



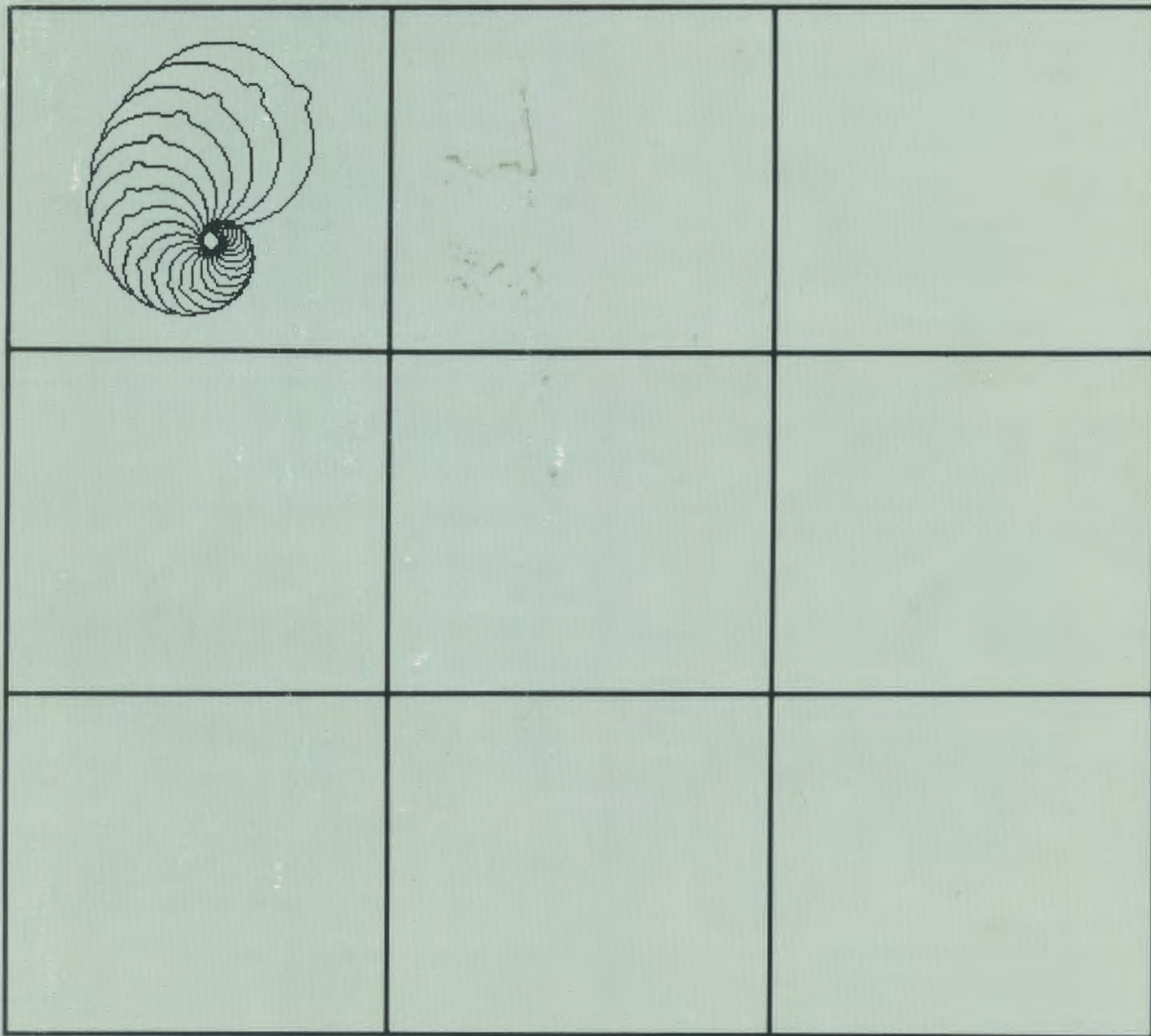
LOGO EXCHANGE

The Magazine for LOGO Activities Worldwide

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VOLUME 5 NUMBER 1

SEPTEMBER 1986



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University of Virginia Summer Logo Fellowship Program 1986 - 1987

What is the UVA Summer Logo Fellowship Program?

An opportunity for educators to come to the University of Virginia for a three week summer period of individual Logo related study.

What are the objectives of the Logo Fellowship program?

The objectives are to:

- Encourage the development of innovative Logo projects in all grade levels and subject areas
- Disseminate Logo projects produced by the fellowship program

- Provide fellowship recipients with time and resources for study, work, and growth

When does the fellowship program operate?

The next fellowship period of study will begin June 1987. The application cycle for this period begins in October 1986.

How is the fellowship program supported?

The program is made possible by a series of grants from Logo Computer Systems Incorporated (LCSI) to the University of Virginia. From these grants, support for travel, room, board, graduate credit hours, and a cash award are provided to each fellowship recipient.

Who may apply for the UVA Summer Logo Fellowship Program?

Teachers of K-12 students, college and university teachers, and teacher educators who have used Logo on a regular basis for the past year are eligible to participate.

What other qualifications are important?

Fellowship recipients must possess exceptional communication skills and initiative, be able to work well with others, and be highly motivated about the possibilities for using Logo in education.

What is the application process?

Applicants should write immediately to the University of Virginia Summer Logo Fellowship Program, Curry School of Education, Ruffner Hall, Charlottesville, VA 22901, requesting the application forms. Applications will be mailed in late October. Completed applications are to be returned to the University of Virginia before December 20, 1986. A selection committee will evaluate the applications and choose a group of finalists, from which the two fellowship recipients for 1987 will be named.

What are the fellowship expectations?

A Logo fellowship recipient is expected to plan and begin carrying out a self-designed Logo-related project during the fellowship period. Tom Lough, Glen Bull, Paula Cochran, and others will serve as consultants to each fellowship recipient. At the conclusion of the summer study period, the recipient would be expected to submit a reasonable plan for completing the project, and for dissemination of the project.

What is a typical fellowship project?

Projects are conceived and planned by the fellowship candidates themselves. Typical projects could include innovative Logo units related to particular subject areas, teaching or training modules, informal educational research, and course development. Projects carried out under the current series of grants must be based on LCSI Logo products.



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Save the Turtle! inside back cover

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From the Editor

by Tom Lough

Now, More Than Ever, FD 100!

Hello, readers! Welcome back! It has been a long time since the May issue, and we missed you. As we begin our fifth year of publication, we are as excited as ever about the potential for Logo to make a real difference in today's classrooms.

Lots of exciting things have happened in the past couple of months! As you can tell, we have "graduated" to a magazine! Alan Meckler of Meckler Publishing Corporation has acquired both the National Logo Exchange (NLX) and the International Logo Exchange (ILX). What you are holding in your hands is the combination of the two, called simply the *Logo Exchange*.

Former NLX readers will recognize their familiar Logo friends and guides in these pages. Likewise, former ILX readers will find Dennis Harper and his group of field editors still hard at work to bring you the international Logo news. And, of course, I will continue to serve as editor.

The magazine format has allowed us to add several new features, including columns on special education and mathematics. In addition, the magazine format will allow much more reader interaction than

ever before. Here are some opportunities.

If you like writing letters to the editor, please do so. We would like to establish a readers' forum with these letters, and finally live up to the *Exchange* in our name.

Barbara Randolph offers your individual students the chance to contact other Logo students directly. Her new LogoPals column will provide that opportunity, in addition to serving as a source of news about the Logo Class Penpal Network administered by the University of Virginia.

Logo people are notorious for their humor. Here is the chance to demonstrate this notoriety and exercise a little creativity at the same time. Linda Sherman will offer a captionless Logo cartoon each month. We will depend on you to suggest what the caption should be. We will publish several of the more creative captions in later issues. I am excited about the possibilities of this experiment, and look forward to your responses.

There have been some changes, as former readers can tell. But I hope that you feel the changes are for the better. With you, I look forward to the future, and wonder what Logo, the LX, and education in general will be like in five more years . . .

Now, more than ever, FD 100!



Starting Logo with Young Children? Slow Down the Turtle!

by Dan Watt and Molly Watt

Logo is intended to be an easy language to use, an environment that makes mathematics enjoyable and "transparent" to learn. Sometimes, however, certain aspects of Logo, or compromises made in implementing Logo on particular computers, can make beginning Logo experiences difficult and confusing. This often happens when young children (ages 4 - 6) use the Logo screen turtle for the first time. Fortunately, the flexibility of Logo as a teaching tool can help us overcome some of its limitations as a learning environment.

Problem: The Turtle Metaphor Breaks Down

Most people start learning Logo by "playing turtle," that is, by pretending actually to be the turtle and walking a shape on the floor. Then they describe the steps involved in a simplified English (or Logo) using the words FORWARD, BACK, LEFT, and RIGHT. By knowing how to move in space and by describing their movements in terms of Logo commands, they develop a personal way to think about programming the computer.

The turtle is the conceptual bridge - or transitional object - to think with in using Logo for intuitive thinking and mathematical problem solving. It gives abstract thought an almost concrete representation.

The turtle metaphor carries beginners over the threshold of Logo with ease until they sit down at the computer for their first hands-on sessions. As soon as they start typing commands to the turtle, Logo often becomes confusing. It is difficult to tell which direction the turtle is heading, due to the limits of screen resolution. If you can't see the turtle clearly, the metaphor doesn't hold up.

When the turtle moves, it leaps from position to position in a twinkling, without moving through any intervening steps or turns. For example, turning the turtle RIGHT 180 has exactly the same effect as turning it LEFT 180. It snaps immediately into a reversed position without seeming to turn at all. This is definitely not what happens when playing turtle! (If you turn the turtle RIGHT 360, you might expect to see it make a complete turn. Instead, it does not turn at all, but appears to stay in exactly the same position.)

Young children beginning to use Logo find this extremely confusing. They cannot see the turtle clearly and they often can't tell what happens when it moves. Furthermore, the inputs needed to produce large scale effects -- numbers like 50, 90 or 100 -- are bigger than the numbers they normally use in counting. At this point the turtle often wraps around the screen, a fascinating phenomenon for many students. But the wrapping occurs so rapidly that they cannot visualize what is happening with the turtle.

Some students spend hours with the "neat phenomenon" of screen wrapping (does this sound familiar to you?). But many new Logo users lose their sense of control

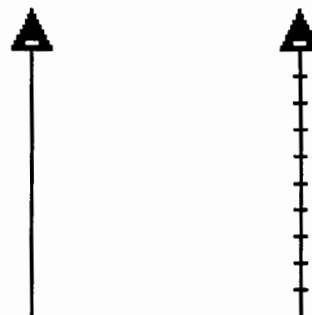
and intentionality at this point. The results become mysterious instead of understandable, the opposite of what was intended by Logo's developers. The problem is not with Logo as a concept, but rather with trade-offs made to cram this powerful language into limited hardware devices. The turtle's behavior is supposed to be easily observable, but current implementations of Logo make this difficult.

Solution: Change the Turtle's Behavior

One of the powerful concepts embedded in Logo is that if Logo does not behave in the way we want it to, we can create new commands (or procedures) that change Logo's behavior. In our work with preschool and primary age children, we have created a set of simple startup procedures that slow the turtle down, and use small numbers to produce large effects. We also use single letter command names to reduce the typing involved. Unlike working with so-called "instant Logo" procedures, our students use standard Logo syntax with inputs, and have access to standard Logo commands at all times.

The simplest way to slow the turtle down is to make it move in units of ten steps, or in turns of ten degrees. Here are the procedures in our startup file that accomplish this:

```
TO F :STEPS
REPEAT :STEPS [ FORWARD 10 ]
END
TO B :STEPS
REPEAT :STEPS [ BACK 10 ]
END
TO R :TURNS
REPEAT :TURNS [ RIGHT 10 ]
END
TO L :TURNS
REPEAT :TURNS [ LEFT 10 ]
END
```



The figure above shows the difference between the effects of FORWARD 100 in standard Logo, and F 10, using our startup procedure. The "tick marks" in the right hand drawing indicate where the turtle pauses briefly every 10 steps. If desired, the F and B procedures may be modified to add them in.

We notice that children who use these procedures can easily observe the turtle's moves and turns, and are able to use the turtle with intentionality. We notice less "mindless wrapping" of the turtle and filling the screen with lines. Instead, we see more conscious experimentation with wrapping as a phenomenon that is understandable and predictable using a slower turtle.

Although the inputs are one tenth of the inputs used in standard Logo, the transition is easily made. When students are ready to use standard Logo commands, we show them how to type the conventional command names, and add a zero to their inputs to achieve the same results as with the start-up procedures.

A Refinement: Making the Slow Turtle Smarter

One problem with this system is that it limits all moves and turns to 10-step and 10-degree increments. There is no way to turn the turtle 45 degrees using this system. It is possible to create a more elaborate set of procedures that take conventional Logo inputs and slow the turtle down in the same manner as our startup files. For example:


```
TO SLOWFD :DISTANCE
REPEAT (QUOTIENT :DISTANCE 10) [ FD 10 ]
FD (REMAINDER :DISTANCE 10)
END
```

```
TO SLOWRT :ANGLE
REPEAT (QUOTIENT :ANGLE 10) [ RT 10 ]
RT (REMAINDER :ANGLE 10)
END
```

The command SLOWFD 105 moves the turtle forward in ten jumps of ten turtle steps each, and adds FORWARD 5 at the end. The command SLOWRT 45 turns the turtle RIGHT 10 four times and adds a turn of RIGHT 5, for a total of 45 degrees.

Adapting Logo to Students' Needs

Our philosophy is that Logo is not a given. If your students can benefit by using procedures that make the turtle behave differently, why not see if you can invent something that works for them? It might be relatively easy to accomplish once you decide what you want to do. Logo is an environment for learning that incorporates a

great deal of flexibility for both teachers and students.

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Dan Watt and Molly Watt are teachers, lecturers, authors, and consultants in the field of educational computing. Write to them in care of Educational Alternatives, Gregg Lake Road, Antrim, NH 03440. Their CompuServe number is 70014,66.

East Coast Logo Conference Call for Papers

The University of Virginia, in association with Meckler Publishing Corporation, will host the East Coast Logo Conference (ECLC), April 2 through 4, 1987, at the Stouffer Concourse Hotel in Arlington, VA. The conference will focus on Logo classroom applications and the extensions of Logo into areas of related technology. The program will include presentations from both invited speakers and those selected based on this call for papers.

Papers and proposals for sessions dealing with Logo applications and extensions are now being accepted for the ECLC program. Logo applications include the integration of Logo into the existing curriculum, creative use of Logo with special populations, and research on educational applications of Logo.

Logo extensions include connecting Logo with additional technology (e.g., optical disks, robotics, etc.), educational methods and techniques which have a philosophy similar to that of Logo, an overview of Logolike software, and topics relating to the future of Logo.

Students of all ages are invited to submit

proposals for a special student session scheduled for Saturday, April 4.

If you would like to be a presenter, send a 200-word abstract of your intended 30-minute presentation to the address below no later than **October 1, 1986**. If you desire to organize and moderate a 1-hour session, send an outline of your proposed session (including confirmed speakers) no later than **October 1, 1986**. Speakers and moderators will receive free conference registration.

A camera-ready 3 to 5 page paper will be required no later than January 15, 1987, from each speaker chosen for the ECLC program. Since a pre-proceedings will be published, this paper is mandatory for all speakers.

If you are not interested in submitting a proposal, but wish to receive more detailed information about the East Coast Logo Conference, write to the address below and request to be placed on the ECLC mailing list.

East Coast Logo Conference
Tom Lough
University of Virginia
Curry School of Education
Charlottesville, VA 22903

Logo 86

July was International Logo Month once again at the Massachusetts Institute of Technology (MIT). Logo using educators from nearly two dozen countries gathered to share, listen, and discuss. A change from previous conferences was the addition of preconference tutorials. Topics included Logo / Lego, Lisp, list processing, music, art, game-making, and 3-d Logo.

Three general plenary sessions were surrounded by nine parallel sessions and five sponsor sessions to make up the conference program.

The proceedings contained over 300 pages of abstracts of 122 papers on many different subjects. The 148-page Logo 86 bibliography contained thousands of Logo references to articles, books, and research reports.

Copies of the Logo 86 proceedings and bibliography are available by mail. The price of the proceedings is \$25.00 for US addresses and \$28.50 elsewhere. The cost of the bibliography is \$12.50 for US addresses and \$15.00 elsewhere. To order, send a check in US dollars made out to "MIT Logo 86" to:

Logo 86 Publications
MIT E15-309, 20 Ames Street
Cambridge, MA 02139.

A geographical breakdown of the Logo 86 participants has been compiled for LX readers by Sandy Towberman. For a free copy, send a stamped self-addressed envelope to: Geographical Breakdown, Box 5341, Charlottesville, VA 22905.

Logo 86 Comments

Donna Nelson: Logo 86 was my second Logo conference at MIT. Full day tutorials were an excellent addition this year. They provided an

intense learning experience with a multitude of hands-on activities.

During sessions and discussions, I found myself analyzing and planning for my own classes. Ideas seemed to flow, not about changing curriculum, but about enhancing the process of learning. I enjoyed pondering how to incorporate independent learning and communicating about learning, in a flexible imaginative environment, using Logo as a tool.

Frustrations of the week centered around a lack of time to digest so much material, to talk with a rich variety of people from all over the world, and to enjoy the culture of Boston.

David Chesebrough: I noted a different tone to the conference this year, which was both encouraging and disappointing. The early fervor and (unrealistically?) high expectations of how Logo was going to revolutionize education have been toned down. Even Seymour Papert seemed more subdued this year in his opening talk, referring to the Trojan Horse analogy of working through the regular curriculum to gain underlying radical changes.

Last year, there was a more adversarial mood, with "practitioners" pointing out to the "academics" that the wonders and magic of Logo were not delivering as promised. Demands were made to see practical solutions and accommodations.

This year, that message seems to have been heard, as evidenced in many of the talks. A lot of progress has been made with classroom developed examples of practical materials in many specific disciplines and examples of broader and deeper Logo use.

Seymour was correct in that we are looking at a more mature Logo. I add that we see one which has had the early blush blown away. Now it is going to continue to grow, but at a slower pace, and with the need to earn its growth in a more

patient and accountable fashion. I hope that we can nurture this growth while keeping our sights on the underlying "radical changes" which inspired many of us originally.

Andy David: My impression of Logo 86 is that the emotionalism of Logo 84 (which was, after all, the launching of a movement) had no place here. Brian Harvey's provocative question, "Whatever happened to the revolution?" did not seem to be the question for the conference. But I don't think dirges are called for, either.

This year, there is evidence that quieter, more substantial progress is being made. In his proceedings paper, Papert noted, "There is a well established broad base of Logo practitioners in schools. We have more concrete examples on which to base discussions of Logo and the curriculum. ...theoretical ideas relevant to the issues have become sharper."

A scan of this year's sessions affirms these observations. If there is a central question for the Logo community, it seems to be, "Can Logo be accepted into the educational system and still produce radical change?"

I suspect that the real movement will come from individuals creating personally meaningful experiences with Logo, and that this will prove more important than national test scores, head counts at conferences, or any other generalized measurements of "success."

Donna Nelson teaches computer programming and mathematics at Steamboat Springs (CO) Junior High School. David Chesebrough is a computer coordinator for Sewickley Academy in Sewickley, PA. Andy David is an educational communications consultant working in the Chicago area. His Logo activities include advanced programming, workshops, and teacher training.

Tipps for Teachers

by Steve Tipps

Guess Who Is Coming to Inservice!

You probably have already read Papert's ideas about computers, schools, children, and learning in *Mindstorms*. It was that small volume, dense with ideas and opinions, that first attracted many of us to Logo. Papert's vision was "syntonic" with many of our beliefs in the joy of learning.

Mindstorms was the first effort at creating a community of shared hopes for computers and learning. However, after a while, the everyday grind of school intrudes on our hopes. The idea that Logo was a quick panacea for all the ills of education was obviously not true. Although students are a constant source of renewal, holding on that early enthusiasm was sometimes difficult for adults. Another effort at community building was needed to foster the possibilities of thinking with Logo.

Conferences are certainly a good way of sharing ideas and getting renewed visions. Getting to the Logo 84, 85, or 86 "main events," or the East or West Coast Logo Conferences may not be possible. Reading about ideas is another way of building a sense of community. That is the main reason for the *Logo Exchange*.

The number of resources and books available for Logo has zintupled in the last two years. But books and conferences are not adequate to build the common sense of purpose and direction which is the very essence of a community. Each school or school district needs its own process for making a Logo community.

Maybe you can invite Seymour Papert to take part in your local inservice program. "Impossible!" you say. "Too expensive and getting him here would be a scheduling

nightmare, even if he had time." A year ago, a visit with Papert would have been impossible. But now, thanks to a new series of videotapes, you can have Seymour Papert come to inservice in your own school.

More of Seymour

The series of tapes is divided into two parts, "New Mindstorms" and "Hurdles." "New Mindstorms" is an extension of *Mindstorms* and concentrates on learning and thinking. Seymour discusses resonance and appropriability of learning. Resonance refers to the "good vibrations" which learning can set up. Appropriability means that the learning is useful and empowering.

A new emphasis is the role of emotion in learning; Papert urges consideration of the affect. In a scene in a zoo, Papert reminds us of our fascination with animals. He sees no reason why learning of all kinds cannot have that same kind of fascination.

Papert believes that children are naturally future oriented. Their learning is aimed at being able to do something new. However, schools tend to be oriented to transmission of past knowledge. Computers, used in the way Papert suggests, may help resolve this conflict in time orientation.

Another idea discussed is Papert's perspective on discovery learning. This has been one of the most widely debated aspects of the Logo philosophy. Discovery learning generally refers to learning through exploration. Students engage in an activity; the meaning or knowledge derives from the activity, rather than from direct imparting of information in a verbal form.

Discovery learning is sometimes interpreted to mean that teachers play no part in the learning process. In fact, some readers interpreted *Mindstorms* to mean just that. In the tape, Papert clarifies his meaning of discovery learning, and restates the importance of "teachers" who guide, collaborate, and provide information as needed. "Learn-

ing without teaching" does not mean learning without teachers or help from others.

Up and Over Logo Hurdles

In "Hurdles," the second part of the tapes, Papert demonstrates aspects of Logo as a programming language. He focuses on the potential and the problems which students and teachers have had as they try to express themselves in a new "language."

For instance, people often seem to have trouble with the difference between PRINT HEADING and PRINT "HEADING. The tape shows Papert working out this difficulty with a group of students who take on the roles of Logo commands. He feels that *we* are the materials needed for understanding ideas in Logo. Recursion is another "powerful" idea that has been difficult to translate into meaningful settings for students and teachers. Papert works on a gas meter type device to show the embedded nature of multiple recursion.

Seeing More

These snippets of ideas about Logo learning and thinking appear in a 30-minute preview tape for the series. Many goodies are left to find in the series, which includes four tapes on teaching and learning issues, four on Logo language issues, and two on thinking with LogoWriter. The developer of the tapes is Bettie Schwartz, Assistant Superintendent of Schools in the Ladue (Missouri) School District, and a long time Logo enthusiast.

The tapes are professionally produced with interesting settings, classroom views, and many examples for off-computer activities. The support materials include diskettes and readings. Bettie calls the entire package a "learning system."

Grow Your Own

The availability of these tapes is an important addition to the effort to develop

the Logo culture. Having Seymour Papert on your own VCR for several hours is a great advance over the short interview pieces done previously. He can expound and illustrate his ideas at length. Papert is very appealing and has important things to share about his vision.

The danger exists that the tapes will become dogma rather than working models for working with Logo. Papert warns against taking ideas and examples as dictates. Teachers have reacted to *Mindstorms* in different ways. Some thought it was insulting to teachers; others were in complete agreement with Papertian observations. Most found ideas to applaud and to question. The tapes should be viewed with the same critical eye used in reading.

When you invite Seymour to your school for inservice, remember that he is *not* the Logo leprechaun offering an instant pot of gold at the end of a Logo rainbow -- a ready made program of do's and do not's.

While specifics are not critical, the underlying idea is important. Learning must be meaningful, useful, personal, empowering, resonant, appropriable, and evocative. Logo is an important tool for achieving that educational goal. The flexibility, creativity, and expressiveness intended for Logo is possible when learners become involved in adapting the tool to the tasks.

Logo has always been a grow-your-own proposition. What new varieties of Logo will you and your students invent?

For more information on the videotapes, write to:

Media Microworlds, Inc.
12 Clayton Terrace
St. Louis, MO 63131
(314) 567-0150

Steve Tipps is the West Professor of Education at Midwestern State University in Wichita Falls, TX, and has been involved with Logo since 1982. He conducts Logo workshops for school systems throughout the United States, and is a popular conference speaker.

Teacher Feature

by Rebecca Poplin

Featuring: Marian Rosen

A recent science project for gifted students at Marian Rosen's school involved the nurture of large, flesh-eating flies. The students used LogoWriter to create an animated science report on the project. Turtle sprites illustrated the various stages of the flies' growth while text described what the students had learned. Since parents were reluctant to provide homes for the "pet" flies at the conclusion of the project, Marian's students held a "Bastille Day." They took the flies to the playground, sang "Born Free," and sent the flies into the greater St. Louis area to seek their fortunes.

Marian's students are "Born Free," too. She urges her sixth graders toward their best efforts and toward creative freedom while protecting them from failure (but not from "mistakes").

Marian has participated in a unique Logo infusion project in Ladue School District. Assistant Superintendent Elizabeth Schwartz has supported the implementation of Logo in schools with extensive after-school and summer classes for students. These programs have given teachers and students a lot of relaxed and stimulating computer time, unbound by curriculum guides and in-school pressures.

Marian credits her experience in the out-of-school programs with giving her the "courage of her convictions" and the personal growth and commitment she needed to create an exciting computer program in her school. At least 80 Ladue teachers in grades one through six have had Logo, many of them in the out-of-school programs. A real Logo community is developing.

But Wait, There's More!

When thinking of Logo, Marian is reminded of those late-night automatic vegetable slicing machine commercials which, after offering the basic machine, proclaim, "But wait, there's more!" The phrase became the title of Marian's session at Logo 86, and describes one of the approaches she uses to get students involved in Logo projects. She presents Logo as a tool kit of shapes and shows the students examples of games that she and other students have created. The sixth graders see what more they can get for "one low price."

One of the groups Marian worked with this past year created projects with the apparent purpose of teaching specific concepts to first and second graders in the district. Naturally, the creators of the projects were challenged and learned a lot, too.

To get the students started, she helped them focus on the ideas they wanted to teach, ranging from shape identification to initial consonants. In the beginning, Marian taught a simple single stroke program using READCHARACTER to drive the turtle. She also showed them how to create an interactive riddle program. These two powerful ideas showed up in many variations in last year's projects.

Marian sees her role in project development as one of preventing failure. Some ideas may seem simple but are really hard, while others appear hard but are not. When her students encounter problems and want the program to do things they haven't learned, Marian's rule is, "When they can say it in English, I show them the code."

Once in a while, students reject techniques they don't fully understand. Usually the desire is sufficient to move into understanding the programming concept, however. Sharing projects with students in the lower grades has contributed to the growth of the student Logo community.

One project created in the gifted class last year was a shape shop. The program

asks the user to pick a color and a shape for the turtle. Then, the user can drive the shape around the screen and stamp a picture. The program amounts to a creative construction set, and students love it.

Another project has a villain who has stolen everything from the classroom. The computer gives riddles for clues. For example, one element starts with a "T." If the user guesses "teacher," the teacher appears in the classroom. As all of the answers are guessed, the classroom takes shape.

Several students made connect-the-dot programs using the coordinate system. In order to complete these projects, Marian made teacher tools to label the dots, and she provided the PICK, READNUMBER, and READWORD procedures.

New Frontiers

Like many Logo teachers, Marian is ready and willing to explore new frontiers. Her school district is using CSMP mathematics. Marian feels there are many deep connections between Logo and the ideas inherent in this math program, and seeks to communicate with others who are involved in both programs and want to share ideas.

Marian is a part of a growing and thriving Logo community. She believes strongly that the successes they have experienced have happened because dozens of teachers have worked together, each bringing different views. The community would not have grown without strong commitment and support from the district administration. Such support is essential.

Marian agrees with LCSl's Michael Temple that, instead of the old line, "Logo is easy," we should be saying "Logo is hard but worth it."

If you would like to communicate with Marian, write to:

Marian Rosen
7541 Marillac Drive
St. Louis, Missouri 63133

If you know of teachers who should be featured in this column, please write to :

Rebecca Poplin
2421 Fain Street
Wichita Falls, Texas 76308

Rebecca Poplin uses Logo to teach computing and mathematics at a junior high school in Wichita Falls, TX.

Teaching Tools

by Glen Bull and Paula Cochran

Chart Tools

For the past two years we have written a column on lists in Logo because we felt that lists were underutilized, particularly in non-mathematical areas such as English and language arts. This year we're changing topics, although we still will be using a good many lists in our column.

In our shift of emphasis, we'll be focusing on teaching tools. Two issues have become irretrievably intertwined in the minds

of many teachers. One issue is that of teaching Logo as a programming language. The other is the issue of using Logo as a tool to make it easier to understand other subjects, such as mathematics and English. In this column we'll be focussing on using Logo to teach, not on teaching Logo.

Over time we have come to the conclusion that Logo tools are essential for this purpose. Some of Papert's microworlds are collections of Logo tools. Logo tools allow the teacher to bypass programming issues that are irrelevant to the subject matter at hand. Logo allows tools to be constructed more easily than almost any other computer language. Yet in many classrooms tools are not utilized.

Line

Tools can be simple, yet powerful. LINE and OVER are two examples that should be in the toolkit of every teacher. LINE just draws a line. The code is not very complicated.

```
TO LINE :LENGTH
  FD :LENGTH
  BK :LENGTH
END
```

(Ed. note: LINE is a primitive command in some Logo versions. You may need to select another name for this tool procedure.)

You should know that our columns are written so that you can type in the procedures as you read along. Many of the dynamic concepts that make Logo fun are hard to convey through a static printed page. If you type in each procedure as you go along, you'll see what we're getting at. Type in the LINE procedure and try it out at this point.

?LINE 60

It's fun to watch the turtle flick forward and back again. Try a few more.

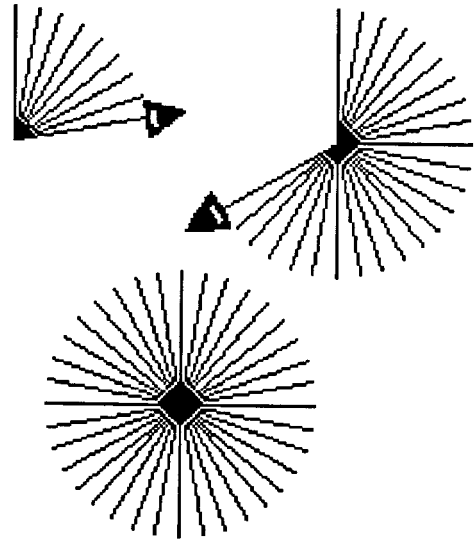
```
?LINE 20
?RIGHT 10
?LINE 73
```

The LINE procedure makes it possible to draw a starburst with the greatest of ease.

```
TO STARBURST
  REPEAT 36 [ LINE 50 RT 10 ]
END
```

Try out the starburst procedure.

?STARBURST



Over

The OVER procedure is also simple, but even more useful. It moves the turtle over.

```
TO OVER :LENGTH
  PU RT 90
  FD :LENGTH
  PD LT 90
END
```

Frequently it is necessary to experiment with the placement of the turtle. The OVER procedure makes it possible to move the turtle over with a minimum of fuss. It's often a delightful surprise when someone discovers that OVER can move the turtle to the left as well as to the right (assuming a heading of 0). Negative numbers are used to move the turtle to the left.

?OVER -30

When LINE and OVER are combined, it is easy to make parallel lines.

```
TO PARALLEL.LINES
  REPEAT 10 [ LINE 50 OVER 20 ]
END
```

You can use numbers other than 50

and 20 to make parallel lines which can be used for a variety of purposes.



Experimenting with Number Lines

The OVER procedure can be a simple yet powerful tool for experimenting with number lines. Let's look at an example. First, draw a horizontal line 120 units long, centered on the screen.

```
?HOME SETHEADING 90
?REPEAT 2 [LINE 60 RT 180]
```

Then adjust the PARALLEL.LINES procedure so it draws short LINEs 10 units apart, and construct a number line similar to the following figure.



Now you are ready to experiment. Is the following inequality true?

$$-60 + 20 > 40 + -10$$

There are two ways to find out with Logo. One is numeric. We can just let Logo figure it out with its arithmetic functions.

```
?PRINT -60 + 20 > 40 + -10
FALSE
```

Logo says that $-60 + 20$ is not greater than $40 + -10$. The other method of evaluating the inequality is graphic. Here is one way you might try.

- A. Do the lefthand side of the inequality.
1. Use SETX to put the turtle at -60.
PU SETX -60
 2. Use OVER to add 20.

OVER 20

3. Use LINE to mark the spot.

LINE 50

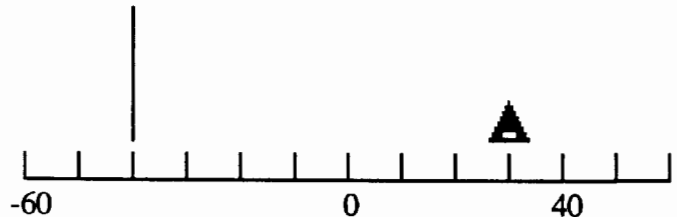
- B. Do the righthand side of the inequality.

1. Use SETX to put the turtle at 40.

PU SETX 40

2. Use OVER to add -10.

OVER -10



- C. Check the position of the turtle to see if the inequality is true.

1. If the turtle is to the right of the line, then $40 + -10$ is greater than $-60 + 20$.
2. If the turtle is to the left of the line, then $40 + -10$ is less than $-60 + 20$.

Both the graphic and numeric methods of experimenting with inequalities are valuable. Both provide the student with feedback, and allow experimentation. This example illustrates that a tool doesn't have to be complicated to be useful. Often it is more important for the teacher to demonstrate how to use a simple tool to explore a subject area than to develop very complicated and sophisticated tools for students.

Programming Challenge

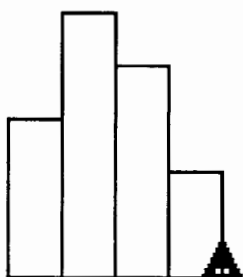
The OVER procedure could be refined. Our OVER procedure picks up the pen before the turtle moves, and puts it back down again after the move. A better OVER procedure would check the state of the turtle's pen, and leave turtle's pen in the same state after the move as before. Can you write an improved OVER procedure?

Bar Graphs

A graph or figure often makes it easier to understand a concept. Textbooks are filled with bar graphs. It is easy to make bar graphs using the OVER procedure. A bar graph tool is a short procedure.

```
TO BAR :HEIGHT
  REPEAT 2 [ FD :HEIGHT RT 90 FD 20
RT 90 ]
  OVER 20
  END
```

This BAR procedure uses OVER to leave the turtle in a position to draw the next bar in the bar graph. This saves the user the effort of doing this.



If your version of Logo has a FILL command, you could construct a SOLID.BAR procedure that draws bars filled with different colors.

LINE, OVER, and BAR can be saved in a toolkit disk file for later chart use. (You may want to erase any other procedures.) We usually add ".TK" to the end of our toolkit file names so we can find them easily later.

?SAVE "CHART.TK

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TO BEGIN :SETUP

*by Elaine Blitman
and Barbara Jamile*

(Ed. note: Elaine Blitman and Barbara Jamile's column is oriented towards the needs of teachers just getting started with Logo and is a welcome addition to the LX.)

In our five years of working with teachers, children, and computers, we have found that attitudes can affect the success of a new Logo learner as much as knowledge about the computer or operating commands. The person who introduces the first Logo experience has a great deal to do with the learner's feelings of self-confidence and eventual success. Encouragement, intervention at appropriate times, pacing, and the entire affective environment are all extremely important. They contribute to the point of view needed to acquire Logo learning attitudes and skills, whether the learner is a kindergartener or a faculty member.

Creating an environment where there is mutual respect between learners and the teacher will help the Logo experience become the unique learning adventure it is meant to be. In such an environment, both students and teachers can help each other. Feelings of support and encouragement are nurtured. Learning is considered an exciting on-going process with everyone participating.

We have found that Logo can stimulate faculty discussions about developmental levels of learners, appropriate strategies for helping students learn in a less structured environment, classroom management ideas, and other pedagogical issues. Such discussions need not be limited to faculty members, however. Encouraging learners of any age to examine their own reactions to Logo experiences provides excellent feedback and extension of the process.

Fostering the attitudes that lead to the consideration of "mistakes" as serendipitous

opportunities is a most important aspect of Logo learning. Playful curiosity about Logo, testing what happens when different combinations of commands are tried (especially in conjunction with thoughtful assessment), record-keeping, and intervention are also valuable.

As you set up for another school year, we would like to offer some ideas and suggestions which may be helpful in your Logo work.

Getting Ready

Reread or browse through *Mindstorms* at the beginning of each year of teaching Logo to be reminded of the philosophy and expectations for setting up a Logo learning environment.

Consider these physical factors:

- The height of the chair in relation to the height of the keyboard. Children should not have to reach up to press a key. Also, they should be able to see the key tops easily while seated. If you are using carts, they can be designed so that the shelves for the components are adjustable. If you are using tables, look for ones that have adjustable legs.

- The height and tilt of the screen in relation to the learner's eyes. Measure and test your children's comfort level before settling on a final configuration for your classroom or lab setup. If you are teaching faculty members, remember that bifocals make a difference!

- The light source. Check to be sure that the screen at the height of the learner is glare-free. It is our experience that young children usually will not say anything about the problem. Trying to see what is on a screen which has glare from a bank of windows opposite can make the most motivated student fidget.

- The color of the wall behind the computer monitors. A green screen against a coral wall (complementary color)

is apt to cause a vibrating effect and some eye strain. If it is not convenient to move the computers, tape a length of chart paper to the wall to create a neutral background.

Time and Sharing

If there are not enough computers in your room for everyone, time management and Logo learning can be handled by using a rotation list. We've found that a time-on-project approach is better than a set amount of time for each student. It is really frustrating for a youngster to get almost to the end of a project and have a timer ring announcing that the half-hour is up. Even kindergartners respond well to a rotation chart and can tell the next person then it is his or her turn in serial fashion.

At least two computers side-by-side are an effective arrangement for the interaction that is so valuable for learning with Logo. Very young children seem to do best with only one child to a computer. They are usually not socially attuned to sharing with a keyboard graciously, but do like to talk about what they are accomplishing with a neighbor.

Compatible partners in second grade and above seem to learn very well together and can share the keyboard, their combined knowledge, and their ideas quite profitably.

Adults need to be matched carefully if they are to share a computer, for great differences in previous learning or experience can prove either frustrating or can become a tutorial situation, where the more advanced partner does not learn much that is new. For an adult workshop that runs for several days when computers must be shared, be sure that partners are rotated frequently.

Assistance

If you are trying to give students experiences in Logo (with two or three computers in the room) and also to teach three reading groups at the same time, here are some

strategies to handle the children's need for immediate assistance.

- Teach them to consult the learner at the neighboring computer. This is good for interaction. However, you need to be available if neither child can figure out the problem. Also, it is sometimes difficult to prevent inaccurate concepts from getting passed from child to child.

- Use students from a higher grade level who are more experienced in Logo, if available. We trained some fourth graders, the "Computer Tutors," in intervention techniques with first graders, so that they would not just take over and do things for the younger students, but would help them think through problems. They took this so seriously that some of them would stand with their hands clasped behind their backs so that they would not be tempted to touch the younger child's keyboard!

- Each student makes a HELP signal from 9 x 12 colored paper, folded lengthwise into a three-sided column. On two of the three sides, the students write their names, making a prism-like name plate. On the third side (the base of the nameplate), HELP is written in large letters. When assistance is needed, the name plate is quietly upended to show the HELP signal. At all other times, it stays on its side. When the call for HELP goes up, we expect our children to continue to work on their problem until a helper can come.

Recording Observations

Encourage students to try out new concepts, then change just one aspect in order to see what happens. Recording the observations in a notebook or on cards with drawing and writing often helps the student to think through what happened and why. For example, the command REPEAT 4 [FORWARD 50 RIGHT 90] could have changes made in three places. Try them one at a time.

```
REPEAT 4 [ FORWARD 60 RIGHT 90 ]
REPEAT 5 [ FORWARD 50 RIGHT 90 ]
REPEAT 4 [ FORWARD 50 RIGHT 45 ]
```

Beginners who record and discuss the results gain a concrete record of progress and have something to share with others.

Even kindergarteners can make records by drawing what they see on the screen. We have found that index cards are easy for younger students to draw or write on. They can be held together with a notebook ring at one corner, hinged with tape, or kept in an envelope.

Children can also share their ideas with others by writing their favorite procedures and discoveries on cards to keep in a collection near the computer. Space for comments or revisions from other children will make this resource a growing one used by all the children in the classroom or lab.

Off-Computer Tools

Included in this issue is a master for a "Turtle Twirler," to be run off on transparency material on your copy machine. This device has proven useful for estimating the angle when manipulating the turtle, or when the children are "turtle walking."

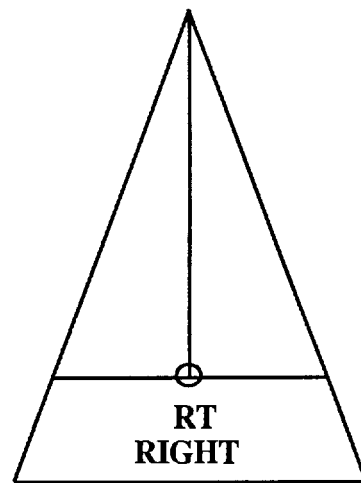
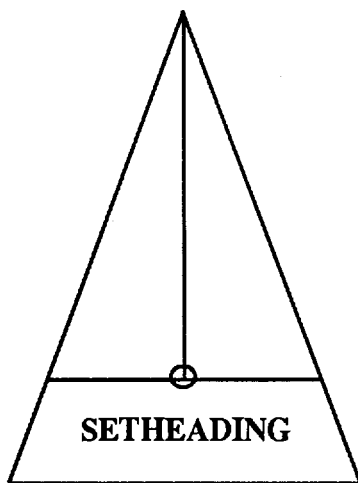
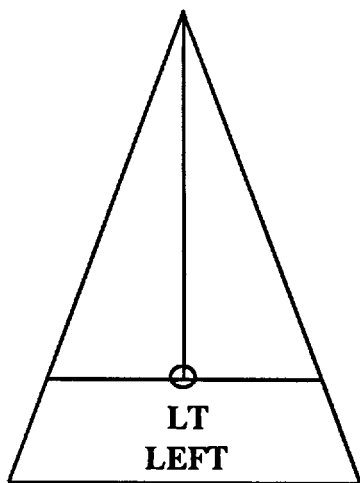
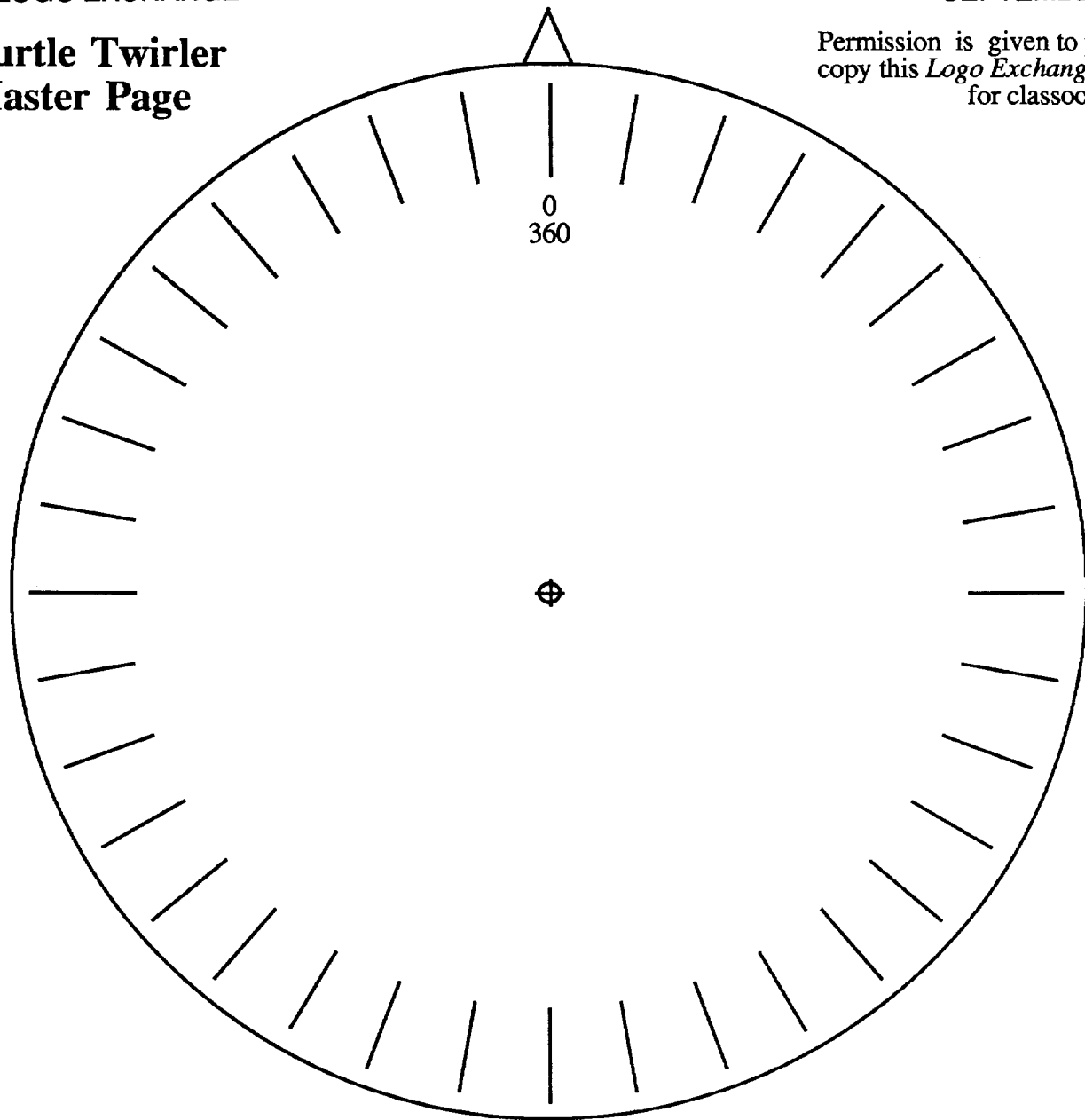
To construct your own set of twirlers, first make two photocopies of the master page. Starting next to the 0 / 360 in the circle, write in the numbers 10, 20, 30, etc., at the radial lines around clockwise on one copy and counterclockwise on the other.

Make two copies of the clockwise twirler and one copy of the counterclockwise one on transparency film. Cut out each circle and carefully punch a small hole through the center.

Color one of each of the three triangles on a master photocopy, cut out, glue onto heavy stock, and laminate. Punch holes where indicated. Connect each triangle pointer to a circle by inserting a brad through the hole in the triangle and then through the hole in the twirler. The

Turtle Twirler Master Page

Permission is given to photo-
copy this *Logo Exchange* page
for classroom use.



RIGHT and SETHEADING pointers go with the "clockwise" circles. Affix the LEFT pointer to the "counterclockwise" circle.

To use a twirler to turn left or right, select the appropriate twirler and turn the pointer to the 0 / 360 position. Place the transparent circle on the computer screen so that the twirler and pointer are lined up with the direction the turtle is headed. Hold the circle in place and turn the pointer left or right until it is facing the direction you want for the turtle. Read the angle indicated by the pointer. Use this number to tell the turtle how far to turn.

To set the heading of the turtle, select the SETHEADING twirler. Hold the twirler on the computer screen so that the 0 / 360 position is pointing up and the pointer is over the screen turtle. Turn only the pointer until it is facing the direction you want for the turtle. Use the number indicated by the pointer with the SETHEADING command.

END

Creating a Logo learning environment is a pleasurable, long-term experience affecting the way all children learn in an entire school community. Teachers, parents, and children can become involved in the process of examining their own progress toward such common goals as experiential learning, trying out various solutions to problems without looking for the one "right" answer, and devising ways to learn together and to support one another in this endeavor.

Elaine Blitman and Barbara Jamile are the K-2 and 3-4 supervisors at the Punahou School in Honolulu, HI. They have been using Logo with young children since 1982.

Logo LinX

by Judi Harris

Logo Music: A Numerical Denomination

(Ed. Note: "Logo LinX" is a new column we have added to provide ideas for linking Logo to various curriculum areas. In the coming months, Judi Harris will report on a variety of ways Logo can "disappear" into the subject area, and still make an important contribution.)

One of my favorite "peanuts" cartoons shows Linus, with Charlie Brown's little sister, Sally, sitting beside him. He patiently explains, "Now say we cut an apple in half ... we have two halves, don't we?"

Sally responds hysterically, "That's fractions! You're trying to reach me fractions! You know I'll never understand fractions! What are you trying to do to me? I'll go crazy! I'll ..."

The Problem

Our students have an important message for us: fractional relationships are difficult to understand. Perhaps this is because there are few non-contrived "real-life" situations that can be used as effective models for instruction of these somewhat abstruse concepts.

History bears out these complaints of confusion: while the Babylonian numeration system was complex enough to sport place value and numbers expressed in base sixty (let alone the first known appearance of the notion of zero, the foundations of algebra, and astoundingly accurate astronomical calculations), neither the Babylonians nor their Egyptian predecessors had more than a vague idea of the addition of rational numbers. There just didn't seem to be practical situations requiring multiplica-

tion and division of fractions. Need we wonder, then, at the difficulty with which our young students perform their operations on fractions?

Yet, there is a motivating, easily understandable, culturally resonant microworld which quite naturally utilizes fractional relationships and operations: MUSIC! Musical notation uses rational labels to indicate the length of each note, and the number of beats for each note is derived through rational operations.

Children are often amazed to observe that they have been comfortably manipulating relatively high-level fractional calculations in music class. This often gives them the boost of confidence that they may require to tackle a difficult set of abstract notions in anything more than a rote way.

Then, Logo to the rescue! The students can play with their new understandings in a creative, child-centered, problem solving environment, using Logo music.

The System

Terrapin and Krell Logo music commands for the Apple II computer are really procedure names that must be read into the workspace from the file "MUSIC on the utilities disk.

(Ed. Note: A file for music in Apple Logo is included on the Apple Logo Tool Kit available from your Apple dealer. A music file for Commodore Logo is included on the utilities disk provided. Both the Apple Logo and the Commodore Logo music commands operate similarly to those discussed in this column. Several more recent Logo versions, such as IBM Logo, Apple Logo II, and LogoWriter, have built-in music commands. Refer to your reference manual for details.)

The user is then free to compose away, using the command PLAY. PLAY takes two inputs: a list of pitches and a list of durations of the notes desired, coded in order of occurrence, and indicated by n:m-

bers. For example, the first phrase of "Row, Row, Row Your Boat" might look like this:

PLAY [4+ 4+ 4+ 6+ 8+ 8+ 6+ 8+ 9+ 10+][40 40 30 10 40 30 10 30 10 80]

The first pitch, 4+, which roughly corresponds to middle C, was given a duration of 40, as opposed to the last pitch, 10+, which roughly corresponds to a G natural, and would be held out for twice as long. In standard musical notation, the phrase would look something like this:



Notice that the appearance of the notes changes according to the specified duration of the pitch. The first note is called a "quarter note." and the last, a "half note." An interesting equation can be formed by looking at the durations of the first and last pitches: $40 + 40 = 80$. This corresponds to the note equation $1/4 + 1/4 = 1/2$.

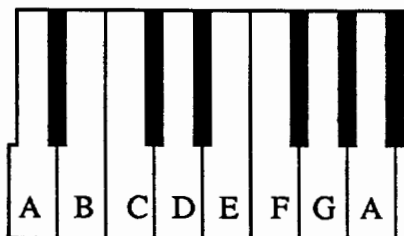
And the other durations? The duration of 10 is one quarter of one quarter note ($1/4$ times $1/4$) or a sixteenth note. How many times have you wondered whether your students will ever really need to multiply fractions in the "real world?" The pitches with a duration of 30 are $3/4$ of a quarter note ($3/4$ times $1/4$ equals $3/16$). The $3/16$ and the $1/16$ note together form a total value of $4/16$, which, when put in lowest terms, is a quarter ($1/4$) note ($30 + 10 = 40$).

So, in the writing of one ten-note phrase, the students have intuitively manipulated not only the labeling of fractional parts, but also fractional equivalence, simplest terms, addition and multiplication of rational numbers, and, by inverse relations, the subtraction and division of fractions as well.

Fraction Power

Truly, these are powerful ideas, not just in terms of the "real worldness" of Logo, but also as a concrete example of one of the many links between the arts and mathematics. These connections existed long before even Mozart was a child, and musicians utilized them freely; yet, just as in the case of turtle graphics making clear the relationships of geometric constructions, Logo music can illuminate difficult fractional concepts for the student. I must confess that this fractional terminology baffled me as a young piano student, and I subsequently hated "piano theory." If only I had known Logo then!

Consider, for example, the arrangement of the part of the piano keyboard that contains the notes to our "Row, Row" phrase.



Notice that there is a black key "between" the C and D, yet not "between" the E and F. In musical terminology, there is a "whole step" in pitch between C and D; D is a whole tone higher than C, while there is only a "half step" between E and F, or, F is a half tone higher than E. This helps to understand why the C pitch is 4+ and the D is 6+ (5+ is the pitch number for C sharp or D flat, the alternate names for the black key between C and D), while the pitch number for E is 8+ and 9+ for F, which is only a half step higher.

There are also fractional relationships in the time signature specifications of music. The time signature of a piece essentially identifies how many of which type of note there will be in each measure of music. Our

"Row, Row" example was written in the most common time designation, 4 / 4, which means that there are the equivalent of 4 (numerator) quarter notes (denominator) in each measure. Had the time signature read "2 / 4," there would be 2 quarter notes in each measure. It stands to reason, then, that given a constant time value for 1 beat (quarter note), a measure in 2 / 4 music would take 1/2 the time of a measure of 4 / 4 music ($2/4 = 1/2$). Further, a measure in 3/4 time under the same assumption would take 3/4 the time of a measure in 4 / 4 time.

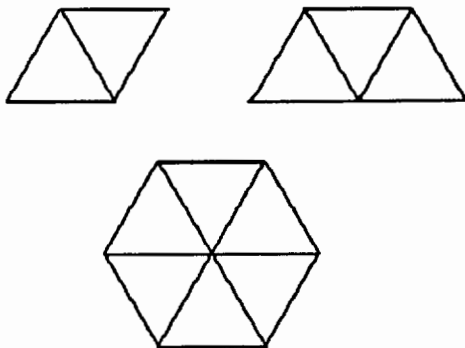
Equivalences become clear and self-checking when linked to familiar music. Two eighth notes or four sixteenth notes take the same amount of time as one quarter note ($1/8 + 1/8 = 2/8$ or $1/4$; $1/16 + 1/16 + 1/16 + 1/16 = 4/16$ or $1/4$). In 4 / 4 time, a total of 4 quarter notes or 8 eighth notes or sixteen sixteenth notes can occupy a measure (1 measure divided by $1/4 = 4$; 1 divided by $1/8 = 8$; 1 divided by $1/16 = 16$). In 3/4 time, a total of 3 quarter notes or 6 eighth notes or 12 sixteenth notes can make a measure ($3/4$ divided by $1/4 = 3$; $3/4$ divided by $1/8 = 6$; $3/4$ divided by $1/16 = 12$). And in the "Row, Row" example, the first measure is composed of three 1/4 notes, one 3/16 (dotted eighth) note, and one 1/16 note ($1/4 + 1/4 + 3/16 + 1/16 + 1/4 = 1$).

Mind boggling? Exciting? Stimulating? That's what the students think. And for those not ready to understand addition of fractions with unlike denominators or multiplication of rational numbers, the whole number multiples-of-ten duration numbers are perfectly comprehensible. When manipulating them in relationship to each other, students are setting the stage for a more abstract understanding of rational numbers later in their education.

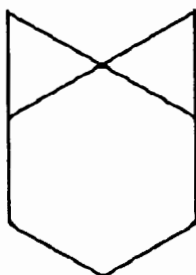
The Projects

These interdisciplinary connections provide fertile ground for integrated study of

mathematics, music, and computer science. For example, I introduced the study of Logo music to fourth - graders who had been working with fractions and pattern blocks. In this set of powerful manipulative materials, small green equilateral triangles can be fitted together to cover a blue rhombus block, a red trapezoidal block, or a yellow hexagonal block.



I instructed the students to think of a "cat face" shape (a hexagon with two extra triangles attached) as one whole.



They then identified what $1/2$, $1/4$, $1/8$, $1\ 1/2$ etc. of the "cat face" would be in terms of blocks. I gave them a sheet with a sequence of pattern block shapes on it, and played a familiar tune on the recorder for them, hinting that they should follow the sheet for a clue for what it had to do with my song.

They quickly surmised the relationship; the rhombus "notes" were twice as long as the triangle "notes," and so on. I then asked one of the children to "spell out" the melody in blocks, then mix up the sequence. I played the tune with the same

notes, but the mixed-up durations, and the children were quick to point out that the shapes were like musical staff notes. This led to a fascinating discussion of the etiology of duration names, values of combinations of durations, time signatures, and speed in music. They delighted in repeatedly rearranging the shape sequence for me to play, and many came in the next day with puzzles for their classmates to solve: shape sequences to represent the melodies of their favorite rock and folk songs that we hung (with hidden answers) on the bulletin board.

The transition to Logo music was simple. Again using the "cat face," and related shapes, I constructed an incomplete "IF - THEN" statement:

If cat-face = 80, then
 triangle = ?
 rhombus = ?
 hexagon = ?

Then, what if cat-face = 360, 6000, etc.? I supplied a note conversion chart, played several tunes for demonstration, quickly reviewed file requirements and syntax, and they were off and composing!

One young clarinetist even transcribed all of his recent practice pieces to Logo music, and continues to do this at home; he says that it is a great way to check to see if he is playing the pieces correctly. Another child decided to use much of his programming time in class, at recess, and at home to construct a type of "computer piano," a superprocedure that will accept either just a letter name for a note or a name and duration (q=quarter, h=half, etc.) and play it immediately upon keystroke. He plans to extend the program to allow the user to enter a series of durations, drawing the notes as they are being played.

Two students in the school choir (one alto and one soprano) decided to program their harmonizing parts to the same song. Their plan was to load each part into a

separate computer, then press the RETURN keys in unison to achieve the desired harmony effect. There were gasps of admiration and much cheering from classmates and teacher alike when the impromptu "concert" was held. Their work inspired me to "procedurize" a soprano recorder trio by Handel. The performance was as well-received as could be expected from a roomful of Bruce Springsteen fans.

There is an important message underlying these suggestions, and future articles in this column. Students can experience the computer more as a tool and less as a separate subject of study if Logo projects

are carefully woven into the interdisciplinary fabric of academics. If the fabric seems to be fraying at your school, with 50 minutes for math and 40 minutes for music, then why not use Logo as the loom?

Judi Harris was an elementary school computer use facilitator, graduate education instructor, and computer consultant for a number of public and private schools in Pennsylvania. She is now a doctoral student in education at the University of Virginia. Her CompuServe electronic mail address is 75116,1207.

MathWorlds

edited by

A. J. (Sandy) Dawson

(Ed. note: The growth of Logo has made it possible to begin the addition of more specialized columns. The first of these, MathWorlds, will be devoted to the use of Logo in the exploration of mathematics and related concepts. We are especially pleased to have Sandy Dawson as the column editor.)

Logo has been intimately related to mathematics since it was created more than a decade ago. Indeed, it is difficult to think of Logo without associating it with turtle geometry, a linkage reminiscent of a psychologist's word association test. Yet, as we all know, there is more to Logo than turtle geometry. Though this column will not neglect that aspect of Logo, I seek and wish to share reports, activities, games, challenges, and microworlds which use Logo mathematically in ways other than just via turtle geometry. To that end, I invite your letters, reports, and outlines of activities.

Moreover, I want the column to explore some unexplored regions in the teaching and learning of mathematics. Mathema-

tics is an activity of the mind stimulated by imagination and guided by intuition. Logo activities and microworlds can assist in the stirring of the imagination and the triggering of intuition. For learners in such situations, both the mathematics and Logo may be invisible in the sense that the learners are doing their work by being involved with the activity or by being immersed in the microworld. This is as it should be. Later, reflection on the experience gives the opportunity for greater insights to be gained and understandings to be achieved.

To me, it is not Logo the language which is of critical importance; the philosophy and psychology foundational to Logo must be central particularly for the development of a Logo culture within the learning environment. The language itself is a vehicle for the advancement of an approach to education which honors the integrity, power, and creativity of children.

Mathematics lessons would be enhanced by taking place within a Logo culture, because that culture subordinates teaching to learning. *However, teachers of mathematics must see it as being in their self interest to create and function in a Logo environment.* A teacher's self-interest will be served only if functioning within a Logo environment is energizing to that teacher, enabling for the children with whom the teacher is working, and still allows the teacher to meet community demands for a sound

education for children.

Most if not all of the mathematics of the elementary school focuses on arithmetic. Children are seldom provided with an opportunity to see the *algebra* which underlies the arithmetic. Logo can be a powerful means for allowing children to explore what might otherwise be a mathematically sterile and static situation. Tool procedures facilitate an algebraic examination of problems, the study of functions and relationships, and the identification of patterns. These activities lay at the heart of mathematics, and are too seldom explored by elementary children.

Future columns will explore these and other fundamentals of the teaching and learning of mathematics, and how Logo can be used to foster their understanding by learners of all ages.

Please send your contributions to:

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SPECIAL TALK

by Paula Cochran
and Glen Bull

Do You Know a Special Educator?

This is going to be a column about Logo and special populations. If you know someone who works with children who have learning problems or disabilities, such as a special educator, a speech-language pathologist, an occupational therapist, or a physical therapist, we'd like you to let them see this copy of your LX.

Teachers and clinicians who use computers with kids have something in common that is not often mentioned in computer-related journals and magazines. They all know that "it" doesn't always work. That is, there are many computer-based activities that should be wonderful learning experiences but which are not. Or at least not this year, with this group of students. Likewise, there is software which any self-respecting professional would reject, which unexpect-

edly provides a child with hours of productive interaction and exploration. Even the best of us cannot predict the times when the empty box is going to be more fun than the expensive toy that was inside.

This seems to be especially true for Logo and Logo activities. They don't always produce the reaction that was expected -- but they frequently have positive results. Nowhere is this more evident than with children who have special learning needs. Special tools for special children: that is what we hope this part of the *Logo Exchange* will be about.

Working with other clinicians and educators has made it clear that there is a need for a way to exchange information, ideas, and techniques for using Logo and Logo-like software with learners who are physically impaired, speech or language disordered, learning disabled, cognitively delayed, or hearing impaired. We would like to invite educators and clinicians to help us make this column such a forum.

Exchanging Ideas

The *Logo Exchange* is intended to be a forum for exchanging ideas. We want this column to be comprised of therapy ideas, experiences, and suggestions from profes-

sionals who work with special populations. We are interested in things that didn't work out as anticipated, as well as the success stories. To get things rolling, this summer we invited 20 teachers and clinicians from across the country to spend three weeks at a special institute in Charlottesville working on the development of Logo applications for special populations. The institute was made possible through a grant from IBM Special Education Projects.

One of the themes that emerged from this institute was the concept of mixing technologies. Mixing technologies means using Logo with other programs and a variety of peripheral devices. For example, you can add a speech synthesizer to a computer and make Logo talk. You can create a picture with a paint program and use it with Logo. You can add a switch to the computer and allow a physically handicapped person to control Logo, even though they can't use the regular keyboard.

A switch project that some of the institute group worked on this summer is a good example. A teacher of a severely / profoundly handicapped class wanted to develop a Logo program to help one of her students practice nodding "yes" and "no" appropriately. How could a computer help with this kind of communicative skill? The plan was to make a two-switch system, using a chin switch for YES (up and down movement) and a cheek switch for NO (sideways movement). The particular child in question was capable of such movement, but not reliably in response to yes / no questions.

The Logo program works rather simply: It asks the child a question (using synthesized speech, of course) and waits for a switch to be pressed. It can do this by monitoring the value of PADDLE and BUTTONP in most versions of Logo. The program then responds according to whether the child answers yes or no. A drill-and-practice program that tells the child

which switch to press would be easy to construct, but would not be particularly empowering:

Logo: Bobby, nod your head yes.
Bobby: (presses chin switch) Yes
Logo: Good. You nodded yes.

Although such a drill program may be a natural inclination at this point, it is not the only possibility. Various choices could be added. For example, the exchange could go something like this:

Logo: Is your name Bobby?
Child: (presses cheek switch) No
Logo: Oh, so you are not Bobby. Is it okay if I call you Sam?
Child: (presses cheek switch) No
Logo: Is your name Bobby?
Child: (presses chin switch) Yes
Logo: Hi Bobby! Do you want red letters?
Child: (presses cheek switch) No
Logo: Do you want blue letters?
Child: (presses chin switch) Yes
(Text changes to blue, etc. . .)

The appeal of using a computer in a flexible, personal way to accommodate special learning and communication needs is what brought the participants in the institute together. We plan to use the pages of the SPECIAL TALK column to share hints, ideas, and occasionally full-blown instructions for how to use Logo in this fashion.

We're particularly excited about the use of synthesized speech with Logo. Synthesized speech is especially helpful with users who are non-readers or beginning readers. The title of the column has a double meaning. It's our chance to talk with you about special populations, however it also emphasizes our interest in Logo programs that talk.

Many of the participants in the institute are also interested in using Logo as the

"glue" for mixing various technologies. Naturally, they want to explore applications in special education. If you are interested in any of these topics, send us a note and we will pass it on to one of the institute participants who shares your interest. Topics include switches, videodisks, speech synthesis, touch tablets, music tools, scanning tools, picture banks, and digitized speech.

We'll be discussing some of these topics and how these technologies can be used with Logo and special populations in future columns.

Learner-Based Tools

There are lots of other topics which we would like to include in SPECIAL TALK. For example, you might want to use Instant Logo as a context for language therapy. We can discuss examples of how Logo has been used to facilitate language development with a variety of special children. Do your students persist in using the "terrible ten" adjectives (okay, neat, alright, nice . . .)? Learning disabled students seem to respond especially enthusiastically to Logo poetry, and the chance to use more exciting descriptive words.

If you are interested in using a videodisk player with Logo, let us know! This past summer, we used IBM Logo to make tools for controlling a Pioneer LVD-6000 from an IBM PCjr or PC. (This particular model of videodisk player has a computer interface.) Logo makes it possible to gain easy and fast computer access to the thousands of photographs or film clips available on a videodisk. We'll keep you updated on this topic.

Are you wondering how to justify the use of Logo on individualized education plans? Do your students have difficulty taking another person's point of view? Have you noticed that they work together better on computer activities? The research of Doug Clements at Kent State University suggests that the most valuable benefit of

Logo may be the improvement in social language of pairs of children using Logo.

Along with technical questions and issues such as those already mentioned, we want this column to include discussion about other applications in which the learner can maintain control of the computer and the learning activity. Susan Jo Russell and her colleagues at the Technical Education Resource Centers (TERC) in Cambridge, MA, coined the term "learner-based" tools to describe this class of software, which includes but is not limited to Logo.

Another example of learner-based software is a new class of tools which are becoming available: talking word processors. For several years now, for example, Teresa Rosegrant has been using talking word processors with young special-needs children. The result has been products such as Listen to Learn (IBM) and Talking Textwriter (Apple, available Fall, 1986). Do you expect that some of your students could benefit from being able to listen to what they write? Could they use writing activity templates and story-starters if they could get help reading some words? We think the addition of synthesized speech to such computer-based activities can make a big difference for some learners, including young children, students learning English as a second language, and cognitively impaired adults.

(As far as we know, LogoWriter can't talk yet, but we hope that it will in the future).

We intend that SPECIAL TALK will take on yet another meaning: readers conversing with each other about topics of interest to them. We would like to use this column to respond to your experiences, ideas, problems, and questions related to the use of Logo and other learner-based tools with special populations. You can convey them to us through the traditional mail system, or through electronic mail.

Logo and Telecommunications

One of the exciting things about the institute held in Charlottesville this summer is that participants will continue to communicate and support one another through electronic mail. They will be sending not only messages, but also Logo code back and forth. If you have access to electronic mail you can communicate with us that way also. There are several ways to do this. We will discuss one method here, and tell about others in later columns.

One way is through an electronic network that links special educators across the country. This network is called SpecialNet and is sponsored by the National Association of State Directors of Special Education. SpecialNet is accessed over a telephone line, via a computer and a modem. Your school district or clinic can subscribe for you, for an annual fee. In fact you may already have access to an account, even though you are not aware of it. If your district or clinic does not yet subscribe, you can obtain information from the address listed below. Electronic mail sent to us on SpecialNet should go to UVACOMDIS,

which stands for University of Virginia, Communication Disorders.

SpecialNet
National Association of State
Directors of Special Education
2021 K Street, N.W. Suite 315
Washington, D.C. 20006
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Teachers and clinicians who use computers with kids know that "it" doesn't always work -- but they also know that sometimes "it" works incredibly well. As the new school year begins, be thinking about the ways SPECIAL TALK can help you out, and let us hear from you.

Paula Cochran is an assistant professor in the Communications Disorders Program of the University of Virginia's Curry School of Education. She is interested in Logo applications for language arts and special populations. Glen Bull is a professor in the University of Virginia's Curry School of Education, and teaches Logo courses at both the graduate and undergraduate level.

LXionary

*with Commentary and Opinion
by Griff Wigley*

Although I first dabbled with telecommunications back in 1982 on my TI 99/4A, I really didn't get the bug until this spring. And like most people, I'm amazed by all the interesting neighborhoods in the electronic universe.

Since there seemed to be slim pickings for Logo articles in mid-July, and I didn't have the conference proceedings from Logo 86 yet, there wasn't much available for the lectionary. So, I decided to see which computer conferencing systems had

some Logo activity on them, and report my observations.

Logo on CompuServe

My first stop was CompuServe, the biggest net in the land with over 300,000 subscribers. Jim Muller is the moderator / system operator (sysop) of the Logo Forum on CompuServe. Most of you might know Jim and his son Larry as the founders and operators of the Young Peoples' Logo Association.

I checked into their forum recently to see what goes on there. "Lurking" is the telecommunication world's somewhat derogatory term for my non-participatory reading of forum messages. If it's answers to questions about any version of Logo you

want, it seems you can't do much better than this forum. Muller is a virtual fountain of Logo knowledge and keeps current on Logo products and the people and companies that produce them.

I was also pleased that Muller was willing to expound on his educational philosophy on occasion. He's not afraid to speak his mind, including some sharp criticism (in my mind, anyway) of Seymour Papert. As I scanned two months worth of messages, I kept hoping for an extended dynamic exchange on some of the philosophical questions he routinely brings up. But, alas, no one emerged from the phosphor to carry the debate, let alone challenge him. None of the Logo "headliners" from this publication nor any other bigwigs from the Logo community were involved in any of the forum exchanges. I had assumed that, since many of the contributors to the LX have accounts on CompuServe, and since it was the host system for the online World Logo Conference in November, the conferencing action would be hot and heavy. But not so.

Logo on BIX

I decided to lurk elsewhere and ended up on the Byte Information eXchange (BIX), the computer conferencing system set up by *Byte Magazine*. BIX, with its 8000 subscribers, is tiny in comparison to CompuServe, but its affiliation with *Byte* makes it a heavy-weight in the world of computers. I assumed that I would find very few Bixen conferencing about Logo and education. But, lo, the first bulletin to scroll across my screen after I typed "join Logo" announced a special two-week conference on Logo! "Bingo!" I thought. "Here's where the action is!"

The BIX Logo conference is similar in structure to that on CompuServe, with books, happenings, news, projects, etc., as subtopics. I was wrong to assume that the panel of experts were all regular contributors to the Logo forum topics. Most of the regulars I had never heard of. But the con-

versations and discussions were more to my liking.

Bixen Logophiles frequently exchange highly technical information (usually over my head) and carry on "heavier" philosophical conversations. In contrast, the Logo Forum on CompuServe has a more folksy flavor which would seem to appeal more to many Logo teachers and those newer to Logo.

Back to the panel of experts. I liked the idea of a conference where anybody can "watch" the bigwigs talking amongst themselves, plus another conference called "ask.experts" where anybody can put a question to them. The moderator has suggested a few topics for the panel to discuss, based on events and issues from Logo 86. My next column will review the panel and report some of the major discussion threads touched off by these questions:

1. The Logo Revolution -- In Brian Harvey and Bill Higginson's talk at Logo 86, "Whatever Happened to the Revolution?" comments and criticisms were aimed at the Logo community for not causing a revolution of the educational system along the lines proposed by the Logo philosophy. What would be the next step towards the Revolution?

2. What are we going to see in future Logo implementations?

3. Will knowledge gained by using Logo naturally transfer to other domains or must the teacher make the connection explicitly?

4. Conferencing - there seemed to be a lot of excitement about computer conferencing at Logo 86. Will this be of any real benefit? Will computer conferencing among Logophiles become an important tool, or will user interest atrophy over time?

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Testudinal Testimony

by Douglas H. Clements

Early Studies on Logo and Mathematics

(Ed. Note: We welcome Douglas Clements as a companion columnist to Barbara Elias and her "Logo Disserts." We hope that these two columns together will provide a well-balanced picture of Logo related research.)

Perhaps the best way to introduce this research-oriented column is to discuss its title. *Testimony* means "firsthand evidence." That's what interests us. The root word "test" certainly is familiar in traditional research. We'll be using the term "testing" in its broadest sense - examination, observation, and evaluation to prove the value or ascertain the nature of something. *Testudinal* refers to a turtle.*

Of course, we'll examine Logo in its broadest sense as well, turtle and non-turtle. In the first two columns, we'll view some of the earlier studies that examined, observed, or evaluated Logo's potential. This one will focus on mathematics, the next on problem solving. More recent research in these and other areas will be reviewed in subsequent columns.

Teaching Mathematical Thinking

The Logo computer language originally was developed as a conceptual framework for teaching mathematics. Early investigations of the benefits of such a framework used Logo experimentally in several classrooms. Seymour Papert, Wallace Feurzeig, and their collaborators taught Logo (sans turtle!) to students ranging from second graders to alienated teenagers (see Feurzeig & Lukas, 1972). The reports indicated that children enjoyed using Logo. Furthermore, they were successful in doing relatively formal work in this environment.

They adapted even assigned projects to express their individuality, often making serendipitous discoveries. For example, one second grader was writing a space launch COUNTDOWN procedure. The procedure had one bug, in the "stop rule." When the boy typed COUNTDOWN, he saw 5 4 3 2 1 0 -1 -2 -3 -4.... He managed to fix the bug. Perhaps more importantly, he was fascinated by the negative numbers, which were, for the first time, generated in a way that was natural and believable for him.

Later, Logo (complete with turtle) was introduced to all sixth graders in the Brookline schools (Papert, Watt, diSessa, & Weir, 1979). This study took the position that programming would not enhance students' thinking in any automatic way. Rather, it would enhance their ability to think about their own thinking and to successfully encounter mathematical ideas.

The work of 16 students was examined in detail. The research team concluded that all but 2 of the 16 learned to program in a functional sense. All underwent significant learning. Children appeared to use ideas in differential and coordinate geometry and to bring structure to the use of numbers. For example, they understood the qualitative difference between the inputs to FORWARD and RIGHT and estimated these quantities accurately. Measurable, though nonsignifi-

*For those who are interested in even more information, or for those like me who read footnotes rather obsessively, the following is offered: "Testimony" comes from the word for "evidence" or "witness." The "test" in "testing" and "testudinal" stems from the root "testā" or shell. "Testing" originally involved examining and analyzing the characteristics of an ore in an earthen pot or shell. "Testudinal", naturally, is derived from "tortoise shell."

cant, transfer effects were found in the ability to estimate angles.

Although the data were generally "soft," they did anticipate the results of subsequent studies, as we shall see in future columns. Incidentally, the reports of this study provide good ideas for programming projects.

Teaching Specific Mathematical Concepts

In another early effort, Milner (1973) worked with fifth graders to investigate whether the concept of variable could be taught through Logo programming. Apparently it could; significant positive effects were found. Curiously, the way in which programming was taught did not make a significant difference (e.g., giving students an algorithm vs. giving them an incomplete program). Structured tasks, however, were superior to unstructured tasks.

In Scotland, Howe, O'Shea, and Plane (1980) supplied low-achieving 11-year-old boys with a directed Logo programming experience for 2 years. The Logo group caught up with a control group on the Basic Mathematics Test but fell behind them on the Math Attainment Test. Random assignment was not used, however, and the control group was significantly more able in mathematics before the study began.

Interestingly, every boy in the Logo group either improved or maintained his school "standing" during this time, with about half actually improving. In comparison, only one boy in the control group improved his standing and another dropped a level.

The authors tentatively concluded that the Logo experience aided in the boys' development in mathematics, especially in their ability to discuss mathematics. It must be noted, however, that this conclusion was based on the ratings of teachers who were aware of the students' group placement.

Working with second graders, Rieber (1983) reported a significant increase on a geometry test (angle and length measurement) after three months of Logo programming. That is fine, except that the test mirrored turtle geometry quite closely, was constructed by the author, and was not validated.

Darker Views

While hardly conclusive, these reports were at least positive and suggestive. However, others were seeing pictures that were not at all rosy. Research from Bank Street (Pea, Hawkins, & Sheingold, 1983) indicated that older children who learned Logo for a year still possessed fundamental misunderstandings concerning the workings of the language. Few mastered important aspects of Logo's "powerful ideas" such as the concepts of variable and recursion.

It is not clear, however, how many opportunities children received to learn about these aspects within the "discovery learning" approach utilized in the study. (An unfortunate characteristic of this report was to be repeated in too many others: Page after page of theory, tests, tables, and charts, and less than one describing what children did with Logo!)

Obviously, research reports conflict. Many optimistic reports observe children within the context of Logo programming, usually without measuring transfer. Even successful efforts, however, provide only weak support for the hypothesis that "Logo programming" in general increases mathematics achievement. It may be that Logo promotes knowledge only in limited areas, such as angular measurement or knowledge of variables. Or it may be that achievement tests assess only limited areas of mathematical knowledge.

Implications

What does all this mean for educators? Teachers must be wary of introducing Logo programming in a haphazard manner, hoping for mathematics achievement gains. On the positive side, teachers should encourage students to see the mathematics in their Logo work and to systematically extend the ideas they encounter. This will not dampen students' enthusiasm and may substantially impact on their learning.

Some structure should be provided to Logo tasks and explorations. Structure does not imply didacticism or authoritarianism. For example, it is often useful to allow hesitant students to accept or reject suggestions until they build confidence (Papert et al., 1979). It does imply the provision of guidance that will illuminate mathematical ideas and processes.

Finally, some of the most important information may not have come from the mathematics tests. Emerging from these early investigations are themes that reappear in later studies of Logo: positive social-emotional benefits, enhancement of students' ability to discuss their mathematics and problem-solving, and the critical importance of teacher-student and peer interaction in bringing about such changes.

As we shall see again in next month's column on problem solving, Logo research, like Logo programming itself, is interesting, disturbing, exhilarating, disappointing, and, ultimately, rewarding.

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Logo Disserts: Dissertations Dealing with Logo

by Barbara Elias

As the use of Logo continues to increase, a persistent question arises as to the relative benefits children gain from the type of learning environment adopted or adapted for use. Such a question served as the focus of an investigation of the effects of a structured environment, as presented by the Minnesota Educational Computing Consortium (MECC), and an open-ended environment, as suggested by Papert, on the level of Logo learning and the conceptual tempo (problem solving style) of fourth grade children. The attitudes of children about computers and Logo was an additional component of the study.

Fifty-five fourth grade children from a

suburban parochial school were randomly assigned to one of two groups. Each group met for about an hour each week for twelve weeks, and worked with Logo in pairs. No children had had previous Logo experience.

The Papert group was assisted in learning the fundamentals of Logo, i.e., commands, syntax, and error messages. They were then encouraged to pursue individual tasks and to record their work in a notebook. The teacher, when needed, served as a guide.

The MECC group, on the other hand, used prepared lessons from the MECC Logo curriculum materials. Modules on "Meet the Turtle," "Shapes," "Patterns," and "Procedures" were used. These materials contain an overview and detailed notes for the teacher, a list of materials and time requirements, student activities, and suggestions for followup.

Data were analyzed from the following sources: (a) California Achievement Test scores in reading and math, (b) Logo Checkout, a Logo syntax test, (c) the Milojkovic test of Logo content, (d) the Brookline test on Logo concepts, (e) an opinion questionnaire, and (f) a journal of Logo activities and comments.

The results show gains for children in both groups. All children in this study improved their understanding of Logo syntax. The MECC group excelled on the Logo con-

tent test. Children in the Papert group improved their error rate on a test of conceptual tempo. This finding may indicate that more attention was given to careful planning and execution of Logo by children in the Papert group.

Socialization patterns observed in the groups suggest that the MECC environment encouraged small group cohesion and the Papert group encouraged much sharing of ideas. Perhaps an approach which combines the best elements of both of these approaches will help teachers provide a valuable Logo experience for our students.

>>>Heller, Rachelle S. (1985). *The Effect of MECC and Papert Teaching Styles on the Level of Logo Learning and the Conceptual Tempo of Fourth Grade Students*. (Doctoral dissertation, University of Maryland, 1985.)

(Ed. note: Each month, Barbara Elias highlights a dissertation or thesis dealing with Logo. She is accepting copies of recent research results for the LX Dissertation and Thesis Repository. Reports may be mailed to her at 4223 Hickory Road, Ettrick, VA 23803.)

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LogoWriter: A Review

by Sharon Burrowes

If you have been reading any computer magazines oriented towards education, you surely have seen advertisements about LogoWriter, the newest Logo product from Logo Computer Systems, Inc. (LCSI). As you may have gathered, LogoWriter is more than just Logo; it includes word processing capabilities as well. In fact, LogoWriter is more than the sum of its two "parts." It is a learning environment that makes text and turtles equally accessible for the novice learner.

The Package

LogoWriter is a site licensed product, where a "site" is usually a school building. For \$395, the school receives a site license, one LogoWriter kit, a subscription to a LogoWriter newsletter, and a telephone number giving access to user support. The licensing agreement gives the school the right to make unlimited copies for student and faculty use on site.

The kit consists of copies of software that runs on 64K Apple II's, IBM PCjr's, and IBM PC's. (By the time this review is in print, a version should also be available for the Commodore.) In addition, the kit contains 6 student booklets, 72 activity cards, 25 reference cards, a teacher's manual, a reference guide, keyboard posters, and keyboard stickers.

Included in the license agreement are all future upgrades to the software, all versions created for other computers, and copies of new materials. Licensees can order additional copies of any print materials at very reasonable costs.

Each subsequent year, the license must be renewed for \$99. For a one-time \$150 fee, a site license can be extended to allow students to take home copies of LogoWriter during the school year for use on their own computers.

The Print Materials

The LogoWriter materials provide a delightful combination of guided activities and open ended "Logo-like" exploration. Overall, they are very well done. The student booklets and activity cards are aimed at students of middle school age, although the content of most of the materials could be used with students of almost any age. Two of the booklets are introductory; the others are designed to enhance teaching in math, social studies, science, and English. The activity cards are keyed to each booklet and provide extensions to the ideas in the booklet.

The teacher's manual is a realistic guide which provides an overview of the LogoWriter kit, suggestions for teaching, and discussions of how to use each booklet, including both on and off the computer activities. The reference guide lists all of the primitives in alphabetical order. Each entry includes a description of the primitive and examples of its use.

The Software

Perhaps the most amazing component of the LogoWriter package is the LogoWriter software itself. From the point of view of the user, the software is identical no matter if it is running on an Apple or an IBM PC.

One of the few differences involves the use of function keys. Although these keys are not the same for the keyboards of the Apple IIe, the IBM PC, and the IBM PCjr, LogoWriter comes with keyboard stickers to give these keys common names. Thus, the manuals can refer to the "Select" key or the "Label" key in all versions in a straightforward manner.

This also means that LogoWriter can be used easily in a mixed Apple / IBM computer laboratory with a minimum of confusion for both teachers and students.

Most of "standard" Logo is included in LogoWriter. The turtle, which now *looks* like a turtle, moves in most of the usual ways. (Ed. note: The TOWARDS, ARCTAN, SETX, and SETY primitives were not included in the initial version.) Most list processing capabilities are present. However, from that point on, LogoWriter differs significantly from other Logos.

The Page Metaphor

LogoWriter's model is that of a "page." The screen is divided into two parts: the page at the top of the screen, and four lines of text at the bottom, with a solid color bar separating the two. The bottom of the screen, called the Command Center, is used to type commands in the "immediate mode." Commands scroll under the page, but are available for easy retrieval and reuse, as in Macintosh Logo.

Pressing the "Flip" key causes the back of the page to be displayed. Procedures are written here; there is no longer an editor or additional editing commands to learn to use. Further, the back side of the page is unchanged by LogoWriter when flipped, so comments and indentation can be part of the code.

In addition to the usual Logo graphics, there are now four turtles. These turtles behave much like turtles in versions of Logo containing sprites. There are 30 shapes that the turtle can assume; 20 are predefined, but all 30 can be edited to create custom shapes. The shapes can be stamped on the page to create colorful designs. Any closed figure on the screen can be filled with color or shaded with the current turtle shape. Further, the LABEL command can add text to become part of a graphics design.

The front of the page can also be used for the usual Logo text, but both text and graphics reside on the same screen. In addition, the page can be used as a word processor page. That is, with a single key combination, text can be entered directly onto the page. This text wraps around as you type, and the page scrolls when you reach the bottom of the screen. In addition, the common word processor functions of cut, copy, paste, and find and replace are available.

What makes this word processor unique is its extensibility. Individual keys can be programmed to perform automatically any task you desire, thus allowing the creation of personalized word processing systems.

There are three forms of output to the printer available in LogoWriter:

- PRINTSCREEN performs a screen dump of the screen contents, printing graphics designs exactly as they appear on the screen, and text in double-word 40-column format.
- PRINTTEXT prints only the text as it appears on the screen, but with standard sized characters.
- PRINTTEXT 80 changes the text to an 80-column format. Some tools for formatting text are included with the LogoWriter software.

While each of the features described above makes LogoWriter a powerful tool, together they are nothing short of amazing. For me, the most exciting moment (among many!) came when I discovered that I

could use the same keystrokes to cut and paste from anywhere to anywhere else. You can copy one shape onto another. You can cut a series of commands from the Command Center, paste them on the flip side of the page, add TO, a title, and END, and you have a procedure built with immediate mode commands.

In addition, a procedure can be cut from the flip side and pasted onto the front. Procedures can be cut from one page and pasted onto another page. This consistency in the use of commands is just one example of the many ways in which LogoWriter behaves the way a Logo "ought" to behave.

Strengths

There is much that is positive to say about this new product, and it is difficult to say briefly. However, let me summarize the points that seem strongest to me.

- LogoWriter solves the traditional problem of learning to use an editor. There is no new set of rules to learn in order to write procedures.
- Text and graphics can be mixed. This is something which teachers know that children want to do early in their Logo experience.
- Text is easily accessible; there is no "list processing barrier" inhibiting work with written language.
- Saving is automatic. When a student is finished working and presses ESC to leave a page, the page is automatically saved. This avoids the problems of files lost because the workspace was not saved before quitting.
- Support materials of the sort classroom teachers have been needing for some time are provided.
- The cost is reasonable for a school with more than three or four computers.

Problems

The problems you are likely to experience with LogoWriter depend on your level of experience. For example, experienced programmers find the automatic saving to be unnerving and frustrating. There is no easy way to "forget" work you have done with a page unless you want it in exactly the form it was when you first loaded it. Since pages are loaded in precisely the state they were when saved, it is annoying to have to clear the front before saving in order insure that it will be blank the next time the page is loaded.

Logo novices catch onto LogoWriter more quickly than traditional Logo, I have found. However, in some teacher training I have done, complete novices have serious problems distinguishing between commands in the Command Center and procedures. It took a lot of direct teaching to get across the idea that procedures were

different from immediate mode commands: procedures were saved, the Command Center was not. There were many lost commands until I understood the problem!

An area that causes problems for both novices and experienced users is the saving of the Shapes page. New shapes are automatically saved on your disk when you leave the Shapes page. However, if you move your page of procedures to another disk, the shapes are not moved as well. This can be confusing for beginners. Experienced users, however, are more likely to overwrite unintentionally an existing Shapes page with a new one.

Experienced users may become frustrated quickly with the small available workspace in the 64K Apple version: about two-thirds that of Apple Logo. In addition, no floating point arithmetic is provided.

Another source of problems is hardware. If you have Apple II+ computers, you are out of luck. There simply are not enough keys on the II+ keyboard for all of the LogoWriter functions. Although the software is compatible with most of the printers that work with such programs as Print Shop, you may find that LogoWriter will not work with printers manufactured several years ago.

Wrapping Up

In summary, LogoWriter is truly an innovative product in both concept and design. Site licensing along with ongoing user support and user responsiveness is something that will be welcomed by the harried computer teachers of the world. A version of Logo that both lowers the threshold and broadens the uses for Logo clearly shows that LCS has been listening to teachers and kids alike. Only when we have used LogoWriter extensively with students will we know fully the impact of this new model for Logo.

Sharon Burrowes is a computer coordinator for the Wooster (OH) Public Schools, and the author or co-author of numerous books and articles on Logo.

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LIFT's Teacher to Teacher

by James Fry

This month, we review an excellent mathematics resource with an emphasis on exploring and discovering.

Mathematics Curriculum

Learning Math with Logo, by Rudy V. Neufeld, 1986, published by Logo Publications, 7 Conifer Crescent, London, Ontario, Canada N6K 2V3, (519) 657-9334. \$24.95 US for student text. A teacher resource is included free. Discount available for purchase of five or more copies.

Target Audience: Students in grades four to seven.

Content: *Learning Math with Logo* consists of a student manual and a teachers resource guide. They have been written for MIT Logo on the Apple II and Commodore 64 computers, and for Apple Logo on the Apple II. The ten chapters are organized into four parts or steps to give the student a logical introduction to Logo.

- Step 1- The Floor Turtle
- Step 2- The Jump to the Screen
- Step 3- Steps into LogoLand
- Step 4- The Turtle in School

The author recommends that the chapters be followed in order from beginning to end, though "students do not need to be able to do all the work in a section before going on to the next section."

The student text is meant to be used either as a part of a class lesson or on an individual basis.

The format of each chapter is set up with an introduction, precomputer activities, guided discovery activities, and extended learning activities. The teacher resource gives the objectives of each chapter, a summary of Logo commands, and the skills required. Mathematical concepts addressed and any materials required are also listed. Suggested answers to the exercise questions along with a collection of blackline masters are also given.

The author indicates that the examples and exercises are based on the mathematics curriculum for grades four through seven.

Strengths: A Logo book with instructions for all the major versions of Logo being used in the schools is welcomed. Though books written for one version of the language can always be translated and used with other versions, it is good to see all the translation done for teachers and students ahead of time to ease the frustrations many novices have encountered when working with Logo.

The detailed and well organized teacher resource should be a great help to teachers. Having a document separate from the student text makes it easier for teachers to plan and facilitate lessons.

There is a page entitled "The Role of the Teacher" in the teacher resource which deserves a special mention. It contains thoughtful teaching ideas for both novice and experienced teachers alike. The author encourages teachers to have fun and learn along with the students.

Finally, and importantly, the book has been field tested in classrooms.

Please contact the Logo Information for Teachers (LIFT) group with information on your favorite new Logo materials and books. Write to:

LIFT
PO Box 5396
Plymouth, MI 48170

James Fry uses Logo with his Chapter 1 remedial mathematics students at Novi Community School, Novi, MI, and is a co-founder of the LIFT group.

Logo Institute Puts Excitement into Summer!

by Barbara Hyink, Gary Stager,
and Charlotte White

How would you like to spend two weeks immersed in a Logo culture? This is exactly what happened when 36 educators from 16 states and 5 countries descended on Keene State College in Keene, New Hampshire, for the third annual Logo Institute. The institute was led by renowned Logo educators Dan and Molly Watt, and Tony Stavely. They were ably assisted by former institute participants Heather Rojo and Marilyn Rogers.

The Program

The formal institute activities were scheduled from 9:00 a.m. to 5:00 p.m., yet the sharing of knowledge and work on projects often lasted until late in the evening. Logo expertise ranged from novice to expert, and all were encouraged to work at their own individual pace.

Participants chose their own projects for individual or collaborative work. Five different Logo dialects were used for programming projects on topics ranging from early childhood through teacher training.

Each participant kept a daily log, wrote a short programming project, evaluated Logo resources, and developed a larger Logo-related implementation.

Michael Tempel from Logo Computer Systems, Inc., conducted a LogoWriter workshop, and Tony Stavely introduced telecommunications by going on line with other Logo users.

Each day began with a gathering of the entire group. The instructors led discussions on general Logo topics, such as debugging strategies and recursion plays. During the day, participants were free to attend any of several classes, including instruction on creating a Logo database, working with list processing, Logo FUN-damentals, and LogoWriter. Each day, a different person reported the happenings using a Radio Shack Model 100 portable computer. These records were fed into a Macintosh to form the basis of the institute journal.



Dalia Goldberg (right) and Kate Carol ponder a Logo problem. Photo by Medora Hebert

Concurrently, computer labs were available for individual or collaborative programming projects. Several groups developed implementation strategies, inservice training materials, and classroom materials to be used with students or staff during the coming school year. Examples included book writing for primary children, LogoWriter inservice models, learning centers, learning with robots, and projects relating to specific content areas.

At the "end" of the day (from 4:00 to 5:00 p.m.), everyone gathered to reflect on the recent activities and to plan for the coming ones. Although

our "required" efforts were complete, many of the true Logo addicts worked straight through the night!

The Culture

Everyone was impressed by how quickly friendships formed. A sense of family provided each of us with needed support. The Logo culture outside of the classroom was nurtured by our sharing of living quarters in a college dormitory. We ate together, laughed together, and helped each other over various programming hurdles.

In addition to academic activities, willing participants climbed nearby Mount Monadnock, while the less willing drove to the top of another nearby mountain. A lakeside cookout and dorm film festivals contributed to the recreational program. The group also designed a T-shirt with LogoWriter graphics.

During the institute, Dan and Molly became grandparents!

The Logo Institute participants and faculty hosted a two-day Logo Conference at the end of the two-week program. We shared our institute experiences with other Logo educators and one parent.

We all went home tired, but inspired! Thanks, Dan, Molly, and Tony!

Barbara Hyink is a graduate student in Lubbock, TX. Gary Stager is an educational consultant in Wayne, NJ. Charlotte White is a fourth-grade teacher in Richland, WA.

Jacques and Elsie

*drawings by
Linda Sherman*

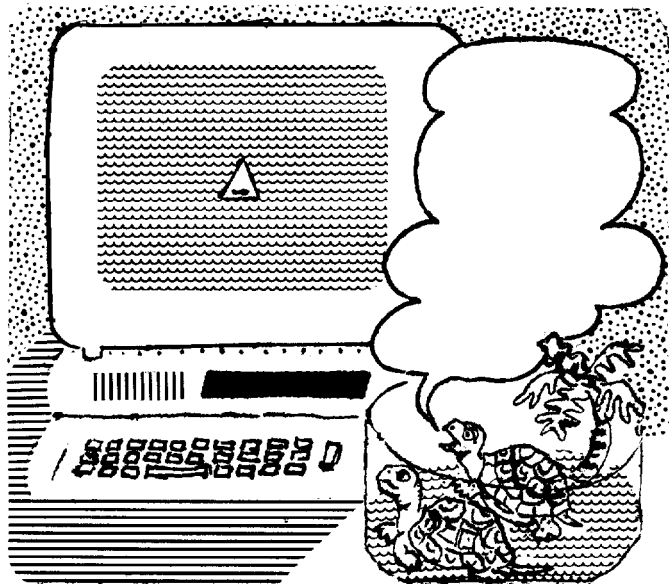
Jacques and Elsie are two cartoon turtles who cannot resist commenting on the world they observe. Most of the time, the things they see are related to Logo. In this month's cartoon, Jacques is making a comment to Elsie as they contemplate their electronic counterpart, perhaps for the first time. What could he be saying to her?

Each month, we will print a captionless Jacques and Elsie cartoon by Linda Sherman, and ask you for suggestions for the caption. Later, we will reprint the cartoon with the more humorous captions.

Please send your caption suggestions no later than September 20, 1986, to:

Jacques and Elsie, Logo Exchange, PO Box 5341, Charlottesville, VA 22905. Include your name and address so that we can give proper credit should your caption be chosen.

All captions become the property of Meckler Publishing. None can be returned.



Linda Sherman is a freelance author and artist living in Shipman, VA, with her husband and two-year-old son.

Q

and

A

by
Jim
McCauley

Q. I'm teaching in a school where no one else wants to use Logo. My supervisor is not convinced that using Logo is a good idea. I feel like I'm in enemy territory! What can I do?

A. Yours is a difficult situation, and it is not unique. I'm sure many readers of this magazine find themselves in the same camp.

I think that there are two basic approaches to your difficulty: the philosophical and the practical.

Philosophize

Let's talk philosophy for a moment. Remember several things. First, your students are your clients. You owe your first responsibility to them. Second, you are a professional person, and as such you should feel free to make use of any reasonable resources for instruction that come to hand, including Logo. Third, your supervisor knows (or should know) about your commitment to students and your professional privileges.

With these things in mind, ask yourself some questions:

1. How accommodating are my colleagues and supervisor? Are they reasonably open to innovation?
2. How much support do I need to use Logo with my students? Am I in a situation in which I can simply garner the resources I need, close the door and teach what I wish?
3. How important is it to me to be in a community of Logo users? Can I function well without much support at my own school? Can I join or form a group of Logo-using educators from other schools?
4. Is my desire to use Logo in conflict with other commitments for computer use that are already in place in my school? What is to be gained or lost by redirecting those resources to Logo use?

These are pretty heavy questions, but I think that as you consider them, some solutions will emerge. It could be that your supervisor is more amenable than you think, and that it's just fine to experiment within reasonable bounds.

Practice

On the practical side, here are some specific things to consider:

1. Your supervisor's doubts about Logo may center on a view of Logo as a

programming language. Many schools are turning away from programming in favor of using computer applications. That's fine. Just show that Logo is the ultimate computer application by teaching a few lessons that are directly connected to your current responsibilities. If you're a primary teacher, teach a lesson on following directions. In intermediate grades, use Logo to develop and expand on word games. In high school math, illustrate trigonometric relations and functions with turtle graphics. Once people see Logo put to these uses, they are far less resistant.

2. Find some support. If there are no other Logophiles at your school, there are sure to be some nearby. Arrange to meet occasionally; once a month is plenty often. Like-minded enthusiasts are a wonderful source of ideas and fellowship.

3. Remember that Logo is an educational philosophy, not just a computer language. Refresh yourself by reading *Mindstorms* again. Consider the possibility of teaching non-computer activities "in the Logo style," and let the joy of it pervade your teaching. Pretty soon those doubters will want to know what's going on in your room, not out of fear or resentment, but out of precisely the kind of curiosity in which Logo thrives.

Each month, I will answer a selected question related to Logo. If you have a question, send it along with a stamped self-addressed envelope to:

Jim McCauley
LX Q and A
876 East 12th Avenue, #4
Eugene, OR 97401

Jim McCauley is a graduate student at the University of Oregon, studying with David Moursund, and has written Logo articles for many national publications.

IntLXual Challenges

by Robs Muir

Rewriting LogoWriter (The Process)

Like binary stars, Process and Content are the two poles around which the dialectics of education revolve. Continually acting on one another, these two entities shape the face of schooling and, each in their own turn, determine the paths that formal education may follow. The tensions between Process and Content describe what can be taught and what a participant's experience will be.

On the one hand, Content is the curriculum (as well as the hidden curriculum) or, what is taught; Process describes how things are learned, the affect of the learning activity, the active doing. The technological revolution in the classroom is Education's attempt to appropriate new ideas while struggling to balance the conflicting demands of both Process and Content. Logo is not insulated from this debate.

This article is the twenty-sixth of a series dedicated to the proposition that the Logo philosophy is fundamentally a Process, and that *how* you learn is at least as important as *what* you learn. If the Process of playing with Logo is valuable to students, it should be equally valuable as a plaything for adults.

Each month, we will present one or more interesting projects, ideas, or puzzles, in which we will consciously omit the "right" answer. Our belief is that *active* exploration is the proper role of a good learner, and that programming, like real life, has a variety of possible answers.

If you choose to "come to grips" with these Logo koans, we encourage you to send a chronicle of your solution (a printout will suffice) and a self-addressed stamped envelope. We will compile a collection of several of the more interesting solutions and redistribute them to all contributors. In this way, you will be able to see how others arrived at a solution. In fact, the only way to get a solution is to make a contribution of your own; even a half-hearted, failed attempt is preferable to reading the answer from a textbook!

Son of Logo

The Logo community is nearing a new stage in its development. Call it puberty, but Logo is growing up. From the early days of Logo, to the MIT dialects and the LCSI dialects, to sprites, multiple turtles, bunnies, and Object Logo, Logo continues to grow. While much of Logo's "evolution" has been motivated by Content (How can we make Logo more powerful?), until recently relatively little concern has been given to extending the Process aspect of Logo (What more can it do for students? What else can students do with Logo?).

Enter LogoWriter. While arguably a step down in terms of "traditional" Logo programming power, LogoWriter has a tremendous potential for reshaping the approach many teachers take when structuring computer activities in the classroom. Through the wide array of tools available to users of LogoWriter, students may be freer to build personally meaningful activities with less directed instruction from the teacher.

With such "building blocks" as multiple turtles, music, easily redefinable turtle shapes, "when" demons, text manipulation programmable word processing, fill, stamp, and shade primitives (all available for computers presently installed in schools), LogoWriter entices a user to build projects in a way that no other Logo has yet captured.

I contend that LogoWriter, in the hands of an enthusiastic teacher, comes closest to meeting the needs of a process-centered classroom. This experience has been borne out in my use of LogoWriter with fifty graduate students during this past Summer. My excitement in introducing Logo was decidedly rekindled with LogoWriter.

Setheading towards TOWARDS

Yet LogoWriter has some holes. During its development, some decisions were necessarily made to exclude some useful primitives. We could devote several more IntLXual Challenges to rewriting Logo procedures to expand LogoWriter. I promise you, we'll stop with just this one. It is an excellent math project for your high school geometry or trigonometry students.

The initial version of LogoWriter does not include a TOWARDS function. So...can you write its equivalent in your favorite Logo? Even if your Logo already has a built-in TOWARDS, see if you can write a Logo look-alike, such as FACE.TOWARDS.

TOWARDS requires a position list as input, and returns the heading necessary for the turtle to face that position from its present location. For example, SETHEADING TOWARDS [50 50] will turn the turtle towards [50 50] regardless of its position.

Problem #1: (hard) You'll need a inverse trigonometric function. LogoWriter doesn't have ARCTAN. Can you build it?

Solution #1: Here's an ARCTAN (courtesy of LCSI). Don't look unless you want to. Depending on the Logo you use, you may need to substitute IFELSE for IF, or THEN and ELSE for the lists.

```
TO ARCTAN :X
  OP IF (ABS :X) < 1 [ATN :X][IF :X > 0
    [90 - ATN 1 / :X] [-90 - ATN 1 / :X] ]
  END
```

```

TO ATN :X
  OP (((((1.19376 * :X * :X - 4.87776) * :X
    * :X + 10.32132) * :X * :X - 18.92477) * :X * :X
    + 57.2881) * :X)
END

```

```

TO ABS :X
  IF :X < 0 [OP -:X][OP :X]
END

```

Problem #2: (harder) Explain the origin of the numbers in the ATN procedure.

Problem #3: Build a functional equivalent of TOWARDS that will work in all cases.

An Alternative Challenge

Here is a quote and a final challenge to leave with you. The quote is from an article by Lee T. Percy in *Archaeology* (Nov/Dec., 1985, p. 34), about the court physician to Emperor Marcus Aurelius:

Galen was born at Perganum in A.D. 129. His father, Aelius Nicon, was an architect and builder. His mother was, as Galen himself wrote, a shrew... Perhaps she found it difficult to live with someone as omnivorously and, it may be, intolerantly intellectual as Nicon. Galen writes of his father's interest in mathematics, logic and astronomy as well as architecture, and a hint of a certain rigidity of mind emerges from Nicon's grammatical purism and from his fondness for exotic mathematical and literary recreations. He was, for example, given to composing isopsephic verses, that is, verses whose letters when given their values according to the Greek alphabetic numeral system and added together give the same total for each line of a poem. Five inscriptions found at Pergamum preserve samples of these isopsephic compositions.

Hmmm... Sounds a lot like the ASCII numbering system, doesn't it? Ahem. How would you write an isopsephic poem generating program in Logo?


FORWARD 100 (Whose isopsephic ASCII sum equals 678.)

Mail your attempted solutions to:

IntLXual Challenges
Attn: Robs Muir
1688 Denver Avenue
Claremont, CA, 91711

CompuServe: 70357,3403
Bitnet: MUIRR@CLARGRAD

Robs Muir is a physics and computer science teacher in Claremont, CA, and an instructor at Claremont Graduate School.



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International Logo News



Dennis Harper
Logo Exchange International Editor

BUTFIRST

Dennis Harper
Institute of Education
469 Bukit Timah Road
Singapore 1025, Republic of Singapore

I would first like to welcome the hundreds of NLX readers who have never read the International Logo Exchange. Making the NLX and ILX two parts of a combined journal benefits all who subscribe. Logo enthusiasts from over 40 countries will now profit from the much acclaimed NLX columns while subscribers to the "old" NLX will find out that marvelous materials, research, and curricula are being developed overseas; the opportunity to exchange Logo ideas with the entire world now exists.

This *Logo Exchange* issue contains columns from all six continents. In upcoming issues, this editorial and three continental columns at a time will appear. You will thus receive reports from each continent five times per year. ("Old" ILX subscribers should note that the LX is published monthly, September through May only.)

Arabic Logo, a conference of French speaking African nations, the state of Logo in China, Brian Harvey's invasion of Australia, an Italian Logo renaissance, and more are featured in this issue's pages.

My work at Singapore's Institute of Education continues to enthuse me. I have managed to insert two future Logo courses for inservice teachers in addition to integrating Logo into five courses for potential principals and department heads. I have also established preservice courses for both secondary and primary student teachers.

The next ILX will describe the INNOTECH Conference I attended recently in Manila, Philippines. Ministers of Education and computer educators from throughout the world were in attendance to discuss the implementation of educational technology in the developing world. I was on the keynote panel entitled, "Computer Educa-

tion in the Developing Nation: What Are the Problems?"

My family and I recently went on a ten-day vacation to Malaysia where I was glad to see some Logo activity taking place. A summary of Logo activity in Malaysia will be featured in an upcoming *Logo Exchange*.

While in Malaysia we visited the famous east coast beach where the world's largest turtles come ashore to lay their eggs. After a long wait and much searching, we finally found two of these 2.5 meter (7.5 feet), 850 kilogram (2000 pound) turtles at 2 a.m.. Now, I've seen Tasman Turtles, Triangle Turtles, and Sprite Turtles but never anything like these leatherbacks!

As I watched the giant creatures move slowly on the beach, I wondered what procedure was guiding their movement. What set of instructions guided these turtles around the world each year and back to the same beach century after century? I suppose if we knew that procedure, we would really know turtle geometry!

More down to earth, I was also thinking that this would be a great place for a Logo conference or study tour!! We have the opportunity to organize Logo study tours next year to Singapore / Malaysia, Fiji / Australia, or Japan / China. If you would be interested in any of these tours, please send a card with your name and address to LX Tours, Box 5686, Charlottesville, VA 22905. Indicate which tour(s) you would like to see organized. If we receive a sufficient indication of interest, we will proceed with the planning. Please send your "vote" before September 20.

Finally, I want to put in a word for the international field editors. If you are involved in Logo activity which would be of international interest, please send information to the Logo editor on your continent. Their names and addresses (except for Latin America) appear on the pages which follow. These editors must depend on you for information to report. Please help in the sharing of Logo information around the world. Thank you.

FD 100!

Africa & Middle East

by
Fatimata Seye Sylla
Laboratoire Informatique et Education
Ecole Normale Supérieure
BP 5036 Dakar, Senegal, West Africa

In the previous Africa & Middle East column, I reported about some new Logo movements. Here, I will give more details about the history of Arabic Logo. The second section will be about projects on the use of computers in education in several African countries.

Arabic Logo

This section is extracted from "Creating an Arabic Logo Environment," a paper written during the fall of 1985 by Ahmed M. Bu-Zebar of Kuwait, presently a graduate student at the University of Oregon.

Ahmed wrote:

The question of why Arabic Logo is needed can be answered in two ways:

- First, we need to introduce computer technology to our people in an attractive way and this can be done very easily with Logo.
- Second, foreign students studying in the United States need to make use of the high technology that they are studying and to transfer the technology back to their countries in a positive manner.

How it all began: The Arab world imports all its sophisticated technology from abroad. Although this common assumption is largely correct, there are exceptions. One of the most remarkable of these is a Gulf company producing educational software. The Arabic AL Alamiah Electronics Company founded an Arabic software division in 1982 to create a range of educational computer programs in Arabic.

The firm got involved with computers as an agent for Atari and Texas Instruments (TI). With an aggressive marketing drive it made Atari the most popular home computer in Kuwait. A dispute with Atari arose later when the American firm gave the Saudi distributorship to a competitor. This, together with the inevitable limitations of

selling English language programs in Arabic countries, led AL Alamiah to strike out on its own by creating its own Arabic programs using the MSX standard, created by Microsoft and used by most Japanese manufacturers.

Most of AL Alamiah's software is bilingual. It has its own version of MSX in Arabic which it calls "Sakhr" or "rock". The hardware was a problem since none of the available equipment was usable for the bilingual programs. AL Alamiah contracted Yamaha and Hitachi to manufacture suitable computers. The first was a 32K Yamaha machine. A more powerful 64K Hitachi is now being produced.

It is part of this company strategy to make its own system widely distributed and available by keeping it simple and inexpensive. The programs already created cover a variety of different subjects: world and Middle East geography, arithmetic, Arabic, English, physiology, and electricity among others.

Arabic Logo: Taking a look at most of the software that had been developed by the AL Alamiah company, one could clearly see that something was missing. The most powerful feature of the computer, namely programming, was not being used yet. There was a debate among educators of Kuwait: "Is an understanding of how computers work, and the ability to make them work, sufficient to prepare our students for the high-tech world, or must students be able to actually write programs?" This raised the issue of having an Arabic programming language which can be used very easily, and Logo was the choice. At that moment, a new Arabic version of Logo was about to be born.

Arabic Logo is almost a mirror image of LCSi Logo for the MSX with some minor modifications related to the nature of the Arabic language. The Arabic Logo primitives were chosen by a group of people specialized in such areas as: education, computer science, and engineering. This set of primitives was chosen taking into consideration that it should have the following features:

- The primitives should be easy and understandable to the level of elementary school students
- The language should be technically implementable
- The language must not contradict Logo educational philosophy

The aim of arabizing Logo was to provide Arabic schools with a powerful and easy to use programming language which will enable students to master the computer using their own native language.

Logo helps the user modify his or her way of thinking and enable the building of an environment which, when combined with "-SX/Sakhr" system, gives an excellent environment for Arabic programming.

Technically, Arabic Logo and English Logo are almost the same except for minor differences in the implementation in order to solve Arabic special cases like number handling, writing from right to left, etc.

For more information, please write to Ahmed M. Bu-Zebar, University of Oregon, Dept. of Curriculum & Instruction, Eugene, OR. 97403.

African Projects Using Computers in Education

Last May, I attended a seminar on micro-computer technology organized in Libreville, Republic of Gabon in Central Africa. On the closing day of the seminar, a meeting on the use of computers in French-speaking African countries took place. Participants from ten countries were present: Burkina Fasso, Ivory Coast, Niger, Gabon, Senegal, Togo, Benin, Cameroon, Zaire, and Chad. Among the subjects discussed, the debate on the use of computers in education lasted longer than any other one.

What is being done or planned in these African countries to introduce computers in education? Each participant talked about his or her own country. As it turned out, only Senegal and the Ivory Coast has a project going on.

In March 1985, a team of educators from the Ivory Coast went to Tunis for training in computer-aided instruction and in Logo. This was a beginning of a collaboration between the Bizerte Centre of Tunisia and the Korhogo Computer Club of the Ivory Coast. The government of the Ivory Coast reportedly is working on a national project to use computers in education which would start very soon.

Burkina Fasso and Cameroon are also making plans to do so. In Libreville, Gabon, there is not a national plan yet, but, in some schools, the teachers are already using computers in a CAI mode. They do not seem to be aware of Logo yet. However, after I presented the Senegalese Logo project, all the other participants recognized the pedagogical value of Logo. They even

said that they would ask the Senegalese for collaboration and assistance.

The participants from other countries did not really present a national project, but they were all determined to work something out when they returned to their countries.

Besides these French speaking countries, UNESCO is making plans to organize a workshop in September on the application of informatics in education in Nairobi, Kenya, through the Aga Khan Academy. We will have more information about this later.

Speaking of workshops, three Logo workshops are being planned by the Senegalese team. Two national ones before October: one for the Senegalese inspectors, and one for the teachers of Ecoles Normales. These Ecoles Normales are schools for elementary school teachers. A regional workshop for French-speaking African countries will be organized in the fall of 1987.

From next year, Logo might be integrated in the Ecole Normale Supérieure curriculum. Ecole Normale Supérieure is the national school for inspectors and secondary school teachers. This means that all inspectors and secondary school teachers would at least know how to program in Logo.

One last note: on June 27th, the Senegalese Minister of Education gave a lecture on the Logo project in Dakar.

As you can see, things are on the move for Logo in Africa!

Asia

*by Hillel Weintraub
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World Congress on Education and Technology

On May 22-25, thousands of educators from around the globe gathered in Vancouver, British Columbia, Canada, for the first World Congress on Education and Technology. I was looking forward to the meeting for a number of reasons, one of the main ones being that I hoped to meet some educators from Asia who knew about Logo or were interested in Logo.

In this regard, the conference was a big disappointment. The number of people attending from Asia, Australia, Europe, or Africa, was very

small indeed. Although the conference leaders proudly stated that there were participants from 51 countries, I would estimate about 90% of the total were from North America. As a result, quite naturally, most of the conference topics were geared toward the interests of North American educators, with some attention being paid to what was happening in Europe.

A few speakers commented upon this, noting that while some of us were concerned about getting more computers for our schools, others in the world were still concerned with getting more schools for their children. Third World problems, while mentioned occasionally, just didn't stay in focus for long anywhere.

The people from Asia or Third World countries whom I asked about Logo gave me a quizzical look. Then, perhaps remembering Seymour Papert's participation in the opening panel discussion, said, Oh, yes, they had heard of it, and then turned the conversation to other topics. It seemed to me clearer than ever how much we have our work cut out for us in developing Logo awareness, which is certainly one of the aims of this publication.

On a more positive note, of course, Seymour Papert's presence at the conference was felt by all. Professor Papert's showmanship, his ability to say challenging things to the audience in order to make them think, was even more evident than usual. Speaking on a distant platform in a cold concrete stadium to more than 2000 people on opening day, and to a thousand or so the following day, he spoke of intimacy, heart, and love being missing elements in present day education.

In a conference where many of the speakers were trying to predict or imagine the future, Papert's message was a ringing, "The idea is not to predict the future, but to MAKE it!"

One of the most interesting projects presented at the conference was by World Citizens for a Universal Curriculum (WCUC), a non-profit group located at Simon Fraser University in Vancouver. WCUC is developing a program designed to "prepare the youth of the world to live successfully in an uncertain world, to make constructive contributions to their communities, and to actively pursue the solution of the global problems we face."

The Universal Curriculum is based upon five ideas:

1) All of us are global citizens, sharing responsibility for solving the problems of the world and for creating the kind of world we want to live in.

2) We are all members of the family of humankind, with responsibility for understanding and caring for people of cultures different from ours.

3) We are all caretakers of the earth and are thus all responsible for "its maintenance and enhancement."

4) Together we are responsible for learning to resolve our differences through peaceful negotiations rather than through violent conflict.

5) In this time of rapid change and increasing uncertainty, it is of utmost importance for us "to plan and actively pursue the future we desire as individuals, communities and global citizenry."

Perhaps you will be struck, as Tom Lough and I were, with the similarity between Seymour Papert's words, "We need to MAKE the future," and the goals of WCUC. When we showed Seymour some of the materials from them, he, too, felt an immediate interest and took down the address. I hope you will be interested, too.

For further information, write:

World Citizens for a Universal Curriculum
Simon Fraser University
Burnaby, B.C. Canada V5A 1S6

Logo News from China

Professor Lu Chuan Xing of East China Normal University in Shanghai has written to the *Logo Exchange* inviting correspondence from readers. His address is:

Professor Lu Chuan Xing
Department of Computer Science
East China Normal University
Shanghai, People's Republic of China

He also welcomed any LX reader to visit him in China. If enough interest is shown in the Japan / China study tour for 1987, Professor Lu will be one of the hosts in China.

Professor Lu has kindly provided the following information to bring LX readers up to date on Logo in China.

Logo has been studied and applied in China for three or four years already, and has experienced an especially rapid growth the past year.

The first session of the Logo Language Research Seminar was held in September, 1985, in Shanghai. More than 60 computerists, educators, high school teachers, and Children's Palace instructors from all over the country spent a week exchanging information about Logo and teaching.

As a result of the enthusiasm of the seminar delegates, the Logo Language Research Institute was founded, with the purposes of (1) strengthening connections between Logo researchers, instructors, and beginners, (2) organizing the popularization of the Logo language, (3) exchanging Logo experiences in the fields of education, development, and applications, and (4) sharing achievements in Logo activities.

One of the first activities of the institute was to sponsor a Logo training class in Nanjung in March, 1986. Over 130 educators attended.

Logo publishing has included the translation into Chinese of *Learning Logo on the Apple II*, by Anne McDougall, Tony Adams, and Pauline Adams. The book has received many favorable comments from Chinese readers.

Two Logo versions with Chinese interaction have been produced, and are being distributed.

From April through June, 1986, Shanghai Television broadcast a Logo program consisting of eleven lessons. Each lesson was broadcast for one week. Later in 1986, the program will be broadcast via satellite to the entire country.

In May, 1986, Ling Qi Yu, an editor of the *Children's Computerworld* magazine (circulation of about 60,000), hosted a Logo competition for Chinese students. The competition offered seven open-ended problems at various levels. Also included were an opportunity to submit one's favorite personal procedure and a request for suggestions to improve the Logo language. Some of the solutions to the problems were extremely creative and sophisticated.

We express our appreciation to Professor Lu for this interesting information.

During part of June and July, Dan and Molly Watt were in China with a team of fellow workers and Apple computers, conducting a training session on Logo for Chinese educators. They presented an informal report of the trip at the Logo 86 conference at MIT. We hope to have a detailed report in a later issue of the *Logo Exchange*.

Logo in Malaysia

Kwan Hoon Ng and Chik Heok Tan have written a Logo book in the Bahasa Malaysian language aimed at secondary students. LX readers interested in obtaining a copy should write to:

Mr. Tan Chik Heok
School of Arts and Science

Tunku Abdul Rahman College
PO Box 10979
50932 Kuala Lumpur, Malaysia

The two authors also presented a paper on using Logo to study reflection and refraction in optics at a recent educational computing conference held in Singapore.

Australia

by Anne McDougall
Faculty of Education
Monash University

Clayton, Victoria 3168 AUSTRALIA

Brian Harvey and Logo at COMPSCI86

In May this year the Computer Education group of Victoria held COMPSCI86, a conference focusing on issues related to the Higher School Certificate (HSC) Computer Science course in this state. (Similar courses exist at final year high school level in most other Australian states as well.)

The course outline for HSC Computer Science advises teachers to choose among four recommended languages for teaching the programming part of the course. Logo is one of the recommended languages (the others are Pascal, COMAL, and Structured BASIC). Many teachers are not aware of Logo's potential beyond its role in introductory programming, and it is not yet widely used at this level in the high schools of Australia. Thus, Brian Harvey, who has worked extensively with senior secondary school students and Logo, was chosen as the keynote speaker for the conference.

Dr. Brian Harvey is now a lecturer at the Arts and Media Technology Laboratory at MIT. Previously he was a teacher at Lincoln-Sudbury High School near Boston. He is the author of a series of three books, *Computer Science Logo Style* (MIT Press, Cambridge, MA, USA), written for high school level computer science students.

Brian presented three talks at the conference: "The Development of an Appropriate Curriculum in Computer Science," "The Hacker's Revenge," and "The Computer Center as a Social Arena." His strong, sometimes unusual, and often provocative views on many questions of concern to computer science teachers provided the basis for much lively discussion and some very informative and stimulating conference sessions.

For teachers present who had not been

aware of Logo's possibilities beyond introductory programming, incidents such as the following must have seemed almost dramatic. One speaker, handing out to participants a two-page BASIC listing to illustrate a binary tree traversal example, said that he suspected it might be neater in Logo using recursion and asked whether Brian would write it. Brian's five-line procedure was written in a few moments and was immediately comprehensible to all.

Other Logo presentations at the conference were from Pauline Byrt, Liddy Neville, and Colin Fox. Pauline's paper, "A Tool to Think With: A New Look at Some Old Problems," presented a variety of Logo programs of value to students of mathematics and science. The topics treated included plotting graphs, plotting the relative motion of planets, sound waves, Pythagorean triads and several modeling examples. Liddy's presentation, "Information Handling Using Logo," discussed the use of lists for information storage and manipulation, and referred to Mike

Sharples' work on Phrasebooks and Boxes. Colin's paper, "Numerical Methods Using Logo," outlined Logo procedures useful in a variety of numerical methods applications.

Computers in Education: On the Crest of A Wave?

The Fourth Australian Computers in Education Conference, "Computers in Education: On the Crest of a Wave?" was held in Melbourne, from August 25-27. The conference was sponsored by the Australian Council for Computers in Education. Included among the keynote speakers were two well-known Logo workers, Bill Higginson from Queen's University, Ontario, and Steve Ocko, coordinator of educational research in the Logo / Logo project at MIT. There was a stream of Logo papers running for the full duration of the conference. I hope to have a full report on the conference in the November issue of the *Logo Exchange*.

Europe

by Richard Noss

London University Logo Group

Institute of Education

Dept. of Math, Statistics, & Computing

20 Bedford Way

London, England WC1 HOAL

Logo News from Italy

This month's contribution comes from Maria Alberti of the Department of Information Science at the University of Milan. Maria's address is given at the end of the article.

**"La Tartaruga un giorno fu un animale
che correva a testa in giu."**

So goes an Italian children's song. This story tells of a turtle, which once was quite a fast animal, who had an accident due to excessive speed, broke his teeth and wisely decided to always go very slowly from then on. Once the turtle is rotated through 90 degrees from its initial heading, the song pops into everyone's mind: "The turtle once was running upside down..."

The Turtle Gets Started

Logo in Italy was welcomed with great enthusiasm when it first appeared in the autumn of 1982 (the LCSi Logo for the Apple II), being

anticipated by echoes from the other side of the ocean and the channel. The enthusiasm cooled off somewhat knowing that the version of the language was in English - worse still, so were the manuals!

But teachers and children were not discouraged. Either they saw the good side of it, theorizing that Logo was a "natural" way to learn English (as learning Samba in Brazil!) or they got in touch with someone who would help them in translating error messages with the CATCH "ERROR" feature. In fact, it was immediately clear that it was not "unnatural" to learn some vocabulary in order to communicate with the turtle: being an animal living on the screen and talking the FD / RT language. It was part of the game. The association between the act of moving forward and FD is a mechanical one. The important fact is that the act of moving forward is an action related to one's experience.

The problem arises as soon as the turtle tries to communicate with you and talks back with error messages. Once the children were expert enough with Logo, they would recognize the error message globally as meaning such-and-such error, without reading it word by word. Of course, to get anywhere, you have to understand your errors. In fact, for beginners we need much richer programming environments to help prevent errors, or if errors occur, to help fix them. Sending error messages is certainly better than the ubiquitous "syntax error" but it is still very primitive.

It was only in autumn of 1984 that an Italian

version of Logo was released (the translation of the TERRAPIN Logo for the COMMODORE 64). At the beginning of this year the first full Italian version became commercially available: S-LOGO, by SISCO s.r.l., which runs on the OLIVETTI M24 or IBM PC under MS-DOS or PC-DOS. It has some nice features such as an integrated text editor to manipulate texts, and a three-dimensional turtle geometry designed by Horacio Reggini of Argentina.

Anyway, whether it is moving forward or "AVANTI" the turtles started moving on. The Department of Information Science of the University of Milan led a two-year experiment with first and fourth graders, which started in October 1982. At about the same time in Rome a similar experiment was started by La Riccia in a junior high school. At the University of Milan in autumn of 1983, a course for teachers based on Logo programming was set up, which was subsequently offered in the city and other towns. In the last two years there has been a flourishing of initiatives but nevertheless some drawbacks have shown up.

First of all, teachers do not feel confident enough to go into their classes and work with Logo without any kind of support. One can hardly blame them for this; support is not available for everyone, everywhere. The literature is mostly in English and therefore out of reach for the majority of teachers. So the question is, what kind of training or inservice courses should be provided for teachers willing to offer work with Logo to their children?

Certainly they should first of all experience the same supportive, not directive, creative environment that we expect them to set up for children. As Maria Montessori (who left a more remarkable educational legacy abroad than in her own country), wrote some 50 years ago, teachers should be taught to bring up the scientist spirit: to observe, to experiment, to love life and its truth and mystery. In a Logo course for teachers the first emphasis should be in learning to observe and understand their own work and to be intrigued by it. This, of course, brings up the questions of what kind of training is provided for teachers, and of the nature of the Italian educational system.

The Establishment

The Italian educational system is a centralized one much as it is in France. Schools and curricula are in principle pretty much the same all over Italy. Changes in structures or educational content are fixed by law and discussed by parlia-

ment. Consequently, changes take years to occur and are usually introduced when the practice is already somewhat established.

No particular pre-service teacher training is provided. To become an elementary teacher one has to have a certain diploma from high school (in principle one could teach at age 19!), and no compulsory university education is required, even though in recent times teachers feeling the need for a better education have often enrolled in university programs. However, to teach from junior high school level (at age 11), one has to have a university degree in the subject one is going to teach.

Inservice training is not provided on a regular basis, but in the last 10 years many organizations have offered valuable courses, following extended debates among teachers on different subjects such as linguistic education, social studies, the "new" math, etc. After years of teaching experience (teaching jobs are very stable) and if one is fond of his / her work, then one can learn to be a good teacher working together with colleagues in the school. The school structure itself does not help much.

As for the use of computers in education, the government has taken a position only for secondary education. Computers have only been mentioned in a recent assessment of elementary education, as far as algorithms and math are concerned.

For additional information on Logo in Italy, write to:

Maria Alberta Alberti
Dipartimento di Scienze dell'Informazione
Universita degli studi di Milano
Via Moretto da Brescia 9
1 - 20133 Milano, Italy

An Invitation from Spain

Theresa Sanchez and Santiago Dominguez are teaching 1300 students a compulsory Logo course in Madrid, Spain. In a recent letter to the LX, they stated they would enjoy corresponding with other readers. Write to:

Santiago Dominguez Salamanca
Fuentelarreyna School
C/Estudios, 12
Madrid, Spain 28012

Latin America

Guest Editor
Amparo Molina de Caviedes
PO Box 85274
Bogota D. E.
Colombia, S. A.

Logo in Colombia

The Colombian government is very much interested in Logo in our public schools. They have a computer center in Bogota, where children can go to explore how Logo works.

The government has sent some computers to other cities for work with Logo there as well.

In Bogota, we initiated our Logo course two years ago in Colegio el Retiro, a private school, with a group of fifty children from three through twelve years old. We chose Logo because it could be changed according to the needs of the children where it is necessary.

We started using four Texas Instruments computers and Logo in Spanish. The children in the primary grades were eager to learn about computers. Some of them explored with very large numbers, and others with very small ones. We also did a lot of playing human turtle for introducing children to the concepts of forward, back, left, and right.

All the teachers in the school took a 20-hour Logo course. We also invited the parents of the children to take the course. About 90% of them did so and enjoyed the class. We were very pleased at this response.

It was good public relations to include the parents in the course because they offered support and wanted their children to participate in Logo. When a child went home and told his mother, "I made a house today," his mother could understand how hard he had worked!

After about one month in the project, the preschool children were asking if they, too, could learn to use the computers and move the turtle. They had heard the primary children talking about their turtle projects. So, we had to create some microworlds for children who did not know how to read and write. Different themes included: geometric shapes, numbers, letters, and exercises for directionality.

When the children had some experience with the computers and with the turtle making geometric shapes, we took them to some of the universities. There, they showed how they were

enjoying working with computers and how they were learning with the turtle. The children enjoyed giving their own university workshops!

Now, in our school, we are planning to do a project for including Logo in the curriculum for preschool and primary children. To do this, we are planning to establish a pilot group and check it every year to determine if the children are learning more than those in other groups.

We want to know if Logo really helps accelerate the cognitive process of the children, and if it is advisable to have Logo as part of the curriculum in the school.

Our consultant for the project will be Horacio Reggini of Buenos Aires, Argentina.

I hope to report on more details of the project later.

Mexico

The Third International Symposium on Computers and Children's Education will be held in Puebla, Mexico, October 25 - 31, 1986. Last year's symposium included a number of presentations on Logo. For North and South American LX readers, the symposium offers an opportunity to learn about Logo from another cultural perspective without the expense of east - west overseas travel.

For symposium information, write to Academia de la Investigacion Cientifica, Insurgentes Sur #949-9, Mexico, D.F., 03810.

A special travel package is being offered for North American LX readers wishing to attend the symposium. Arrangements include registration, round trip air fare, hotel reservations with breakfasts and dinners, and tours of Mexico City, Puebla, and vicinity. For more information, contact:

Daniel C. Orey
 Department of Educational Foundations
 College of Education
 Albuquerque, NM 87131
 (505) 277-3603 (day)
 (505) 247-4549 (evenings)

North America

*by Michael Friendly
Psychology Department
York University
Toronto, Ontario M3J 1P3 Canada*

Logo News from Michigan

During the final session of the MACUL '86 (the annual conference of the Michigan Association for Computer Users in Learning) in March, about thirty-five individuals interested in Logo gathered to establish a Special Interest Group for Logo Users, MACUL SIGLOGO.

One of the first "official" projects of the group was to host a spring Logo conference at the School of Education at the University of Michigan. "Nurturing Networks and Enhancements to the Curriculum" was the title and theme of the conference.

The next SIGLOGO project will be an all day conference on October 22, 1986, in Ann Arbor, MI. The special guest will be Kathleen Martin. The theme and activities of the conference will center around LogoWriter, what it is and how it can be used.

For conference information, write to:

Chris Canning
MACUL SIGLOGO Conference
PO Box 628
Westland, MI 48185

North American Conference News

The Logo 86 conference was held at the Massachusetts Institute of Technology (MIT) in Cambridge, MA, in early July. A report appears elsewhere in this LX issue.

Our thanks to Josie Drushal, a computer coordinator for Wooster (OH) City Schools, for the following Logo conference report.

The year-long Educational Computing Consortium of Ohio (ECCO) Logo Project under the coordination of Sharon Burrowes was made possible by a generous grant from the Martha Holden Jennings Foundation. The project culminated on May 9 at its Spring Logo Conference. Seymour Papert spoke both at day sessions and at the evening banquet.

The program featured hands-on workshops on a variety of subjects and lecture sessions on topics such as future trends in Logo, ways to use Logo in the classroom, and using Logo with gifted students. A special highlight was an introduction to LogoWriter conducted by Seymour Papert and Michael Tempel of Logo Computer Systems, Inc.

One of Papert's main points at the conference was that Logo can be used to its fullest only if it becomes an integral part of the classroom instead of a separate entity. He is enthusiastic about LogoWriter because it allows the computer to become a programmable computer, a word processor, and a tool of discovery.

Because of the year-long ECCO Logo Project, the level of understanding of the use of Logo by the participants at the conference was unusually high. This allowed for an extremely rich variety of discussions and sharing.

For more information on the ECCO Logo Project, write to:

Alice Fredman
ECCO
1123 S. O. M. Center Road
Cleveland, OH 44124

Seymour Papert will be speaking at the Conference on Thinking in Hawaii during the 1986 Christmas break. A package tour is available leaving December 26, 1986, from Los Angeles or San Francisco. The 12-day tour includes air fare, transfers, dormitory space at the University of Hawaii, and several meals for \$599 per person. A 5-day option is available for \$489. The deadline for tour reservations is October 1.

For additional tour information, write to:

Jill Kinney
27 East Canon Perdido
Santa Barbara, CA 93101
(805) 564-2460.

For conference details, contact:

Dr. Victor Kobayashi
University of Hawaii Summer Sessions
2500 Dole Street, Krauss 101
Honolulu, HI 96822
(808) -732-1360



by Barbara Randolph

The Logo 86 conference at MIT was enjoyable for me because I saw old friends and met new ones from all parts of the globe. One thing they all had in common was their interest and fascination with Logo.

Picture this . . . people of all ages around the world talking to the turtle (or to multiple turtles!), engaging in interesting projects, and exploring new "turtle ideas." Of these thousands of people, I would like to address two groups in particular in this column.

For Logo Students

Teachers, would you please convey the following message to your students?

Dear Logo Students,

The discoveries you make in Logo, the programs you design, the projects you carry out represent important work. I want to encourage you to share your work with other students.

There is no limit to what your imagination can create. And, if several of you are imagining together, it is even better!

When I was growing up, I had a lot of fun writing to other students from all around the world. I couldn't wait to come home each day to check the mailbox. I loved the beautiful stamps from other countries, too! Later, when I grew up, I was fortunate enough to meet one of my penpals from Hong Kong in person! What a wonderful experience that was! Perhaps you would like such an opportunity, too. That is one of the reasons I have started this column.

I would like to invite you to join the LogoPals. Who are the LogoPals? They are individual students all over the world who will be writing to each other directly, sharing their Logo ideas, projects, and activities. They will work together on shared projects as well as get to know more about each other and the countries in which they live.

How can you join? Just write to me at the following address:

Barbara Randolph
LogoPals
1455 East 56th Street
Chicago, IL 60637 USA

In your letter, tell me a little about yourself. Include such information as your age, grade level in school, and your Logo experience, as well as the kind of computer and Logo you use. You might like to design and enclose a brief ad with your request for a LogoPal from another country.

We hope to include ads in this column later. Somewhere in the world, a teacher might read your ad and tell his or her students about it. Perhaps one of them will write you a letter and become your LogoPal! Then you could start on your own adventure.

If you begin writing to a LogoPal, please let me know. I'd like to keep a list of active LogoPals. Have fun!

To Logo Teachers

Teachers, if you would like to get your entire class involved, then you should know about another program, the Logo Class Penpal Network. Through the network, you and your class will establish a correspondence with another teacher and class in the United States or in another country of the world. You will be able to share Logo teaching and learning ideas, procedures, and projects. Your students will have the opportunity to gain direct experience with students of other cultures. What a wonderful addition to to your curriculum! You will be matched with a counterpart according to grade level, Logo experience, interests, computer type, and Logo version.

To obtain a free application kit for you and your class, send a long self addressed envelope to:

Logo Class Penpal Network
UVA Curry School of Education
Ruffner Hall
Charlottesville, VA 22903

If you are writing from an address in the USA, please enclose a 22¢ stamp. Otherwise, please include sufficient international postal coupons for a 1.0 ounce (28 gram) air mail reply.

As teachers establish sharing relationships through this program, we hope to publish news about their projects and activities during the year.

Barbara Randolph is an experienced classroom and laboratory teacher in the Chicago (IL) Public Schools. She also presents Logo workshops and courses for both students and teachers.

Save the Turtle!

Help save the Kemp's Ridley Sea Turtle, an endangered species.

If you have been looking for a project to involve your students with Logo, life science, geography, and social responsibility, here is an idea to consider. The Kemp's Ridley Sea Turtle is in danger of extinction. You and your students can help save it.

The only known nesting beach of the Ridley is a 20-mile stretch of sand on the east coast of Mexico. In recent years, the nesting grounds have been ravaged by poachers and predators. Today, only a few hundred Ridentles remain.

An effort is being made to establish a new nesting beach in a protected area on Padre Island, off the coast of Texas. Each year about two thousand Ridley eggs are collected from the Mexico beach and transported to Texas. When the hatchlings emerge from the eggs, they are placed on the Padre beach for "imprinting." The baby turtles are recaptured and fed in captivity for a year and then released into the wild. It is hoped that, when these turtles reach adulthood, they will return to Padre Island to nest.

This year, about sixteen hundred baby Ridentles will be maintained at Padre Island. It costs \$4 per turtle to feed them for the year. Other costs include buckets (\$1 each) and crates (\$3 each). Each of these needs represents an opportunity to help save the Ridley.

Free brochures, booklets, and information about the Ridley are available, as well as the free loan of a Ridley videotape. These materials contain a multitude of ideas for classroom projects. And the connection with the Logo turtle is a natural!

For information on the Kemp's Ridley Sea Turtle and what you can do to help keep it from becoming extinct, write to:

Help Endangered Animals Ridley Turtles (HEART)
PO Box 681231
Houston, TX 77268-1231

HEART is a Special Committee of the Piney Woods Wildlife Society of North Harris County College, Houston, TX.

** Teacher's Pet **



"...the best robot I've ever seen..."

—Seymour Papert, M.I.T. LOGO '85 Conference, Cambridge, Massachusetts.

"We have found the Valiant Turtle's presence has increased the interest level of students and teachers in Logo, facilitated the understanding of Logo commands, and changed personal interaction during Logo work, providing students more time to share and discuss their observations."

—June 1986 review in *The Computing Teacher* by Jim Ellickson-Brown, Mountain View Elementary School and Doris Mimnaugh, 4th grade teacher, Wilson Elementary School, Corvallis, Oregon.

Meet Valiant Turtle, state of the art in Logo programming! Controlled from your Apple II+, IIe, IIc, IBM PC, PCjr or Commodore 64 computer by an infrared beam, the Valiant Turtle requires no cords or wires to move. Create a design on the screen and watch Valiant draw it on paper! Watch as Valiant executes your commands in three dimensions. Plan some fancy footwork and choreograph a dance in Logo!

Valiant Turtle is the ideal learning tool for students learning Logo as well as a great introduction to the world of robotics. Valiant is simple to use and easy for even the very youngest Logo learner to understand. Complicated and sophisticated ideas are presented in simple, graphic form. Students build artificial intelligence concepts and learn to think about space and spatial relationships.

Valiant Turtle operates with most popular versions of the Logo language. Watch through Valiant's transparent plexiglass dome as the Valiant Turtle draws with extreme accuracy with its built-in pen. Valiant comes completely assembled with easy-to-read instructions and control software. Because it's so easy to set up and use, the Valiant generates much enthusiasm in the classroom! Young imaginations fly whenever Valiant Turtle enters the room!

The Valiant Turtle is available from Harvard Associates, Inc., 260 Beacon Street, Somerville, Massachusetts 02143. Harvard Associates provides full technical support for the Valiant. For more information, or to order your Valiant Turtle, please call (617) 492-0660.