>Reflection II</i>	Learning Cycle 2 - <i>Engagement</i>	Learning Cycle 2 - <i>Engagement</i>
5	Learning Cycle 2 - <i>Reflection</i> Preparing for the Challenge	Learning Cycle 3 - <i>Exploration</i>	Learning Cycle 3 - <i>Exploration</i> <i>Reflection</i>	Learning Cycle 3 - <i>Engagement</i>	Learning Cycle 3 - <i>Engagement</i>
6	Learning Cycle 3 - <i>Engagement</i>	Learning Cycle 3 - <i>Reflection</i> Preparing for the Challenge	Learning Cycle 4 - <i>Exploration</i>	Learning Cycle 4 - <i>Exploration</i> <i>Reflection</i>	Learning Cycle 4 - <i>Engagement</i>
7	Learning Cycle 4 - <i>Engagement</i>	Learning Cycle 4 - <i>Engagement</i>	Learning Cycle 4 - <i>Reflection</i> Preparing for the Challenge	Primary Challenge	Primary Challenge
8	Preparing for the Primary Challenge	Preparing for the Primary Challenge	Preparing for the Primary Challenge	Preparing for the Primary Challenge	Preparing for the Primary Challenge
9	Preparing for the Primary Challenge	Preparing for the Primary Challenge	Preparing for the Primary Challenge	Presentations of the Primary Challenge	Presentations of the Primary Challenge

*For block scheduling, adjust the Unit Calendar appropriately.

Information and Communication Technologies

Table of Contents

Preliminary Challenge	
Talking Through the Times	5
Investigate Methods of Communication	
Primary Challenge	
Behind Closed Doors, That's My Stuff	16
Design and Build a Security System	
Learning Cycle One	
Return to Sender	23
<i>Exploration I</i> - Construct a Telegraph Machine	
<i>Exploration II</i> - Encode a Paper CD Using Binary Code	
<i>Engagement</i> - Build a Lighted Keyboard Using Binary Code	
Learning Cycle Two	
EM Phone Home	47
<i>Exploration I</i> - Assemble a Telephone Network	
<i>Exploration II</i> - Create and Test an Electromagnet	
<i>Engagement</i> - Make an AM Radio	
Learning Cycle Three	
Listen Up!	67
<i>Exploration</i> - Test Electronic Devices' Electromagnetism	
<i>Engagement</i> - Program a 7-Segment Display	
Learning Cycle Four	
Instant Information	91
<i>Exploration</i> - Explore Electronic Input Devices	
<i>Engagement</i> - Automate Input Devices with the Basic Stamp	
Appendix and Supplemental Materials	AA

