



**The 2009 Logo Summer Institute
New York City
July 13-17, 2009**

Overview

The Logo Summer Institute is an intensive workshop in Logo theory and practice. The individualized approach of the Institute accommodates experienced Logo users as well as novices.

Most of each workshop day is devoted to Logo Lab, where participants explore, design, build, and program. They have an opportunity to experiment and develop projects in one or more Logo-based computer learning environments. These include MicroWorlds™, Scratch and NetLogo among others. The Lab also includes robotics equipment and materials from LEGO Mindstorms™ with the RCX programmable brick, LEGO NXT, PICO Cricket and the Handy Cricket. These are used with a variety of software options including LogoBlocks and Cricket Logo.

The Logo Lab is a model of what might happen in school: Participants learn skills and explore ideas while designing and constructing personally meaningful projects. The projects are chosen from among several strands including multimedia, turtle geometry, simulations, natural language, music, robotics, and game design.

There is also time for discussions of issues of learning, schooling, and curriculum, and strategies for implementing a Logo program in schools or alternative learning environments.

Logo Lab

All computers are on a local area network and also have a full-time connection to the Internet. Participants may freely share projects with each other and people outside the workshop.

The workshop begins with an overview of Logo and robotics and how they are used in educational settings.

First Project

Participants work on a short introductory project. Several choices are presented. People with prior experience in Logo and robotics may move directly to the next step.

1. An Animated Story

Participants may work from the Animated Scene tutorial that is included in the MicroWorlds EX software. Some participants follow this guide closely. Others use it as a starting point for creating projects of their own design.

2. Drawing with the Turtle

The most widespread use of Logo over the years has been in turtle geometry. The *Turtles and Geometry* tutorial serves as introductory material.

Further ideas are provided by books and handouts:

- *Turtle Geometry*, by Hal Abelson and Andy di Sessa
- *101 Ideas for Logo*, by Dorothy Fitch
- Mosaic Project
- Shapes

3. A Vehicle

A vehicle is built around the RCX programmable brick or Handy Cricket with separate motors for each of two driving wheels. This makes it possible to program the vehicle to move forward and backward in a straight line and to turn. Some participants build from diagrams that are included with LEGO Mindstorms and RoboLab, while others develop their own plans.

Next Steps

Any of the initial activities may be extended and developed into a major project, or a new project may be started. Activities will diverge depending upon participants' interests and learning styles. Some people will execute one or more of the project ideas that come with LEGO Mindstorms, PICO Cricket, Scratch or MicroWorlds. Others will design and develop original projects. Some will take a more exploratory approach, testing out various ideas without concluding a major project.

The inspiration for the projects and explorations will come from several sources: the prepared materials, other members of the group, web sites with projects, and books and articles.

4. More About Vehicles

Adding touch, light, or temperature sensors makes it possible to program vehicles to interact with their environment and with each other, avoid obstacles, or negotiate mazes. One RCX brick may be used to control a vehicle built around another RCX via infrared signals. Valentino Braitenberg's *Vehicles* offers additional ideas and inspiration.

5. Robot Arm

This device picks up bricks from one location and deposits them in a bin. There are a number of different approaches programming this operation.

6. Building Sensors

With a soldering iron, a hot glue gun, a few tools, and some parts from Radio Shack participants can build their own sensors that work with the RCX programmable brick and the Handy Cricket.

7. An Amusement Park

The variety of rides provides a rich collection of possibilities for construction and programming. Putting the whole park together makes an excellent group project.

8. Games

Video games are a popular domain for programming projects. The Snac Man sample and the Horse Race and Quiz-Maker tutorials in MicroWorlds EX provide good starting points. Additional ideas for more elaborate projects are provided in the form of sample games. Based on these ideas, participants will be able to design original games.

9. Simulations

Logo may be used to create simulations of phenomena in ecology, biology, physics, and other areas. Some participants work with StarLogo or NetLogo, which are specifically designed for exploration of decentralized systems, and is a rich environment for simulations.

10. Multimedia Reports and Stories

MicroWorlds projects may be extended to include a variety of multimedia elements: music, recorded sounds, video clips and hyperlinks to web sites.

Although most of the Lab time will be devoted to independent and group work, there will be brief daily sharing sessions during which projects and ideas will be presented and discussed. Skill sessions will also be arranged during Lab time on an as-needed basis.

Discussions

During the week there will be discussions about issues of learning and teaching as they relate to working with robotics.

1. Learning Styles

A Logo workshop is a particularly good environment in which to observe and reflect upon differences in learning style. Some people approach the material in a very playful way, while others are more comfortable messing about. We will explore our own learning styles and how we see our students.

2. Powerful Ideas

What are some Big Ideas that are emerging during the workshop; important concepts like feedback and debugging, which may be explored in this context and more widely applied?

3. Making it Happen

What does one need to do to implement a Logo curriculum in a school or other setting? The group will share ideas and develop specific plans.

Skills Sessions

Skills are learned in the context of the projects described above. There will also be brief small group lessons to provide instruction in important programming ideas and project building techniques. These will be organized on an as-needed basis and will occur during the Logo Lab. The major topics are:

1. Logo instructions - using the command center; paying attention to error messages
2. On-line help

3. Using the drawing tools
4. Making music and working with sound
5. Working with text
6. Programming turtles and colors; understanding parallel processes
7. The Backpack
8. Writing procedures; the special word "to"
9. The difference between commands and reporters (operations)
10. Using sliders and text boxes as variables
11. Procedures that take inputs
12. Procedures with subprocedures
13. Recursion
14. Interactions with other software: importing and exporting text, graphics; movies, and sound; converting Logo projects to html
15. Working with gears and pulleys
16. Feedback as a mechanism of controlling robotic devices
17. Advanced topics to be introduced as needed

Requirements for Graduate Credit

1. Project Description

Participant will present a description of one major project or several smaller activities and explorations. The description may be in the form of a two to five page written report with illustrations, photographs, and program listings or a collection of Web pages.

2. Paper

There are three choices of topic for a two to five page course paper:

- a. Provide a written plan for implementing a Logo program in a school, home, or alternative setting. This may consist of a collection of activity sheets or Web pages along with notes for the teacher.
- b. Describe plans for further projects and explorations that would be carried out on one's own or in a group following the workshop.
- c. Write a personal reflection on the learning that has occurred during the workshop.

Schedule

This is the schedule for the five-day workshop:

	<u>Monday</u>	<u>Tuesday</u>	<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>
9:00 - 10:30	Introduction	Logo Lab	Logo Lab	Logo Lab	Logo Lab
11:00 - 12:00	Logo Lab	Logo Lab and Discussion	Logo Lab and Discussion	Logo Lab and Discussion	
12:00 - 1:00	Lunch	Lunch	Lunch	Lunch	Lunch
1:00 - 1:30	Sharing	Sharing	Sharing	Sharing	Wrap Up
1:30 - 3:30	Logo Lab	Logo Lab	Logo Lab	Logo Lab	Presentations
3:30 - 4:00	Journals and Reflection	Journals and Reflection	Journals and Reflection	Journals and Reflection	

Recommended Readings

Abelson, Hal and di Sessa, Andy, *Turtle Geometry*, MIT Press, 1981

Braitenberg, Valentino, *Vehicles*, MIT Press, Cambridge, MA, 1984

Falbel, Aaron, *Constructionism*, The LEGO Group, 1993

Fitch, Dorothy, *101 Ideas for Logo*, Terrapin Software, Cambridge, MA

Hogg, David W., Martin, Fred, and Resnick, Mitchel "Braitenberg Creatures"
<http://fredm.www.media.mit.edu/people/fredm/papers/vehicles/>

Martin, Fred, "The Art of LEGO Design," *The Robotics Practitioner: The Journal for Robot Builders*, Vol. 1 No. 2, spring 1995 (Also available as a PDF file via ftp at <ftp://cherupakha.media.mit.edu/pub/people/fredm/artoflego.pdf>)

The MIT Programmable Brick

<http://el.www.media.mit.edu/groups/el/projects/programmable-brick/>

Papert, Seymour, "Images of the Learning Society," chapter 8 of *Mindstorms*, Basic Books, 1981, New York

Papert, Seymour, "Cybernetics", chapter 9 of *The Children's Machine*, Basic Books, New York, 1993

"Programmable Brick from LEGO" in *Logo Update*, Vol. 7 No. 1, fall 1998, and *Logo Update On Line*

<http://el.www.media.mit.edu/logo-foundation/LU/v7n1/v7n1.html>

Sargent, Randy, et. al. "Building and Learning With Programmable Bricks," *Logo Update*, Vol. 3 No. 3, spring 1995

<http://el.www.media.mit.edu/logo-foundation/LU/v3n3.html>

Tempel, Michael and Chafiiian, Hope "Computer Games By Kids, For Kids," *Logo Update On Line*, Vol. 7 No. 2 and No. 3, spring and summer 1999,

<http://el.www.media.mit.edu/logo-foundation/LU/v7n2/v7n2.html> and

<http://el.www.media.mit.edu/logo-foundation/LU/v7n3/v7n3.html>

Valente, José "Logo as a Window into the Mind," *Logo Update* Vol. 4 No. 1, fall 1995

Software and Equipment

LEGO Mindstorms™ with the RCX programmable brick

LEGO NXT

PICO Cricket

MicroWorlds™

Logo Blocks

Cricket Logo with the Handy Cricket

StarLogo

NetLogo

Scratch

Other versions of Logo as needed

Materials and equipment for building sensors