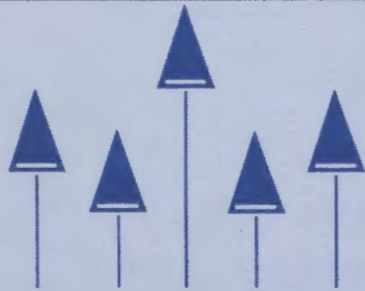


Journal of the ICCE Special Interest Group for Logo-Using Educators



# LOGO EXCHANGE

SEPTEMBER 1987

VOLUME 6 NUMBER 1



International Council for Computers in Education



Publications

# University of Virginia Summer Logo Fellowship Program 1987 - 1988

## **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 in the summer of 1988. The application cycle for this period begins in October 1987.

## **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, or call (804) 924-7471, requesting the application forms. Completed applications are to be returned to the University of Virginia before December 21, 1987. A selection committee will evaluate the applications and choose a group of finalists, from which the three fellowship recipients for 1988 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, Judi Harris, 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.



*Publishers of The Computing Teacher journal.*

Dear Logo Exchange Subscriber:

Enclosed is the Spetember issue of *Logo Exchange*. Thank you for your patience!

The International Council for Computers in Education (ICCE) has recently taken over publication of *Logo Exchange* from Meckler Publishing Corporation. Please bear with us as we make the necessary adjustments required of the aquisition.

Because we were not supplied with pertinent subscription information in a timely manner, we got off to a late start on the fall issues. We anticipate being back on track by the first of the year. We apologize for this convenience.

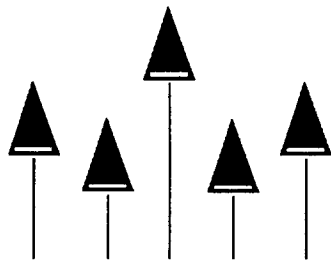
You will notice that Sharon Burrowes will be working in conjunction with Tom Lough as editor-in-chief. Please note also the information on the East Coast Logo Conference.

ICCE is the leading U.S. and international professional organization for computer educators at the precollege level. It is non-profit, supported by more than 50 organizations of computer-using educators worldwide. These organizations are statewide or region-wide in scope, averaging 500 members each.

We look forward to a successful year. Thank you again for your patience during the change-over.

Sincerely,

Kathleen M. Geygan  
Marketing Director, ICCE



# LOGO EXCHANGE

VOLUME 6 NUMBER 1

Journal of the ICCE Special Interest Group for Logo-Using Educators

SEPTEMBER 1987

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## SIGLogo Membership (includes the Logo Exchange)

|                 | U.S.  | NON-U.S. |
|-----------------|-------|----------|
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Send membership dues to ICCE. Add \$2.50 for processing if payment does not accompany your dues. VISA and Mastercard accepted.

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Opinions expressed in this publication are those of the authors and do not necessarily reflect or represent the official policy of ICCE.

Dear Readers,

When Posy and I started The National LogoExchange newsletter five years ago, we hoped to provide teachers with a means for sharing useful Logo information. Beginning as an 8-page dot-matrix publication, the NLX carried a monthly offering of articles written by teachers and columns written by Steve Tipps and Glen Bull. What an exciting time it was!

Soon, the newsletter graduated to a letter-quality printer. Other contributors joined the effort. Robs Muir and Griff Wigley were the first of nearly two dozen people who eventually became involved with the publication.

Later, a laser printer provided another "upgrade" to the typeset look, with 16-plus pages of Logo information each month. With Dennis Harper, I started the bi-monthly International Logo Exchange newsletter, to respond to the needs of educators wishing to stay informed of Logo developments and use on a global level. Outstanding field editors on each continent reported on "happenings" in their area. For the first time, it was possible to get a sense of the "big picture" of Logo around the world.

Meckler Publishing acquired the NLX and the ILX in 1986 and consolidated them into the Logo Exchange magazine, expanding the offering to 32-plus pages each month.

As this publication enters its sixth year, even more changes are evident. It has a wonderful new home with the International Council for Computers in Education (ICCE). It is now associated directly with a Logo organization, with membership open to all. Even more people now have the opportunity to be involved with the writing, editing, and publishing.

In that regard, I invite each of you to consider making a contribution to the LX. Perhaps an article, a short paragraph or two of your favorite Logo tip, or a printout of a student project. As Logo enters what some are calling its "maturation" stage, it will be even more important than ever before to continue to share information and ideas with each other. Let's work to make the Logo Exchange better than ever!

Five years is enough; it is time for me to step aside. With a mixture of nostalgia and anticipation, I pass the torch to the ICCE and the new staff of the Logo Exchange. Sharon Burrowes, a long-time

Exchange contributor, has agreed to be editor. Sharon, the present contributors, and the volunteers being added will bring a much needed dimension of breadth to the publication. I plan to continue my writing on a more or less regular basis.

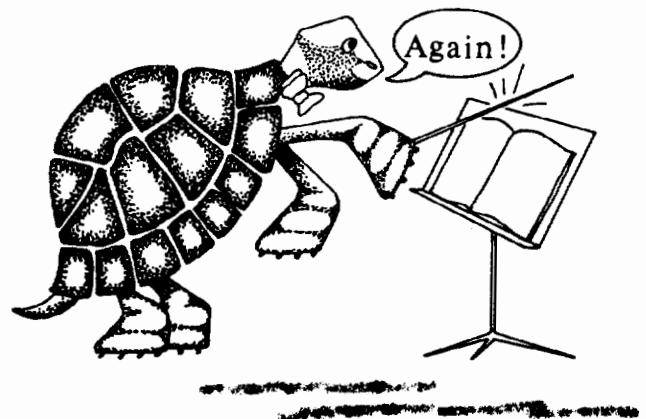
When I think back on the past five short years, I am amazed, humbled, and proud. Steve Tipps and Glen Bull each have written nearly fifty significant Logo pieces. The NLX, ILX, and LX combined have published and distributed nearly six hundred Logo articles! The staff of contributors has become like a second family to me. And you, dear readers, became my extended family. What a pleasure it has been to meet you at conferences and to receive mail and telephone calls from you. From the bottom of my heart, I thank each one of you.

As always,



FD 100!!

Tom Lough  
 Founding Editor  
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## From the Editor

By Sharon Burrowes

Dear Readers, both old and new:

I want to take this opportunity to welcome you to the "new" Logo Exchange. You will find only a couple of changes in this first issue of LX; many familiar "faces" are back providing you with classroom ideas and new challenges.

As the new editor, let me begin by telling you how I managed to find myself in front of this keyboard today. My story begins shortly after the East Coast Logo Fair in March of 1987. Since I am a member of the Board of Directors of the International Council for Computers in Education (ICCE), several members of the Logo community approached me about the possibility of creating a Special Interest Group (SIG) for logo. The time seemed ripe for a professional organization focused on Logo using educators.

After discussing the appropriate process with ICCE, we began to circulate petitions for establishment of a SIGLogo throughout the Logo community. (Perhaps you even received one!) The petitions began to fill my mailbox almost immediately; it became clear that indeed there was sufficient interest in the Logo community to create a Logo SIG. At the June board meeting held at NECC (National Educational Computing Conference), the ICCE Board of Directors voted to establish SIGLogo, and I agreed to be newsletter editor.

Later in the summer, a phone call came from ICCE. They were acquiring the Logo Exchange from Meckler Publishing. Clearly LX would be appropriate as a journal for the SIGLogo. Since I had agreed to edit the SIGLogo newsletter and Tom was stepping down as LX editor, how would I like to edit LX?. After the initial ...GULP! .. I agreed. During the rest of a very hectic summer, I spent many hours thinking about how LX and ICCE can benefit each other in the years to come.

If you are not familiar with ICCE, let me introduce you. ICCE is a professional organization of primarily pre-college computer using educators. ICCE publishes the highly respected journal, *The*

*Computing Teacher*. In addition, they support publication of a number of smaller newsletters and journals, publish a variety of materials for all aspects of computers in education, sponsor a number of SIG's, and are intimately involved with the annual NECC conference.

As a subscriber to the LX, you automatically become a member of the SIGLogo. If you are not a member of ICCE, I would encourage you to join. Not only does it reduce the cost of your SIG membership (and thus LX), but your subscription to *The Computing Teacher* gives you some excellent Logo articles each month as well as a window on the world of educational computing as a whole.

Officially establishing the SIGLogo and putting together the first new issue of LX is just the first step. There is much yet to be done. Both the SIGLogo organization and LX need your help. What can you do? Many things.

- Write an article for LX
- Volunteer to review articles for LX
- Become active in the SIGLogo
- Volunteer to be an officer
- Help with development of the constitution and by-law
- Help establish SIGLogo meetings at local conferences
- Become active in your local Logo group and send news of their activities to ICCE/LX.
- Communicate your opinions about the content of LX and the activities of the SIGLogo.

With your help, LX will continue to grow in directions helpful to an even wider segment of the Logo community and the SIGLogo will establish links among local Logo groups. I look forward to hearing from you or seeing you at regional or national conferences.

Sharon Burrowes, Editor  
 ICCE-SIGLogo  
 University of Oregon  
 1787 Agate Street  
 Eugene, Oregon 97403  
 CompuServe 73007,1645

Cover: Patty Turning and Liz Kiefer, Parkview Elementary, Wooster, OH

Patty and Liz have been working with LogoWriter for two years. They had completed the LogoWriter Activity Cards and were creating their own project. The graphics are only a part of the project. The entire program has the basketball bounced and shot through the basket with a musical finale. The girls claim it isn't finished, but then most LogoWriter projects rarely are.

# SIGNews and Conference Announcements

## Great Lakes/ East Coast Logo Conference

The Great Lakes/ East Coast Logo Conference will be held on May 6-7, 1988 with preconference workshops on May 5. This conference, held at the Stouffer Tower City Hotel in Cleveland, OH will feature numerous well-known speakers: Seymour Papert, Dan and Molly Watt, Michael Tempel, Tom Lough, Brian Silverman, Steve Ocko, Mike Battista, Doug Clements, Alison Birch and many more.

Presentations that describe university, district, and school based Logo projects, address issues of equitable use of computers and present uses of Logo beyond the introductory level are particularly desired. Deadline for submission of proposals is January 15, 1988.

For more information on submitting proposals, contact Sharon Burrowes, L.C.S.I., 330 W. 58th, Suite 5M, New York, NY 10019-2925.

## National Educational Computing Conference (NECC) '88

Loews Anatole Hotel, Dallas, TX, June 15 - 17, 1988. For more information contact Jim Poirot, NECC '88, Department of Computer Education and Cognitive Systems, North Texas State University, P.O. Box 13886, NT Station, Denton, Texas, 76203-3886.

## Cover Art

Do you have interesting pictures, patterns, or designs that either you or your students have produced using Logo? This year the cover of the *Logo Exchange* will feature pictures generated by LX readers using any version of Logo. Submit your "entries" both on disk and with camera ready copy to Sharon Burrowes.

We need to hear from you. Tell us about your local Logo users group- What have you been doing? What activities are you planning? What conferences in your area will feature Logo presentations and/or workshops?

Send your news items to

Sharon Burrowes  
ICCE-SIGLogo  
University of Oregon  
1787 Agate Street  
Eugene, Oregon 97403-9905

We're looking forward to hearing from you!!!

## IF...THEN

by  
Nancy Parks Sopp

Six years ago I spent my entire year's teaching supply budget on a robot turtle from M.I.T. and the Logo language. I had just received a brand-new Apple II+ for my junior high resource room and didn't know what to do with it. A trusted colleague told me that Logo was just the thing for my learning disabled students. It was. I wonder now if she suspected the impact that a floppy disk and a little robot would have on my teaching style.

My students and I began learning Logo together. They wrote programs to make the robot turtle move about our classroom on its long cord, tooting its horn and flashing its eyes—red lights soldered to a circuit board. The high point came when we learned to program it to respond to feedback from its touch sensors.

Here is a sample program:

```
TO MOVE
IF FTOUCH? THEN BACK 20 RIGHT 90
FD 20
MOVE
END
```

The MOVE procedure makes the turtle check to determine if its front touch sensor is activated by someone touching its shell or the turtle running into something.

If it is not, the turtle moves forward 20 steps (about 6 inches) and checks again. If the sensor is activated, the turtle rolls backward, turns right 90 degrees, and moves forward once again. The turtle keeps moving about the room this way until someone interrupts the program from the keyboard with CONTROL-G.

My students and I learned Logo the same way the robot behaved in its MOVE procedure. We went slowly through the chapters in the M.I.T. Logo technical manual and Hal Abelson's book, *Logo for the Apple II*. IF we bumped into something that intrigued us, THEN we stopped our sequence of readings, changed course, and moved forward in a

different direction.

That first year, we wrote a text adventure story, spent hours creating recursive designs, and programmed our Apple II+ to play the role of a sarcastic psychoanalyst.

The students wrote programs for the robot off and on throughout the year. Sometimes they made errors in writing the IF...THEN statement, so that when the robot ran into something, it would ignore the input from its touch sensors and spin its wheels, desperately trying to move forward, oblivious to the fact that it was making no progress.

This IF...THEN teaching and learning style was a big change from my former practice, in which I decided what course our learning would take and then moved forward relentlessly, without regard for the students' interests. In learning Logo, I gave students a voice in what they learned.

For instance, I came upon the branching adventure story idea in *The Computing Teacher*<sup>1</sup>. I proposed it to the students, thinking it would provide much-needed practice on language arts skills. They agreed to write one. Mark, testing the limits of my new teaching style, said "Let's call it 'The Day the Teacher Dropped Dead'."

The title stuck, and these easily bored students stuck with their story until it had nine endings, several of which featured the untimely deaths of their favorite teachers. The project gave Jason, the class clown, an appropriate outlet for his humor. Mark, a disheveled boy who couldn't organize himself enough to bring his glasses, paper and pencil to class, helped me organize the story segments. Tara dropped her look of perpetual boredom and spent long hours helping Linda, who could barely read or write, type her story segments.

The IF...THEN style of learning carried over into our time away from the computer. For example, Chris had been spinning his wheels in our spelling lessons, making no progress learning new words. He asked to take over a project that a student in the gifted/talented program had given up on—repairing a motorcycle engine. He had to order parts for it, so he learned to spell magneto and carburetor, thus moving forward in learning spelling, but moving in a different direction.

The following year I got a new job. I packed the robot in foam peanuts and carried it to one of the two new computer labs which I was to supervise. I



had no students of my own, being responsible instead for teaching other teachers' students everything from single-digit subtraction to spreadsheets. Overwhelmed by my new responsibilities, I neglected to unpack the turtle and forgot the IF...THEN style of learning and teaching that had worked so well.

A teacher at the nearby elementary school, Mrs. Sanz, requested Logo instruction. Every week or two she shepherded her third graders across the street to my high school computer lab, where I gave them a Logo lesson.

Several years into my new job, I was teaching Mrs. Sanz' latest crop of third graders. It was the last week in October. Tromp..tromp... I heard their heavy boots coming down the hall. With big smiles on their rosy faces, they filed into the lab. Mrs. Sanz thrust a sheaf of smudged papers into my hands. I glanced at the first one—"Dear Mrs. Sopp..." was all I read before setting them on my desk to read later. I proceeded with my lesson on pentagons and hexagons, using the same lesson plans that I had used the previous two years. After they left, I read the letters. Halfway through the stack, I read one that acted like a CONTROL-G to interrupt my carefully sequenced lesson plans.

Dear Mrs. Sopp,

Thank you for teaching us Logo. I hope you can teach us how to make a pumpkin. And a jack-o-lantern too. I hope you do Mrs. Sopp.

Your student,  
Jana

It was nearly Halloween; of course they were interested in pumpkins! I could have programmed a pumpkin shape and a big toothy grin, and they could have programmed the triangle eyes themselves! It would have been a wonderful lesson, incorporating both their interest in the holiday and my goal to have them learn more Logo.

I had not taken their interests into account. I had been teaching Logo from a predetermined plan instead of allowing students' interests to determine the course for our learning.

I had been acting like the robot turtle with an error in its IF. . . THEN statement, ignoring all input from its touch sensors and spinning its wheels, trying

to move forward and oblivious to the fact that it wasn't accomplishing its goal.

What is wrong with ignoring the students' interests? They still enjoyed their Logo lessons. But they had glimpsed its potential as a tool they could use to create whatever they wished, for they asked for pumpkins, rockets, and spaceships.

The students had dared to bring an agenda to the computer lab. By ignoring it, I was teaching them that teachers are the ones who decide what is to be learned.

In the months after those letters, I modified my plans according to the students' and Mrs. Sanz' interests. The next time I saw the students we constructed Logo rockets and spaceships. When two girls chattered to me about the costumes their mothers were making for their Thanksgiving play, I remembered a Thanksgiving Logo activity from *Teaching and Computers*<sup>2</sup>. On their next visit to the lab they were pilgrims, planting Logo corn and building Logo cabins.

At the end of January I programmed Logo lace, hearts, and the alphabet in large letters<sup>3</sup>, and the students made fancy Valentines for mothers and friends. In March, Mrs. Sanz told me of her struggles to introduce fractions to her students. I paged through past issues of *Logo Exchange* and came up with a fractions lesson.

I recently unpacked the robot turtle. It now has a decided list, veering off to the right when it's supposed to move straight forward. But it still responds just fine to IF...THEN statements. And now, most of the time, so do I.

- 1 "The Logo Center," *TCT*, Vol. 10 No. 5, January 1983 p. 66-71
- 2 "The Misadventures of Francis Billington," by Candy Colborn, *Teaching and Computers*, p. 20-23, Vol. 4, No. 3, Nov./Dec. 1986
- 3 "National Logo Exchange Apple Logo Alphabet Procedures," *LX*, December 1982

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*Nancy Parks Sopp is the learning disabilities specialist for grades one - three, Woodriver Elementary School, Fairbanks, AK.*

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# Star Patterns: An Alternative Approach to Angles

by Reinhold Wappler

Start Logo and type RIGHT 60. Then ask your students:

Show me the angle.....



Or type FD 40 RT 60.

Show me the angle.....

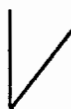


Or type FD 40 RT 60 FD 40 and again ask:

Show me the angle.....



“Conventional” Logo experience does not impart a conventional sense of angle to elementary level children. None of the above show a textbook angle you would draw if asked to show what 60 degrees looked like.



As our Logo-trained children encounter the standard geometry of regular polygons and irregular closed shapes in 5th and 6th grades, we have been struck by how little the two disciplines, as taught, support one another. Several studies have noted that Logo-trained children have a procedural conception of turns and angles quite different from the static geometric notions held by more traditionally instructed kids. Both notions are valuable. It should be possible to adjust the usual approach to Logo so as to familiarize students *simultaneously* with *both* procedural and textbook notions of what angles are. CLIME (Council for Logo in Mathematics Education; see below) member Doug Clements points out, in the April '87 issue of the *Logo Exchange*, that one of Piaget's

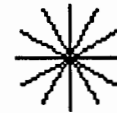
strongest findings was that children's sense of geometric form is based *on actions they perform on objects*. For this reason we chose early in our program to teach students to use angles in their familiar form to draw shapes like *stars*, and leave regular geometric shapes for later. We have found that very simple procedures yield a rich harvest.

A good starting point is a classroom exercise using this procedure:

```
TO STAR :ANGLE
FD 40
BK 40
RT :ANGLE
STAR :ANGLE
END
```

Type STAR 10, and when it finishes winding out a *full circle* of 10-degree angles *all the way around*, stop and clear the screen. Type

STAR 30...



This one is suitable for counting the arms or the angles. Ask a student to count the 30 degree angles, and several others to trace with a finger the two arms that bound each 30 degree angle. Suggest the multiplication of 30 by 12 to see how many degrees are needed to turn all the way around. Then clear screen and type STAR 36. This produces ten angles and arms to be counted and traced. Again, multiplying 36 by 12 results in 360.

Continue with the principle angles for 8, 6, 5, 4, 3, and 2-armed stars. Then challenge your class to make a 7, 9, or 11 armed star and work toward understanding of division of 360 by the number of wanted arms. Stress that an input to STAR of 360/11 works just as well as 32.767 and is much easier.

Now draw a sequence of STARS starting with STAR 1, STAR 2, STAR 3, etc., on out as far as you can retain interest. Play with the process the first time; next time have the kids prepared with data collection sheets. This simple exercise can easily consume 2 or more class periods. It can yield pleasure and benefit for grades 5 thru 12, since it involves prediction, counting, comparing, tabular data collec-

tion, prime numbers, calculator exercises, mental arithmetic, division, remainders, factoring, prime factors, fraction manipulations, patterns, modulus, formulas, functions, and much more.

Included is a copyable sheet of stars which you may find useful in the version of the exercise you evolve. A tabular form is shown on which students can collect observations as this process goes on.

Kids always want to complete the orbit, at which point "retrace" may occur, with no further filling in, or it may not occur, producing another "orbit" of arms, and sometimes another and another. The process always has an endpoint in a new pattern or in one of the previous patterns on the chart. (One is missing: which?) The basic game is to run STAR with some number input and call for predictions of the endpoint pattern, and the number of orbits that will occur before retrace. Some are obvious, others are tricky.

To help determine if a pattern is an 8-degree or a 10-degree pattern, engage the kids in a writing a procedure to place a comparison star to the right of the test star, as suggested in the drawing below. Then can place another on the left. Direct visual comparisons are made easy.



Calculators may be used to figure number of arms, but don't let calculators be the enemy of mental arithmetic. Since calculators do not figure remainders, it is a challenge to figure out how to convert decimals to remainders. Alternatively, Logo programs can be written to output remainders. Try to write one not using the primitive REMAINDER.

The exercise gets more difficult with larger inputs. Above 360 the notion of modulo is introduced. Use inputs like STAR 2397, and depending on the grade level you can ask for a formula to determine the end point pattern, the number of arms, or the number of orbits required for retrace.

Add a "wait until keypress" line to the STAR procedure such as MAKE "K RC and at the completion of one orbit of, say, STAR 19, ask a student to point to where the next arm will be drawn, and the next and the next, and finally, why?

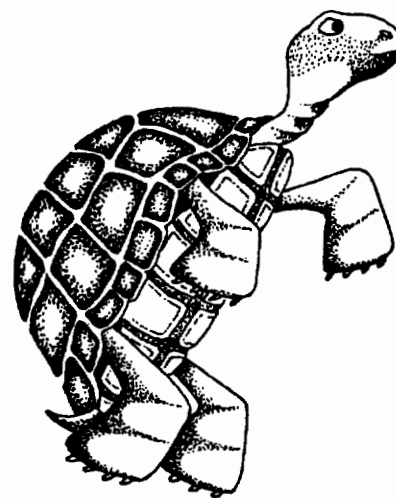


The paragraph you just read will mean little to you until you sit down, write the procedures, and run

them. This is, above all, a dynamic non-verbal process, uniquely demonstrative of the utility of a computer and Logo in your classroom. Typically, our effort to give kids a good sense of what angles are has led us along many mathematical trails. Enjoy!

*Reinhold Wappler, 252 Carter Street, New Canaan, CT 06840.*

This article previously published in the Junk, 1987 CLIME Newsletter. For information on becoming a member of CLIME (the Council for Logo in Mathematics Education), send a self-addressed stamped envelope to Ihor Charischak, Editor, 445 Broadway, Hastings on Hudson, New York 10706.





## Teacher Feature

by *Rebecca Poplin*  
Featuring: **Mary Upton**

### A Jeffersonian Logo Experience

Imagine staying in a room designed by Thomas Jefferson on The Lawn of the University of Virginia and working with Logo at the same time! That is what Mary Upton of Lubbock, Texas, experienced this summer. Mary was one of the two Logo Fellowship recipients in a program sponsored by the UVA Curry School of Education and Logo Computer Systems, Incorporated. She was chosen on a competitive basis to spend a three-week period of residence at UVA with all expenses paid to work on a self-designed LogoWriter project.

The fellowship program was coordinated by Tom Lough and Glen Bull. Judi Harris served as a LogoWriter consultant to the fellowship recipients.

Mary proposed to create Logowriter tool pages that will allow children to put together data tables and graphs. As they put the graphs together they will learn how to read and interpret them. The project includes instructional pages which the child may use and tool pages for bar, line, and picture graphs. Children will build graphs from surveys or topics they are studying. When Mary finishes, the materials she has produced will be available in the public domain.

### The Groundwork

Mary's interest in Logo developed about 5 years ago when she began taking staff development courses with Bob Knight, computer coordinator in Lubbock. After 150 hours of training, Mary became a computer technologist for the Lubbock schools. As such, Mary set up a lab in her elementary school and worked with all grade levels, concentrating very heavily on Logo.

A master's degree in instructional technology at Texas Tech gave Mary the opportunity to participate in an innovative program in Lubbock. The school district hired her as one of two programmers to create software. They found that just about the time they created a particular item, the commercial

software would become available on the market, so Mary has become a software evaluator instead. In addition, she has been correlating the Texas essential elements (curriculum goals) with software, and making a catalogue for teachers.

### Designs

Mary Upton's career centers on helping teachers use computers effectively to enhance learning. She has developed two guides for computer use with different curriculum areas. In these guides she has accumulated various Logo procedures that have been developed and has put them on a menu-driven disk. The guides also include a laminated turtle compass and teaching tips.

Plans for the near future include working extensively with Lubbock's 50 computer technologists to develop a support network, helping teachers use computers more as a tool, and fostering the burgeoning use of LogoWriter in the school district. The teachers who have started using LogoWriter are really excited and willing to learn. As Mary says, "There is just something special about Logo people!"

If you are interested in learning more about the computer technologist program or the materials Mary has developed, you may write:

Mary Upton  
5420 15th Street  
Lubbock, TX 79416

To apply for the UVA Logo Fellowship Program for the summer of 1988, request application forms from:

University of Virginia Summer  
Logo Fellowship Program  
Curry School of Education  
Ruffner Hall  
Charlottesville, VA 22901

If you know of someone who should be featured in this column, please contact:

Rebecca Poplin  
2421 Fain Street  
Wichita Falls, TX 76308

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

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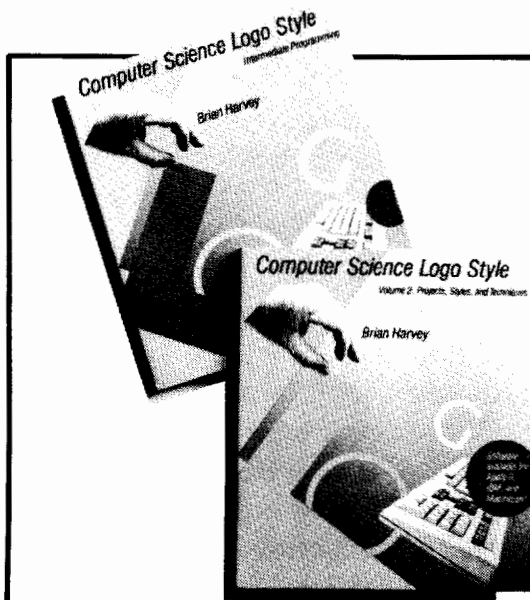
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## Listful Thinking

by Glen L. Bull  
and Gina L. Bull

### Writing by Formula

Two summers ago we did a workshop at Punahou School in Hawaii. One of the products of that workshop was a Hawaiian syllable generator. A Hawaiian syllable generator relies on the fact that the Hawaiian language has only a very few consonants.

```
TO C
OP PICK [P L K H M N W]
END
```

```
TO PICK :LIST
OP ITEM 1 + (RANDOM COUNT :LIST)
:LIST
END
```

The procedure "C" shown above will pick one of those Hawaiian consonants. Since the consonants are picked randomly, the consonant you see when you try this procedure may be different than the one shown below.

```
?PRINT C
M
```

The addition of a similar procedure to pick vowels, V, makes it possible to construct Hawaiian syllables.

```
TO V
OP PICK [A E I O U]
END
```

The consonants and vowels are combined in this way.

```
?PRINT ( WORD C V C V C V C V )
HAMAHANO
```

Of course, you could continue with as many C's and V's as you think necessary. This type of Logo procedure is simple, but makes a wonderful tool for study of language arts, phonetics, and linguistics. For example, what sorts of consonants would it be necessary to substitute in the consonant procedure to

create a Polish syllable generator? Is it even possible to produce syllables that look Polish by only changing the consonants? What other factors could be involved?

This past summer, we introduced the Hawaiian syllable generator in the first week of a University of Virginia Logo class that had five science teachers and five elementary education and social studies teachers. The elementary education teachers thought the exercise was great fun, but the science teachers were more dubious. What, they wondered, did Hawaiian syllables have to do with teaching chemistry?

The standard explanation is that the syllable generator provides an introduction to list processing. The science teachers still looked unconvinced. At that point, a chemical compound generator was suggested. A compound generator, you see, could randomly pick chemical elements instead of syllables. It might look something like this.

```
TO EL
OP PICK [H Cu O F S Co Li]
END
```

It would be used in this way.

```
?PRINT ( WORD EL EL EL EL )
HCuLiS
```

When the chemistry teachers saw the result, they hooted. Chemical elements, it seems, can not be combined in any old way. Elements have valences, and the number of positive and negative valences in a compound have to equal one another. Here are some lists of elements sorted by valence.

```
TO PLUS1
OP PICK [H Li Na K]
END
```

```
TO MINUS1
OP PICK [F Cl Br I]
END
```

```
TO PLUS2
OP PICK [Mg Ca Ba Cu Zn]
END
```