



Elementary School Science with the Labdisc





Table of Contents

Contents

The Need	1
The Labdisc Solution	1
Pedagogic Benefits	3
Equipment	4
Activities & Curriculum	4
Labdisc Enviro Data Logging Specifications	5
Labdisc Enviro Built-In Sensor Specifications	6
Analysis Software Specifications	7





The Need

Science education in schools is very important for sustainable national economic growth and independence in a competitive global economy. To nurture the next generation of scientists, engineers, and technicians, effective and engaging science teaching is essential. Research shows that the best way to teach science, while increasing student motivation and understanding, is to combine technology with inquiry-based learning.

Science is a language, and like any other language, it is best taught from a young age. As important as it is to teach science properly, it is critical to start science learning early. This will plant the seed of curiosity and foster a love of science in young students, ensuring a greater number make science-driven career choices.

However, science currently has a very different reputation with students. Due to the tedious, dull, and passive rote learning methods used to teach science (such as memorizing formulas), most students associate science with difficulty, boredom, and irrelevance.

The Labdisc Solution

The Labdisc Enviro solution makes science exciting with a focus on a subject that is relevant to all: Exploring our environment and the sustainability of our planet.

LEFT

Elementary school students use the Labdisc Enviro to measure pH, temperature, and water cloudiness in a pond.

RIGHT

Elementary school students use the Labdisc Enviro in a weather box to take temperature, humidity, and barometric air pressure measurements over 48 hours.



To discover their world, and understand the importance of environmental protection, young elementary school scientists don't need special materials or bulky equipment and cables. The Labdisc is simple and immediate, opening the door for inquiry-based learning with compact, award-winning data logging technology.

The Labdisc also fully integrates with the latest and ubiquitous technologies that children love to use such as tablets, iPhones, and computers. Labdisc technology is cost-effective, as well as being very easy to use by young students and elementary school teachers who have limited or virtually no technical experience.

The Labdisc is the only all-in-one wireless laboratory which teachers can apply with confidence in elementary school science. As a direct result of this, Boxlight is currently the only science education company implementing data logging on a grand scale across a large number of elementary schools in Russia, Israel, Chile, Brazil, and more.







Pedagogic Benefits

Parallel real scientific behavior

Young students learn in an intuitive way to connect their actual sensations and experiences to real science. For example, when a child says “I feel hot,” they can translate this sensation to degrees Celsius. In other words, the room’s temperature is 35 degrees Celsius.

Prepare young students for their responsibility to our planet

Students can learn about their immediate environment, the globe, and the detrimental effects of global warming. They are educated to protect their environment and ensure the sustainability of resources for their own and future generations.

Familiarity with important science tools

The digital laboratory technology allows students to become fluent in data interpretation via graph reading, meters, understanding coordinates, and even spreadsheets.

Delighting in science

Students have the opportunity to act as real scientists and conduct science experiments, inquiry, and research. They develop a sophisticated scientific vocabulary and understanding, but more importantly, they learn to appreciate the beauty in science—an appreciation which directly influences their later academic choices and career path.





Equipment

The science course provided here is based on the Labdisc Enviro unit. This is a single multi-meter device that can measure 13 different parameters such as: temperature, barometric pressure, relative humidity, water quality, sound level, UV radiation, and more. The Enviro also includes a GPS unit, allowing students to plot their measurements on Google or Apple maps. The Labdisc rechargeable battery allows up to 150 hours of measurements between charging—very useful for long weather recordings. All measurements performed with the Labdisc can be wirelessly transmitted to any computing platform, such as desktops, netbooks, or tablets, where students can use our GlobiLab software for data analysis.



By focusing on environmental studies with an all-in-one solution like the Labdisc, schools can eliminate further investment in additional experiment materials. The single exception is a basic weather box located in the school yard, which can store the Labdisc during long-term weather recording and observations.

Activities & Curriculum

Starting in the fourth and fifth grade in elementary school makes the Labdisc the first measurement device young students will have ever experienced in their science activities. Thus, the course will start with simple temperature measurements to allow students to become acquainted with basic units of scientific measurement, such as Celsius and Milibar, and fundamental measuring and data display tools such as meters, graphs, bar graphs, and tables.

The course will provide students with basic science knowledge and inquiry skills. Students will learn about the need for environmental protection, and schools will be able to conduct collaborative research and share data measurements collected by different schools located in different climate areas.

Activities will include:

- Weather observations
- Water quality measurements
- Heat isolation
- Acid rain
- The greenhouse effect
- Microclimates
- Noise in the city
- Cloud detection
- UV radiation





Labdisc Enviro Data Logging Specifications

PARAMETER	LABDISC ENVIRO
Supported Platforms	Standalone, PC, Mac, iPad
Built-In Accessible Sensors	12 sensors: Ambient Temperature, Barometer, Colorimeter, Dissolved Oxygen (electrode sold separately), External Temperature, GPS, IR Temperature, pH, Relative Humidity, Sound Level, Turbidity, Universal Input and UV
Maximum Sampling Speed	10/s
Sampling Resolution	12-bit
Internal Data Storage	100,000 samples
Internal Rechargeable Battery	LiPO 7.2V
Battery Life	> 150 hours
Display	Graphical LCD 64 x 128 pixels
Keypad	Yes
Communication	USB 2.0
Wireless Communication	Wireless Bluetooth V2.0 communication for all sensors
Remote Data Collection	Yes
Automatic Sensor Testing & Calibration	Yes
Size	$\phi = 132$, H = 45 mm
Weight	200 grams
Temperature Range	-10 to 50° C
Standard Compliance	CE, FCC





Labdisc Enviro Built-In Sensor Specifications

SENSOR TYPE	MAXIMUM RANGE	ACCURACY
Ambient Temperature	-10 to 50° C	± 1° C
Barometric Pressure	300–1100 mB	± 2.5 mB
Colorimeter	10–90% transmittance (3 colors)	± 5 mB
Dissolved Oxygen	0–14 mg/liter	± 8%
External Temperature	-25 to 125° C	± 2%
GPS	N/A	± 3m
IR Temperature (Wide)	-70 to 380° C	±0.5 °C @ 0 to 60°C ±1 °C @ 60 to 120°C ±1 °C @ -40 to 0°C ±2 °C @ 120 to 380°C ±2°C @ -70 to 40°C
pH	0 to 14 pH	± 2%
Relative Humidity	0 to 100% RH	± 4%, 10% to 90% RH
Sound Level	USB 2.0	± 4 dB
Turbidity	Wireless Bluetooth V2.0 communication for all sensors	± 10%
Universal Input and UV	Yes	± 5%





Analysis Software Specifications

PARAMETER	LABDISC ENVIRO
Data Retrieval	Online up to 100s/s, or download Labdisc stored data
Data Display	Line graph, table, meters, Google Maps
Communication	USB, Bluetooth
Data Logging Configuration	Sensor selection, sampling rate, sampling points
Data Manipulation	Placing and moving up to 2 markers on the graphs, zoom in/out, graph cropping, graph coping, functions such as derivative and regressions
Data Export	Automatic export to Excel
Simulation	Effect of temperature and air pressure on gas and liquid molecules
OS	PC, MAC, iOS

Want to learn more about the Labdisc solution?
Visit mimio.boxlight.com/labdisc.



