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This special, 12 page edition of GO is dedicated to Logo. It is ten years since Logo was initially introduced into classrooms so it seems apposite to review just how much of its early promise has been fulfilled, how it is being used in the classroom and what the future holds for it. In this edition we investigate and deliberate the impact of Logo.



THE LESSONS OF LOGO

 Ten years ago, "Mindstorms: Children, Computers and Powerful Ideas" captured the minds of educators across the world. Now Logo is ingrained in the National Curriculum and is in use in classrooms around the globe. Here we reprint an interview with Seymour Papert given in the American magazine "Teaching & Computers"*.

Has Logo turned out the way you expected, in terms of classroom use and student impact? If not, how has it turned out differently?

At first, I used to be very upset when I saw schools using Logo in a rigid way, making it just another curriculum subject with a test, almost rote learning. I stopped being upset when I came to the understanding that everyone can use Logo as a personal mode of expression according to a personal style.

Many teachers believe in a very highly structured, teacher-centred, authoritarian approach to education. It's not surprising that they use Logo in the same way. It's not my business to try to persuade them to be different, because they are who they are.

What I find most exciting, though, are teachers whose instincts are towards open education, encouraging individuality and creativity in children. I am pleased by the way that these teachers use Logo to do better what they have been doing – teaching.

So the question doesn't have a simple answer. Some aspects of what was expected for Logo are still for the future. Some aspects are being carried out

wonderfully by teachers whose philosophy of life is compatible with the way I look at education, and I'm pleased with that. As for the teachers with philosophies not like mine, I shouldn't be surprised if they use Logo in their own way.

Properly preparing teachers to use computers can be difficult. What do you think are necessary ingredients for successful in-service training?

First of all, stop using the word training. Just consider, are you training the teachers to train the children? Everyone is horrified at the thought that we're "training" children. So why do we talk about training teachers? I think it's because in the domain of technology, we think that all teachers have to do is implement something that has been set up by someone else. It's a mechanical process to know how to put the disk in and what to say to the kids – that is what calls for training, but what we need is something very different.

We need to encourage teachers to rethink what it is to be a teacher, what it is to learn. With the possibilities for doing mathematics, science and writing in very different more integrated ways, some

fundamental questions of philosophy open up for teachers. In the past, as long as we were only changing the curriculum very slightly, a teacher could say that mathematics was whatever was in the math curriculum. The opportunity for radical change makes it the teacher's business to rethink these fundamental questions.

I think it is most important that Principals/Heads take teachers much more seriously as thinkers and as activists, as people with a responsibility in society for change and not for implementation of ready-designed systems.

What is the best way to prepare teachers for using Logo?

The best preparation for teaching Logo in the classroom is to be very emphatic that we don't want to teach Logo in the classroom. We want to give teachers models – models which use Logo as a medium.

For example, I was working on a project that involved ten year olds working four hours a day for three weeks. They were using LogoWriter to make a piece of software that would explain something about fractions. Now what were these children learning? Were they learning about fractions, teaching, or how to approach and carry out a very complex project? Because everything happened together, the components gave meaning ▶

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TECHNOLOGY FOR EDUCATION

to each other. The children learned more in that time about each of the components than if the entire time had been spent on just one component. As a result, they improved quite spectacularly in their knowledge about fractions and they learned much more Logo than children usually learned.

So it illustrates the principle that sometimes learning more is much easier than learning less. It can be easier than learning each area separately. This is the kind of principle I see carried out by Logo.

What role did the teacher play during this LogoWriter project?

He or she acted as an advisor, conciliator, consultant, sometimes as a stimulator and therapist (to ease frustrated spirits). Sometimes when children tried to do something of great difficulty and didn't get the results they hoped for, the teacher gave them courage. I don't think the project could have happened or been nearly as successful without someone in that room. But what the teacher did not do was tell the students what to do. Instead the teacher only helped them to do what they wanted to do.

Many schools can only afford to put one computer in each classroom. What do you suggest in this situation?

Some of the best things I've seen done with computers are by teachers who have one or two computers in the back of the room. This requires a great deal of teacher flexibility. The teacher must be laid back and a lot more "out of it" than when there are 20 computers in a lab with a student sitting at each one.

One or two computers in the classroom can be a bad situation though. If the teacher is too structured and won't let the students step away from the class to work on their own, it won't work.

There is an educational technique known as "superlearning" that was developed in Bulgaria and is catching the attention of educational innovators here. The idea is to teach to all our

"intelligences": linguistic, logical/mathematical, intrapersonal, spatial, musical, bodily-kinesthetic, and interpersonal. How might this technique compare to your own thinking about learning?

I can't comment on this technique specifically but I can comment in general that I think it's a profound weakness in our school structure that we fragment knowledge into disciplines and that we fragment children's learning time accordingly. I think it is important for education to go less toward fragmentation and more toward whole learning, where people learn through meaningful activities that are not chopped up into fragments.

So I think for learning to be really "super", it will have to break away from fragmentation. I think that computers can be used in a way that will greatly facilitate that. I am very skeptical of anyone who came along with a technique of "superlearning" that can be implemented in a standard classroom with a standard curriculum. I think a curriculum and natural learning are really diametrically opposed to each other.

Some researchers believe that teaching programming to children does not make them better problem solvers and thinkers because the skills learned in programming are not carried over to other subject areas. What do you think about this?

I'm the first one to agree with this. These silly people (researchers) seem to be the ones who have misread "Mindstorms" as suggesting teaching programming in itself will do any good to anybody. A large part of "Mindstorms", in fact, is quite vehemently opposed to some programming.

I don't think that programming in itself is a particularly valuable activity. I do think that learning to program can open up wonderful opportunities for children to do projects that lead to very good learning . . . to what you call "superlearning".

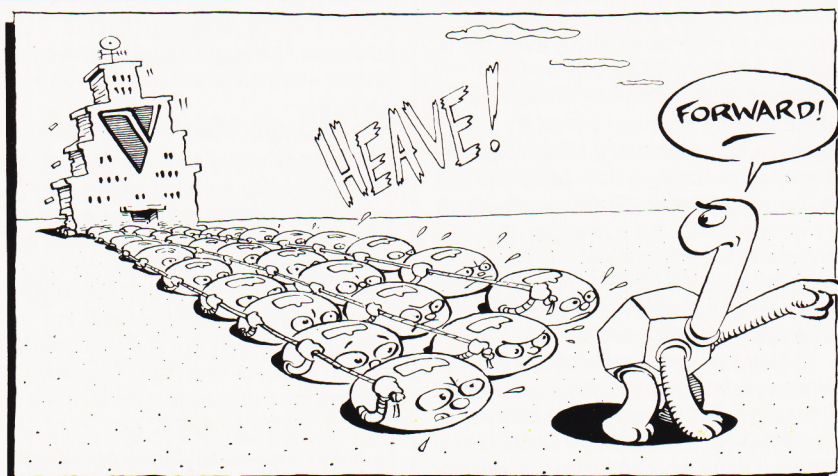
I think one could say the same thing about reading. What's the effect of reading on children? Well, I think if you are reading wonderfully exciting spiritual poetry it will have one effect and if you're reading violent horror stories it will have a different effect. So I don't think that reading has one particular effect, either good or bad. My criticism is not of the researchers themselves but of the traditional educational psychology which tends to ask very narrow questions. If you want to measure small little effects, you only have to ask small-minded questions.

What are the benefits of using LogoWriter?

It has no benefit by itself. I think it is a very flexible expressive media that imaginative teachers and learners can use for a great variety of wonderful projects. For example, I think that a teacher who wants to give children the opportunity to do multi-media long term projects is able to do this with LogoWriter much better than with traditional pencil and paper. It's not what Logo can do with children but what they can do with Logo.

What other projects are you currently working on?

I'm trying to write a book that would be for the 1990s what "Mindstorms" was for the 1980s. "Mindstorms" had a certain success because it articulated hopes and perspectives quite widely shared. There was a tremendous sense that this computer was something new and it was going to change learning. The people who were most enthusiastic about the book and got most out of it were not looking for how-to stuff but for an articulation of a vision. I'm trying to write about that vision – a vision of a less fragmented, more constructive, child-centred education. Part of that vision is that somehow computers will make it easier for children to learn in a more natural, less constrained way, and that somehow the computer will be used by teachers and children as an instrument of creativity. ▼



On May 1 1992 Valiant Technology moved to larger premises. The new address is:

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London SW11 9DQ

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We apologise for any inconvenience this may cause customers, and hope that there will be minimum disruption to our services.

LOGO – FORWARD 2000



André Wagstaff of the NCET reviews the use of Logo and investigates its promise for the future.

Decades are comfortable units of time. Days pass in a blur, years seem to proceed through a series of fixed, repeating events (Christmas, birthdays, summer holidays), but we look to decades as the ruler against which to measure real changes in our own personal lives or those of the structures of society. Within education, a decade almost serves to allow an entire cohort of children to pass through the primary and secondary phases of education. There have been many recent articles looking forward to the decade which will carry us through into the next century; I should like to take a little time to reflect over the past decade. Why? Well not in order to make a better guess at the future, no amount of historical brooding can enable us to foretell coming events. On the other hand, reflection is one of the most necessary of the learning skills and one we ignore at our peril.

We are now in the second decade of teachers and children using Logo in our schools. Much was promised, rather less delivered and even less achieved. Why has this happened, why do I feel a mixture of guilt and disappointment, and why do I still feel that Logo still carries within it the seeds of a deliverable promise?

The precise starting point of any new educational development is always a little debatable. For me, Logo started when I read "Mindstorms: Children, Computers and Powerful Ideas" by Seymour Papert. The essence of the book, published in 1981, was that children can acquire powerful problem-solving concepts and tools by learning to program a computer. Logo was a computer language which lent itself particularly well to being used by children because of its graphics capabilities and the use of a floor turtle. The book still reads as freshly as it did when originally published and is well worth rereading from time to time. I can still remember the extraordinary efforts I went to in order to obtain a copy of the first Logo which was able to run on a microcomputer. It was called Krell Logo, ran on an Apple II computer and the first time I ordered it was mistaken for an Apple logo, so that I had a large cardboard tube delivered to my door containing a wall poster of an enormous logo of the apple computer company! A few phone calls and letters later and I receive a square hopeful-looking parcel. Inside were the disks and documentation. On went the computer, into the disk drive went the Logo disk, and up on the screen came a question mark and – nothing else.

Now I was used to computer programs which did something for or to you. This one just sat there with that pulsating question mark. I felt a mixture of disappointment, fear and excitement. Disappointment that there seemed to be such a gap between the heady prose of Papert's book, fear that I would not be able to rise to the challenge offered by this new medium, and excitement that I might be on the verge of making new discoveries.

Well, over the next few months the children in my class and I wrestled with Logo. True it provoked much interest and comment, but it became obvious that this was a computer language which demanded precision in instruction and rigour in thinking. There was no room for fuzziness or fudging. "Near enough" was not a concept which Logo could tolerate. And we seemed to be locked into turtle graphics. Although list processing lay at the heart of Logo and text processing was therefore possible, neither the children nor I really seemed able to get to grips with it. Papert had spoken of microworlds. We seemed locked into a microghetto. Help seemed called for. And it came, but not exactly from the expected quarter nor in the amounts needed. After all, this was a British experience and I should have expected that muddle, uncertainty and doubt would be the order of the day.

First of all BLUG came into being, run by well-meaning and dedicated individuals all imbued with a tremendous enthusiasm, an unwavering faith in the powers of Logo to refresh learning other computer languages could not reach, and an antipathy towards any who showed doubt or tried to reach the same ends by other means. I have attended several successive BLUG conferences and watched as the faithful fell back through a series of defensive positions. First, all would be well when we got a Logo running on a British machine. Next, we could only expect results when there was a machine in the classroom all the time. Then we were told that it was only when every classroom in the school was equipped with a micro that Logo would definitely take off. Finally, I heard the view advanced that we could only really expect definite progress after schools had several machines in every class dedicated solely to Logo and the staff of schools were wholly dedicated to Logo and sufficient time had passed for an entire school cohort to have passed from 5 to 11. During the years that these views were propounded, BLUG grew in stature

and membership – and then waned. Today it is a pale shadow of itself.

More formal support for Logo came from the LEAs and national bodies such as MEP. Invariably this support was simply not sufficient to address the size of the task. As a result we can point to a number of interesting but isolated projects (the Walsall Logo Project, the Chiltern Logo Project, the PLUM Project etc.), plus a larger number of generalised Logo INSET activities held across the country. These all served to heighten awareness and whetten interest. They were never enough to produce that slow but sure growth in teachers' confidence and competence which is so necessary if effective change is to take place.

It is also worrying that the various versions of Logo which were made available proved too "difficult" for many teachers to handle. It's not simply that they lacked power, rather that you were constrained in the ways in which you could do things. You seemed to need different levels of ability in order to use sound, graphics and text. Children's early enthusiasm was blunted by encountering hidden stumbling blocks and teachers clung to shallow projects, rightly fearing that anything more ambitious would only invite failure.

So, what's to be done? I don't think we can expect the floodgates to open and resources and training to appear in limitless quantities. But new generations of machines are appearing in our schools and perhaps we should take the opportunity to take stock of what we really need to achieve success over the next decade.

First, we need versions of Logo which recognise the differing interests of children and allow them to pursue projects which do not depend simply on turtle graphics. Next these versions will need proper support materials, which help both teachers and pupils manage their learning. Finally, there need to be well established networks which act as channels through which children and teachers can support and encourage each other beyond the walls of their own particular school.

In thinking about the ways Logo should be able to present itself to children, we need to think about the ways in which children naturally seek to express their thoughts. Quite simply many young children find difficulty restricting themselves to one particular mode. Pictures need labels, writing needs ▶



drawings, both need verbal explanation or sound effects. Many young children find it difficult to produce a drawing or painting which stands on its own. They need to comment on it, to explain it, to articulate details which only exist in their own imagination.

Sometimes you will see a child engaged in producing a piece of writing accompanied by drawings and sketches which will only really be complete as an act of communication if accompanied by the body language and sound effects which their author considers necessary for full meaning to be obtained.

It would therefore seem that a Logo which permits the integration of sound, pictures, text and computer logic would fit rather well with how young children view communication. Particularly if decent support materials are available. How might such a Logo be used?

There seem to be two distinct possible types of use.

First, Logo must be used as a learning tool. This implies children having available to them Logo resources which are akin to other well established learning materials. What advantages might these have over present methods? Well, there is the obvious point that children will want to be able to tie words, sounds and pictures together. Real benefits are likely to come when support materials are available which:

- Children can explore at their own pace
- Encourage different pathways to be taken through the material
- Encourage a degree of interactivity
- Do not assume a linear approach
- Enable individual difficulties to be catered for
- Ease the difficulties of recording usage and progress

Second, Logo could be used by primary children as a communication tool. It is arguable that if children were to use Logo as a way of making their thinking clear to others then:

- decisions would have to be taken as to the nature of the enterprise
- they would have needed to acquire and use research skills
- they would need to consider the most appropriate way of conveying their message
- they would need to work cooperatively
- they would have to use design skills
- there would be the need for some sort of reflection and evaluation of the processes they have gone through.

Of course, these two uses are just opposite ends of a continuum. In between we might expect children to contribute comments to some existing material or to work on extending existing ones.

Either way, there are a large number of challenges which need to be addressed if Logo is to retain a place in the primary classroom.

Perhaps the greatest challenge is the source of both a suitable Logo and the necessary support material. We already know that the production of resources is far from cheap. Satisfactory results only come when educationalists and those skilled in media such as television, radio and print come together to work cooperatively.

Next, the materials must be based upon some model of learning. And it is important that the support materials accord with the model of learning embraced by Logo.

All this is going to be expensive and where Logo supports existing learning opportunities we can expect it having to justify its use in terms of cost

effectiveness. Where Logo leads to new learning opportunities it will need to demonstrate that the benefits are real.

Another challenge which the use of Logo poses is that posed by the underlying skills involved. If we really believe that primary children's education should embrace Logo, we need to address the issues of skills acquisition and the development of concepts. Confidence and proficiency in the use of Logo will only come about if we as teachers have a clear idea of the hierarchy of skills involved, and a good idea of how best to introduce them to children.

Finally, there is the challenge of teacher professional development. We should by now have learned from our experience of introducing any change in the primary classroom. Teacher confidence is all important, and it must be found on a firm base of knowledge and wisdom. This in turn can not be expected to appear by fiat or by exhortation however charismatic. It can only be achieved through a school's well thought out and supported policy of teacher development. Only then will the use of Logo be set in the proper educational context, the organisational and classroom issues particular to the institution be resolved. The absence of proper in-service support will produce all the ills we have seen bedevil the introduction of Logo in the previous decade – early promise, overblown claims, patchy implementation, teachers flitting from one quick fix to another, an absence of progression and a proliferation of floor turtles sitting forlornly in cupboards.

The promise of Logo and its potential contribution to education is simply too great for us to permit this to happen. ▼



LogoWriter – the way forward

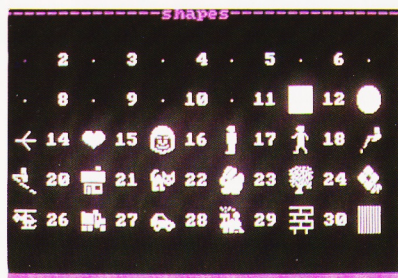
LOGOWRITER



The improvement in computer power has offered the opportunity for Logo to fulfil its original promise. LogoWriter, based on the research and development of Seymour Papert and his company LCSI, aims to overcome the original problems. GO looks at its features.

By aiming at ease of operation and adding wordprocessing features, LogoWriter offers a more congenial and educationally more valuable programming environment than its predecessors.

People familiar with the Logotron Logo will readily recognise many of LogoWriter's features. Logotron Logo used to be promoted as "LCSI Standard Logotron Logo". Like many other Logos around the world it adopted LCSI primitives and structures as a standard. Apart from some of the more esoteric mathematical features, the Logo user will find all the conventional aspects of the language available in LogoWriter.



The Turtles can be changed to a multitude of shapes.

LogoWriter is presented like a school exercise book: All the action takes place on one side of the 'paper', at the bottom of which is the command centre where instructions are written; on the 'flip' side of the 'paper' procedures and notes can be recorded.

The first hint of similarity between LogoWriter and a wordprocessor is the ability to scroll up and down the command centre. Instead of moving about a page, viewing and adjusting text, you can do the same to your Logo program. One way of utilising this feature is to develop a procedure in the command centre, it's then a simple task to use wordprocessing style features like cut, copy, paste etc. to store and name the procedure on the flip side. Other wordprocessing facilities like search and replace are also available to simplify the programming process.

LogoWriter's wordprocessing capability is not limited to streamlining program writing. It is educationally significant in several ways:

- Text and graphics can be mixed (without using cumbersome labelling).
- Text can be printed on the screen in complete blocks and not just a line at a time.

■ Text can also be written directly on the screen as per normal wordprocessing.

■ Text is programmable. Cut, paste, search, replace – all the wordprocessing features – can be incorporated into the procedures. This Papert calls 'dynamic text'.



The rhyme 'Jack and Jill' can be printed word-by-word on the screen as the nursery tune is played. LogoWriter can then be programmed to search the text for the verbs; when the correct word is found LogoWriter can then run a procedure to animate the story. For example "... Jill came **Tumbling** after ..." will cause the character to fall down the hill. Creating Turtle shapes like Jack is another very user friendly feature of the software.

Dynamic text is to language what turtle graphics is to mathematics. The combination creates a powerful language and mathematical environment. This provides the child with the means to develop projects and reports with writing, labelling and graphics that can be animated. Stories can be created that follow pathways determined by the reader.

To support LogoWriter in the classroom, LCSI have developed resource material rooted in the same philosophy of problem solving, but providing a structure for the student which allows them to explore the environment without much teacher intervention. Through practical activities it introduces the child to the capability of LogoWriter. For teacher's unfamiliar with LogoWriter the material provides an invaluable resource at less than the cost of in-service training.

LogoWriter allows LEAs and schools to have a standard language not dependent on the type of machine being used. It is available for the Nimbus 286 and the 186

(under emulation – emulator provided free), the Apple range and the Archimedes 3000 under emulation. It can also be accessed through Windows 3.

As the complete Logo environment, LogoWriter fulfils the expectations of Logo that were first inspired by "Mindstorms" back in the early 1980s.



A full set of resource material is provided to support LogoWriter's use in the classroom.



SCRAPBOOKS, TOOLS AND ADDITIONS



Mike Doyle, who has used LogoWriter extensively and is chairperson of BLUG, explains how LogoWriter can be extended.

Scrapbooks and tools

As soon as you use LogoWriter you find that it is easier to work with than most software. This is because LogoWriter is based around the metaphor of a page – a sheet of paper. Each page you name is saved and appears on the contents page. This collection of pages is known, in LogoWriter parlance, as the scrapbook. A scrapbook disk need not have the LogoWriter program on it, just a collection of pages. Children may be given their own scrapbook disk to keep their work on.

Logo, as you know, is a language. The procedures children write are not just exercises but extensions to the language – new words. Mostly these are only of interest to the particular child; but sometimes a collection of procedures can have wider uses. For instance, the LogoWriter page **Wordtool** supplied with the LogoWriter disk contains nine word processing procedures. These include **changeall**; which replaces every occurrence of a word ie. it is an extension of the primitive **replace**.

Obviously you don't want to mess up this special page when you use the procedures on it, so LogoWriter lets you add these tools "invisibly" to the page you are working on using **gettools** "wordtool". You can make any page of procedures into tools using this command; but it is helpful to put the word "tool" into the pagename. A scrapbook disk for a particular project might have a set of tools on it, eg. the LogoWriter primary scrapbook disk has a "one key Logo" toolkit called **Kidtool** on it.

These are a number of professionally designed tool sets available for LogoWriter. **Graphtools** help in drawing pictogram, bar- and pie charts in LogoWriter projects; **Language Arts tools** are useful for literacy work. Two toolkits developed recently in America are: **The Special Needs tools**, which give access to LogoWriter for switch users and provide a number of "readymade" graphics; and the **Hypermedia tools** which are a sophisticated way of creating and looking through linked pages.

Additions

Toolkits are a good way of extending Logo for yourself, but there are times when this is not possible. For instance, where a new piece of hardware is introduced. There are three major extensions of this sort.

LogoExpress is a version of LogoWriter

which has been designed for communications. New primitives have been developed to control a modem (a gadget for connecting a computer to a telephone line) and toolkits developed for sending electronic mail, running bulletin boards, and sending and receiving LogoWriter pages and pictures. You can also send messages between computers in the same school using a serial connection between them. It is a separate product.

LogoWriterROBOTICS is a development of Technical Control Logo. It adds the primitives needed to control the LEGO Interface A and is designed to work with LEGO Dacta kit 9700.

LogoWriter/Concept adds the primitives needed to work with the Concept keyboard. By merging this extension with LogoWriter or LogoWriterROBOTICS you can assign words to Concept keyboard keys as you go along, eliminating the need for an editing program. So, you can create overlays as "control panels" for, or records of, your projects.

LogoWriter Classroom Packs: Economical INSET?

Introducing a new element to the school curriculum is not easy. The potential for misconception is quite high. This has been particularly true for Logo where new technology is used to introduce new subject matter through a new language.

Teachers who have bought Logo in the past will have received a technical manual with it; and perhaps a booklet of little projects. Many will have found this "documentation" daunting; and even after the local IT team's LOGO course may not be sure what Logo, or a Turtle, really is. Teachers need the means of providing "ongoing classroom based training" for themselves – some painless way of learning alongside the children.

Seymour Papert and LCSi understand this need. They know that learning is an active enterprise. Teachers, no less than children, need time to learn in mind-sized bites. Like us, they know that learning in context – within a project – is best. So they have made activity cards which the children can use "out of the box". These they accompany with teacher's notes (and technical guide for later reference).

We who use Logo are very fortunate. Logo, like the computers it runs on, is international. Children all over the world

will be learning to use Logo in very much the same way, and at very similar ages. So, though Brigitte writes "avance", Kurt "vorwärts" and Juan "adelante", they will all, like David, be telling the turtle to go forward. So, we can safely go to the "horses mouth" for our training. David's teacher will know that all four children – and her European colleagues – may well be using the same materials to get them started.

Pack	Keystage			
	1	2	3	4
Primary Package	✓	✓		
Intermediate Package		✓	✓	
Secondary Package			✓	✓

What, then, do these classroom packs consist of? Well, there are three: One for primary, one for middle school and one for secondary. Each has been designed to introduce Logo ideas in "mind-sized bites" appropriate to the children's development. All the sets have two common aims:

1. To provide initial tuition and starter ideas for projects, and
2. to make reference information available in an understandable fashion.

Let's look at the Primary set first. There, in the box, is a lovely big poster showing where the keys are on the keyboard. Then there are four sets of cards, colour coded blue, orange, green and red. The blue cards introduce the basics of LogoWriter one step at a time. Because young children don't know their way around the keyboard they use the "one-key Logo" tools "kidtool" to start with. So, children just press the "F" key and the turtle moves forward a little – little bites for little minds. Other aspects are first introduced manually using the special LogoWriter keys. By the time the children progress to the orange cards they will have learned all the basic Logo words. This second set of cards "Turtle Fun" introduces turtle graphics and the principles of procedures. The green set sums this all up with open ended projects where the children can exercise their new skills. But children need more than activity cards. They need to learn to find out how to do things themselves. Here the red cards fit in. Instead of an impenetrable technical manual, there are 14 "How To" cards which explain, largely pictorially, how to carry out LogoWriter operations learned at this level.



The Intermediate Set is more sophisticated. Six booklets form the basis, with a range of activity cards associated with each one. For older children with better reading and computer skills the bites are bigger. Turtle geometry and turtle graphics are fully developed. The full LogoWriter word-processing facilities are explored. Sophisticated ideas such as "hot key" keyboard events and the use of a "joystick" on the games port are introduced. Also introduced is the powerful idea of recursion. Again, the "manual" is in the form of "How To" cards – this time with explanations.

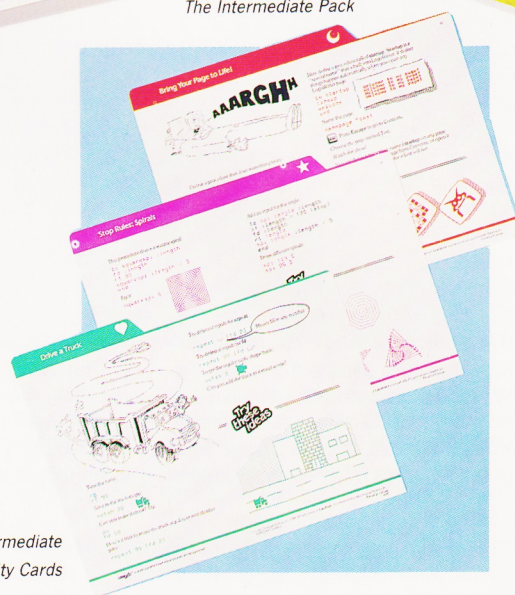
As you might expect, the Secondary Set is based around pupil books. There are six in all, starting with "Welcome to LogoWriter" which introduces the basics and running through to "Adventures" in which pupils write a complex adventure game. Working though these books will provide any youngster with all the computer language skills needed for constructing computer models of systems demanded by the technology national curriculum. For instance, it is a relatively simple matter to write a LogoWriter project for recording, printing and issuing parking permits for the school car-park. Even at secondary level, however, pupils are not faced with the technical manual. They have a How To book and a Quick Reference guide to the vocabulary.

My sub-title for this piece was "Economical INSET?" Why? Let me tell you. A boxed set of classroom materials may seem quite expensive, but what about a one-day INSET course? Supply cover alone will cost nearly £100. Now, what would you bring back that could be used straight away in the classroom? How well might the advisory teacher know his or her stuff? Now, think carefully about the economics of a classroom materials set which is, in many ways, a distance learning course from the international experts. LCSi materials will introduce you and the children to this new curricular area at a level and pace appropriate to both of you; will enable you to learn looking over children's shoulders; and can be used year after year. Isn't this economical INSET and from the foremost practitioners in the field?

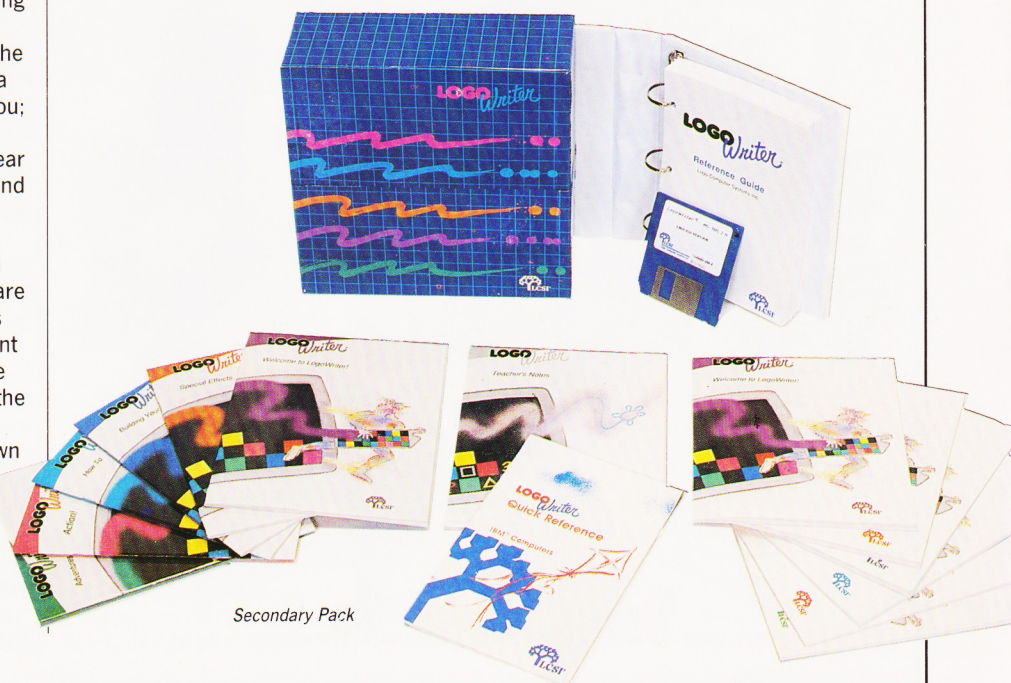
Logo is an important aspect of IT in education. LCSi's classroom materials are "horses mouth" stuff – not Loamshire's advisory teachers' best efforts. You want you and your children to get it right the first time. You want the right stuff, not the cheap and questionable. Once we are skilled, we can go on to develop our own ideas, like, "Why not use an overlay keyboard instead of one-key Logo?". Now where is that Concept keyboard extension to . . . ? ▼



The Intermediate Pack




Examples of Intermediate Activity Cards



Secondary Pack



USING LOGOWRITER IN A PRIMARY CLASSROOM

 Ken Hedley, Headteacher at Lamplugh School, Frizington has been using Logo for many years. He first started with the Atari Logo in the early 1980s which he felt was excellent considering the cost and the computers available at the time. He has recently upgraded to LogoWriter, here he explains why.

The reasons I chose LogoWriter is that:

1. It is a Logo that is available for MSDOS computers.

2. It is a "microworld" implementation of Logo and not confined to turtle geometry and list processing as some are. The creation of static and dynamic scenes really motivates the children. They feel they are creating something special.

The project approach works exceptionally well provided the users can read the booklets and cards. Both are self explanatory. The booklet approach is reminiscent of "Logo Challenge", an early turtle graphics program for BBC computers. Commands, grammar etc. are introduced gradually allowing the user to become familiar with them. When they feel confident in the skills they have acquired, they create their own projects. This is a complete change to the way we worked in the past where the pupils defined their projects. If they encountered problems I was needed to help solve what were in reality, gaps in their knowledge of

Logo. This resulted in some of the solutions to pupils projects being heavily influenced by me; leaving the question to be asked – were they still the children's solutions?

The advantages of the project approach are:

1. Teacher interference in the children's projects is minimised.
2. Pupils progress at their own pace.
3. Pupils are independent learners.
4. Teachers do not need to be expert as the children are working within previous experience.

I can honestly say that I have spent far less time with the children using LogoWriter than in the past with other versions of Logo/turtle graphics.

Two welcome features of LogoWriter are:

1. Comprehensive help messages. Or to put it another way – if you think LogoWriter's messages are poor, try some of the other versions of Logo.
2. An inbuilt word processor allowing

messages or longer passages to be displayed in reasonable style. This was not possible with the versions of Logo I have used in the past.

I must stress that I am not an expert in the use of Logo. To me it is a tool to enrich the children's experiences. My experiences with LogoWriter to date have all been good, you suddenly become aware of useful features, (eg. when editing a procedure the cursor is where you left it in the procedure after the last alteration). These little features go to show what thought went into designing the program. Before writing this I asked the children in my class how they found LogoWriter compared to Atari Logo and they thought it far better. The children must have the last word since they are the users – it really doesn't matter what I think.

Old Church C.E. Primary School, Darlaston is highly developed in its use of computers and modern educational software, and finds that LogoWriter has a significant part to play. Paul Westley explains their philosophy and approach.

For all of us involved in education, the present times are characterised by increasing pressures, change and uncertainty.

It is against this kind of backdrop that mention of computers and IT can cause consternation amongst those of us in the job of educating young people. It is only when staff believe in the use of the computer as an aid to the learning process of those in their care, that the potential of the computer, and in particular Logo, can be fully realised. Perhaps this small article will go some way towards encouraging those of you already under continuing pressures to see how the computer and particularly LogoWriter, can be integrated into the school day.

At the outset it is important to give you an idea of the school's philosophy of the use of computers and their use across the 3-11 age range.

The philosophy of the school has been to encompass the use of the computer across the curriculum in a problem-solving approach; involving open applications, where the child is the thinker and the computer is used as an aid to thinking.

The computer is seen as a vital part of our approach to the implementation of the National Curriculum.

For example:
The computer plays an important part in



TECHNOLOGY FOR EDUCATION

developing the exploration of science and technology in the following areas:

- Information handling
- Manipulation of text
- Simulation of events not possible to experience first hand
- Control
- Manipulation of numbers

The uses of databases in science should be concerned with the information collected by children through observation and investigation. They should use it as an analytical tool so that hypotheses can be proposed and further tested.

Databases allow rapid interrogation procedures, enabling children to find out what is relevant to them without the distraction of unnecessary information being presented. They are able to produce graphs, charts and scattergrams leaving pupils free to concentrate on the analysis of the data, thus making correlations, drawing inferences and proposing hypotheses.

Logo is used extensively throughout the school. Starting with a floor robot in the Nursery, children progress to the use of the floor turtle in the foundation class. By Year Two most children are happy to use the screen turtle and manipulate their work in the art package such as Paint Spa.

Groups of top infant children have been introduced to LogoWriter using turtle graphics and word processing. In Years Three to Six the children, usually organised in groups, work using a problem-solving approach with their own projects. Sometimes their ideas are either based around teacher planned topic work or are self-generated projects. Pupil lead projects often appear to be more meaningful, pupils having a greater commitment to finding solutions. The growth in autonomy and experience has led to an increase in respect and appreciation of each others work.

The computer is used from Years One to Six as an aid to develop the child as a writer of different styles with the ability to target a given audience. The process of drafting work at the computer, analysing and re-drafting is encouraged from an early age with the use of a variety of word processors. Folio is preferred for the production of overlays for the concept keyboard while input from the keyboard is facilitated by Pendown and business type word processors. LogoWriter is used from top infants to Year Six.

Amstrad computers are also used by the older children for Desk Top Publishing. They collaborate to produce displays for topic and language work. At their disposal is a Logitech hand scanner allowing them to scan and manipulate images from books and photographs, then import them into their productions. Links with parents are established, pupils designing posters to communicate events that are taking place within the school and local

community. Parents are encouraged to work alongside pupils using a variety of applications from screen turtle to DTP.

We envisage the micro making a vital contribution to the Geography and History curriculum. Information handling packages and spreadsheets all should play a prominent role in the storage, interrogation and interpretation of data while Logo would provide concrete situations for the young in route planning and directions. Simulations could provide children with access to environments that would not otherwise be possible, examining issues such as rain forests, acid rain, endangered species and food cycles.

Children in Years Five and Six have had experience with Deluxe Paint. Trials led to

Church School, covering a variety of curriculum areas including mathematics, science and technology, language, and humanities using a problem-solving approach.

Junior children have been actively involved in redesigning the Nursery playground, an ideal opportunity to audit, measure, plan, design, communicate, express, using LogoWriter as an aid to the learning process.

Groups of children have been writing adventure stories, drafting and redrafting, sharing ideas of programming them into games for other children such as "Star Alien Attack" a game of choice in which the player either survives or is lost in space!



Star Alien Attack and Football Program

the school considering more powerful computers with higher resolution screens for the future. These machines fit very much into the philosophy of the school where the tedious and time consuming work is handled by a machine dedicated to the task while the creativity and thinking is done by the pupils. In this sort of context what about the LogoWriter package?

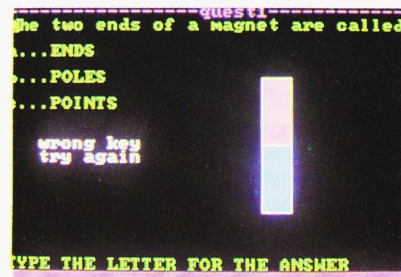
We use LogoWriter because:

Firstly, children and staff are at ease with it. It is a very easy package to use. To write, to draw, to save, to print and so on, are all simple operations. If a mistake is made (for example – the escape key is inadvertently pressed) the work on screen is automatically saved and heartbreak averted!

Secondly, it is a complete package giving the children the opportunity to think, solve problems, draw, illustrate, animate and write about projects in an interactive way.

There are a number of examples of the way LogoWriter has been used at Old

As part of a study of magnetism some Upper Juniors have designed and programmed a quiz using a variety of skills to test the knowledge and understanding of their peers!




A group of Upper Juniors during "Computer Club" taught the computer to draw a football match using the LogoWriter package.

Such examples illustrate the terrific potential that is offered using LogoWriter for those teachers willing to use Logo as part and parcel of the learning process.▼



LOGOWRITER ADVENTURES

 **Lindy Edwards, of T.A.S.I.S. England American School, Thorpe, Surrey, explains how she has developed the use of LogoWriter in her school.**

In the January issue of "GO" Seymour Papert, the inventor of Logo, talked about LogoWriter as combining, in the best way possible, wordprocessing and Logo, allowing students to do both at the same time. Most users of Logo are familiar with the writings of Papert and phrases such as "the child programs the computer and in doing so acquires a sense of mastery over a piece of the most modern and powerful technology and establishes an intimate contact with some of the deepest ideas of science" come to mind.

It is with these ideas in mind that I have worked with students in computing. Students themselves program the computers, with teacher guidance, not intervention, and so acquire mastery of this technology.

At T.A.S.I.S., children from the age of 7 to 11 have explored LogoWriter in the computer rooms, creating shapes and patterns; using the different tones to create music and exploring all the above in colour. Usually the students, working in pairs so that they can interact with their ideas, have chosen their own projects to work on. Students who need direction are given it, but it is the ideas initiated from the students that become the program.

LogoWriter as a graphics program is wonderful, we have created books for each student at the end of the term with a collection of favourite programs that students have chosen. Each student is able to contribute about three programs. The students treasure these as they can see what others have done.

Today, as students acquire mastery of the computer, LogoWriter as Papert points out, can break down the division between graphics, word processing and programming. This has happened at T.A.S.I.S!

Recently the 5th Graders (10/11 year olds), after being re-introduced to LogoWriter (creating shapes and refreshing their memories on the different commands) started writing their own "Choose-your-own adventure" stories.

As I was excited about the prospect of the students writing interactive stories with graphics, I decided it was necessary to introduce the idea to them in a way that would excite them, too.

A demonstration "Choose your own space adventure" was written on the

computer, similar to that found in the LogoWriter Secondary Series book "Special Effects". Before running the program we talked about flow charts and together made flow charts for activities that they were familiar with (eg. getting up in the morning and the activities and choices involved). I then outlined the flowchart for the story.

Gathering around the computer, we read the story, complete with coloured graphics. Excitement radiated from the group at this first session and has continued. The students were interested in not just viewing one path of the story but going back and viewing the path they hadn't selected. After seeing all aspects of the story, they began creating their own flow charts.

During this session and for some students, one or two additional sessions, computers weren't used as the students drew their flow chart for their own planned story. This was an interesting project in itself as they realised the complexity of their thoughts and tried to draw paths that had choices for the reader to make. The students found that just as their thoughts flowed from one step to the next, so the story flowed along the path they had created.

When flowcharts were completed they began to transfer their stories onto the LogoWriter page. Some named several new pages before starting to work and others worked page by page. Over the different sessions most students needed

to have their flow chart at hand. Although each student was encouraged to write her/his own story, many worked in pairs – helping each other, sharing ideas and improving each others' stories.

It is only seven sessions later and as the stories are beginning to take shape some observations can be made.

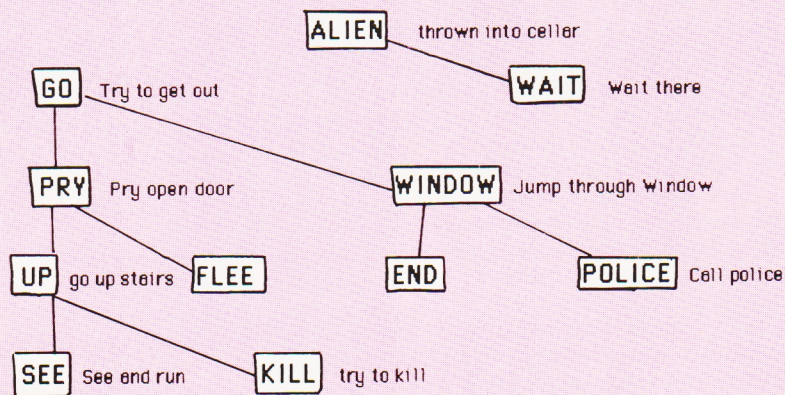
1. With graphics being part of a larger project, there is a different purpose in the creation of graphics than earlier LogoWriter exercises – the students are tailoring their graphics to the story. The students create shapes on the shapes page more than they had in the past to fit their program. They increasingly use movement as their persons, guns etc. need to move across the screen.

2. Their understanding of the whole concept of programming seems more real than it had before as they use startup procedures on the pages. The computer won't acknowledge some of their commands and they have to correct them to be able to move to the next page.

3. The concept of 4 turtles moving is being used by many students as they require a variety of shapes on the screen. This is a difficult concept when 4 shapes are being complexly fitted together and then required to move as a whole.

4. Some students, as they work, find that some of the paths and steps they had initially planned, they will not use. One particular student planned a story that was following everyday tasks: getting up, having breakfast, doing piano practice etc. Her flow chart showed the steps and choices for the reader to make "do you want to have your breakfast or do your practice?" However after about 5 sessions of preparing the flowchart and starting to write the pages, she changed her story around by first changing her flowchart. She commenced in the same way but added drama to the story as the girl fell down stairs. When asked why she changed it, she answered, "It was boring. I wanted to make it more exciting." This process of

Student's Flowchart:



"Mindstorms: Children, Computers and Powerful Ideas" page 5.



writing is a continuing learning and creating process. As the story path gets changed, endings get altered and I am sure more changes will come before the product is finished.

One student, with a program requiring a person to run upstairs, used four turtle shapes to create a whole person. These he placed at the bottom of a set of stairs. As

he worked he had to keep changing the shapes as he wanted them to become more life-like. He then found that his person was out of size with the stairs, so he made the staircase small. At this point in his story he is trying to turn each shape to the same direction so he can proceed to walk the man up the stairs. He plans to add music – but this is a little way off yet.

The students share their successes and failures – laughter broke out as the man, when told to walk, headed in four different directions!

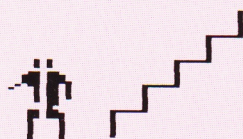
The three classes are only about half way through completing these stories. There is a deadline, the evening at the end of May when students present their published stories to parents at an Author's festival. We will use several computers on this evening and have parents choose the adventures.

Before this climax is reached, the students have further graphics to create, music to add and proof reading to be done as they read and run each others stories.


For graphics alone, using LogoWriter is worthwhile; the children learn programming and that they CAN program the computer. However, using LogoWriter where word processing and graphics are combined gives the students a dynamic power to express themselves and abundant enjoyment as they master the computer. ▼

Page called "GO", where the student tries to create a man with four turtles.

You go up the cellar stairs and push the door it doesn't open. To pry the door open type PRY, to climb through the window type WINDOW.



TURTLE POWER

 Valiant Technology's Managing Director, Dave Catlin, has been involved with Logo since 1983. As the designer of the Valiant Turtle and Roamer he has a unique insight into the contribution robots can make to education.

Papert's concept "Children should program computers, not computers program children," always struck a chord with me. The whole process of setting your own targets and learning through exploration I considered as vital skills in my engineering and business career. I took no convincing that because the Logo approach epitomised the way I had survived in the rapidly developing world of technology, it had a significant contribution to make to the education of children.

What also impressed me was the concept of the floor turtle. It is interesting to watch people animate their bodies as they direct a stranger left and right through the streets of their town; or numerous times when faced with a mechanical puzzle that was proving beyond my perceptive capabilities I would pick it up and fiddle for an answer. There seemed a mystical link between the concrete puzzle pieces and an abstract problem. The floor turtle expressed the same link: the concrete reality of the turtle with its enigmatic relationship to "body geometry" and the abstract worlds of mathematics, geometry and computers. All this I read into Papert's succinct phrase, "The turtle is an object to think with".

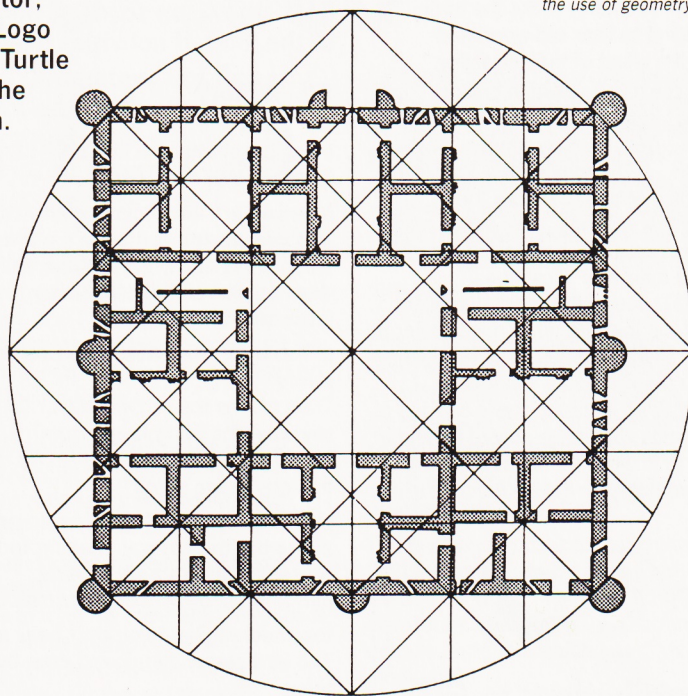
As an engineer who had reached a reasonable proficiency in mathematics, I

found many people's attitude to the subject odd. The popularist view seemed to be that it was dry, logical and boring. Yet to me the subject was full of excitement and adventure. Whole worlds could be described with an elegance and precision that rivalled the emotions expressed by artists in their painting or poetry. As I grew older I was not surprised

to experience the splendour of standing in an architectural marvel like the Pantheon, constructed with a geometric precision; or to enjoy the symmetry and regularity of classical Greek sculpture or appreciate how the artist, painting from emotion, evoked the Golden Rectangle rule with such algebraic nicety.

I guess what I am trying to say is that ►

A feeling of balance can be achieved in buildings through the use of geometry



Qasr al-Kharānah, Jordan, 1st/7th century. Plan of upper floor.



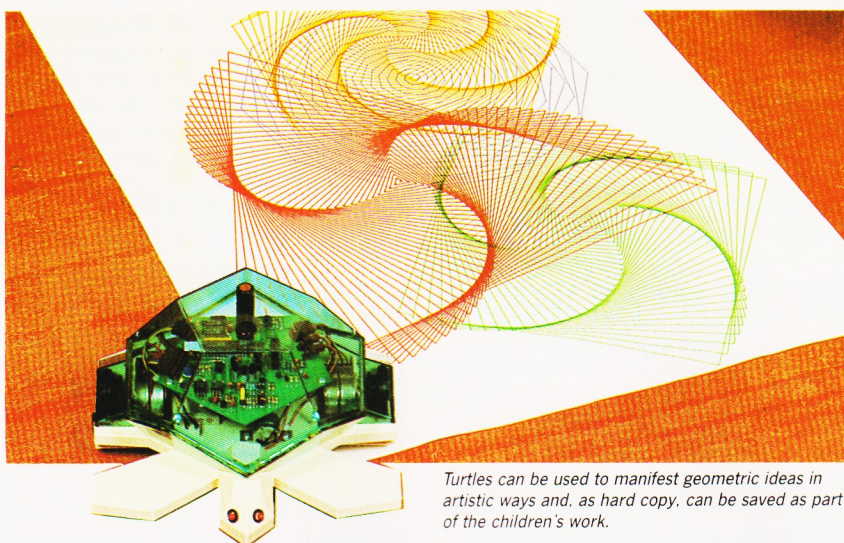
when mathematics is expressed, not in mumbo-jumbo formulae, but as tangible manifestations, it never fails to excite. The floor turtle works on that level, it provides a concrete and potentially artistic expression of geometric ideas.

Geometry describes space: the floor turtle explores space with a reality the computer cannot (often children are confused that forward on the computer screen can mean up). Children walk the route describing what they are doing and programming the turtle to follow, thus the body geometry becomes a means of problem-solving and exploring mathematical ideas in a way far more obvious and meaningful to the young pupil.

The Roamer can be used to explore space in a similar way to the floor turtle, but it should not be considered a cheap turtle; they are not the same. The Roamer does not have the precision required by some turtle graphics activities, but more importantly the turtle is part of a computer world. The turtle is used to explore the computer and helps to put the computer in its place: it's a tool we use – in this case to control the robot. This aspect is particularly successful with disabled children. They gain tremendous satisfaction when they make the turtle move, adding to their self-worth and reducing the effect of their disability.

The turtle can be used to explore "non-arithmetic" ideas of Maths. For example, perimeter, area, nets, symmetry, scale, proportion . . . In many of these cases the turtle adds a reality: it draws "real" perimeters, surrounds "real" areas and nets, drawn on card, can be cut out and made into their real 3D shape.

Probably one of the most significant contributions that the turtle has to offer is that children love robots. Their fascination motivates their learning experience. I always recall an incident where a group of nine year olds voluntarily stayed behind at playtime to finish their Maths lesson with turtle. It would never have happened in my day! ▼



Turtles can be used to manifest geometric ideas in artistic ways and, as hard copy, can be saved as part of the children's work.

LOGOWRITER IN AMERICAN SCHOOLS

As the world standard Logo, LogoWriter is used extensively in American schools. Here, Alain Tougas of LCSi gives an example of the kind of activities that are being developed there.

Add-a-Story

The game goes like this:
Using LogoWriter the first player types the first few lines of a story:

It was a dark and stormy night. The wind was whispering someone's name
When done, she presses **Control-X**. This erases a part of the text, leaving just a few last words on the screen:

t. The wind was whispering someone's name

Then comes the second player (he didn't see what the first player wrote). After reading the few words left on the screen, he adds to the story:

t. The wind was whispering someone's name but the cat was making too much noise. I couldn't hear a thing.
and finishes by pressing **Control-X**:

too much noise. I couldn't hear a thing.
The next player comes and does the same thing:

too much noise. I couldn't hear a thing. The disco was definitely too loud for me. I went out to get some air.
and presses **Control-X**:

I went out to get some air.
The next player goes on:

I went out to get some air. My tires were flat and I still had a long way to go.
When the last player is finished, he or she presses **Control-P** to rebuild the whole text as it had been typed in by all the writers.

It was a dark and stormy night. The wind was whispering someone's name but the cat was making too much noise. I couldn't hear a thing. The disco was definitely too loud for me. I went out to get some air. My tires were flat and I still had a long way to go.

In order to perform the magic, get a new page and define the following procedure on the flip side:

```
to start up
make "text [ ]
when "x [cu select top
    make "text 1put selected :text
    cut bottom]
when "p [top insert :text top]
end
```

Flip to the front side. In the command center, type **startup**. The magic keys are now ready. Go up on the page and begin the story . . .

The result can be funny! Be imaginative! ▼

Contributions to GO

If you want to contribute to the GO magazine, send your manuscript to Valiant Technology at the address below.



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