TEACHER PUPIL INTERACTION
IN A
LOGO SETTING
AN EXPLORATORY STUDY

by

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Abstract

The purpose of this research is to determine the nature of the teacher interactions with students in a Logo setting. The interactions of a teacher and two pupils are analysed. Two sixth grade students were taught Logo for a three week period by one teacher, completeing several graphic projects and achieving competence in computer programming. The interactions between the teacher and the students were recorded, transcribed and then examined using a categorization system. The teacher interaction categorization system illustrated what kinds of interactions on the part of the teacher, made up a successful Logo experience for the students.

PRECIS

Ce projet de recherche avait pour but de déterminer l'interaction entre le professeur et l'élève, dans un environment Logo. Sur une période de trois semaines, le professeur a enseigné le système Logo à deux élèves de sixième année; accentuant plusieurs projets graphiques et acquérant une compétance en programmation. Les interactions entre le professeur et les élèves ont été enregistrées en vidéocassette, transcrites puis analysées d'après un système de classification schématique. Le système de classification illustrait bien les différentes formes d'interactions du professeur qui promeuvent une expérience Logo, pour les élèves.

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CHAPTER 1

INTRODUCTION

While many schools are still trying to find ways
to aquire computers, others are engaged in great
debates and efforts to determine how to actually use
them in a school setting. Should they be used as
"teaching machines" that present traditional material
in a new way, or as tools that may open new ways to
teach new ideas and concepts?

One of the most popular applications of the micro
computer in the elementary school system is in the
teaching of Logo. Logo is a programming language that
was developed to enable children to use and control
the computer from a very early age, but it has become
apparent that it is more than just a programming
language. Students seem to be able to learn both
programming and mathematical concepts in geometry,
procedural thinking, problem-solving, spatial
awareness, quantitative value of numbers and more, all
within a Logo framework. Logo teachers in elementary
schools have felt that there is learning going on in a
Logo classroom on many different levels. It is in part
this feeling that has made Logo as widely used a
language as it has now become.

However, what is it that makes a successful Logo experience? Many have suggested that discovery learning is synonymous with Logo and should be the method used for successfully teaching Logo. Is this so? What is the teacher's role within such a framework? The purpose of this research is to determine the nature of the teacher's interactions with students in a Logo setting. A descriptive exploratory design was chosen as this would allow for close examination of the details of such interactions. This is described in chapter 3. The course of one teacher and 2 students is recorded during an in depth summer Logo course. While the complete protocols are given in appendix A, this thesis concentrates on one aspect, namely the interactions between the teacher and students. The main objective is to establish a classification system for these interactions which is described in chapter 4.

CHAPTER 2

LITERATURE REVIEW

Logo

Much of the research on Logo has been either
anecdotal reports or the analysis of a child's
problem-solving in a Logo environment (Chait,1978;
Jewson & Pea, 1982; Maniatis, 1983). Very few studies
have looked at what role the teacher plays in
supporting a Logo environment. One of the most
confused issues in the Logo debate is that of what is
meant by the term "discovery learning". Seymour Papert
(1980), the creator of Logo, stresses that processes
that take place without deliberate and organized
teaching should be the models of successful learning.
In his book Mindstorms(1980) he suggests that Logo is
designed to function in a setting that supports
Piagetian learning.

> I take from Piaget a model of
> children as builders of their own
> intellectual structures. Children seem
> to be inately gifted learners, acquiring
> long before they go to school a vast
> quantity of knowledge by a process I
> call Piagetian learning or learning
> without being taught.
> (Papert, 1980, p.7)

Within the general framework of learning how to
program a computer using Logo, children also learn
about the functioning of procedural knowledge. In

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debugging program errors, they learn to generate transformations of the structure of those programs. In learning to systematically isolate and correct their errors they are in effect debugging their own thought processes. It is suggested that this in turn leads the child to develop a general heuristic for organizing thoughts. Papert calls these general heuristics "powerful ideas" or "mathematic" principles. He links these heuristics, developed through writing a program for the turtle to Polya's (1957) four stages of problem solving, which are:

1) understanding the problem

2) devising a plan

3) carrying out the plan

4) looking back on the solution to see if it worked

> Some of the strategies used in turtle geometry are special cases of Polya's suggestion ... Such as : Can this problem be subdivided into simpler problems? Can this problem be related to a problem I already know how to solve? (Papert, 1980 p.64)

Logo Research

Such claims about the power of Logo have led to many studies of the effects of Logo on children(Shultz, McGilly, Pratt, Smith, 1984. Hillel, 1984). The best known of these are contained in the reports of the Bank Street College Logo studies (Pea & Kurland, 1984). The teaching model they used was based

on Papert's idea of learning without a curriculum. They claimed that the teaching approach used was discovery learning. Students were observed using Logo and were only aided when they asked for help from the classroom assistants, who were not trained teachers. No mention was made in the reports of whether the effects of the interaction of assistants and students were considered in the analyses that were done. The reports concluded that learning Logo with discovery-learning pedagogy as suggested by Papert (or interpreted by the Bank Street group) did not lead to generalizable cognitive benefits, and needed serious reexamination.

The basic assumption on the part of the Bankstreet group that the Logo instructional environment that Papert (1980) offers to educators is devoid of curriculum and that this environment is discovery learning pedagogy has led to great confusion. It should be noted that in another article Papert states that his approach does not mean that teaching or behavioral objectives are not necessary, rather that the relationship of teacher to student is one where the teacher provides the student with an environment where discoveries can be made(Papert 1980b). Papert(1980) even allows for the teacher to sit down with the student and say "Let me show you

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something." This does not fit the model of pure discovery learning at all. To dispell some of this confusion, discovery learning will be discussed —later in this chapter.

A teaching strategy that is more clearly stated and structured than the one advocated by Papert is that of Howe(1978). Howe tries to fit his teaching framework into a set of three developmental stages in learning to program in Logo:

1) product-oriented

2) style-conscious

3) creative problem-solving

These stages are closely tied to the teaching strategy of a series of Logo worksheets developed by Howe (Howe, O'Shea, & Plane, 1980). A worksheet consists of an explanation of purpose and a specimen procedure to be copied and run(stage 1). There are also exercises which require minor modifications of the given procedure(stage 2). Finally the student may further modify the procedure in order to use it in a new or different way(stage 3). It is not clearly stated whether these stages were observed before the worksheets were developed or afterwards. This brings into question whether stages may actually be a reflection of the teaching methodology. This structured and systemized approach to teaching Logo is

contradictory to that of learner as experimenter in a discovery learning environment. This approach is also in conflict with general findings about teaching. Becker and Gersten (1982) found that although direct instruction, concentrating on specific operations for accomplishing a task, produces immediate effects, it is not likely to create the higher level knowledge structures required for the flexible use of those operations. Howe does however point out that conclusive results about Logo's effects can only become apparent in a classroom situation over a long period of time.

What has not been addressed in the research on Logo to date are the pedagogical issues. How Logo was taught may well be the key variable affecting the outcomes of much of the Logo research, yet it was a factor that was poorly controlled if at all, and most often ignored completely in the methodology. Clearly —it is time this issue was looked at.

Discovery learning and teaching strategies

Negative findings about discovery-learning are not exclusive to Logo. One of the problems that is associated with the discovery method is that it is difficult to empirically substantiate claims about its

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effectiveness regardless of whether Logo is the subject or mathematics or history.

In a review of the theoretical ideas of Piaget and educational practice, Groen (1978) highlighted some of the problems with this approach. When tested in an experimental setting,

> frequently, adequate transfer of training does not occur. When it does occur, the discovery learning takes an extremely long time. However this does not prove that the Piagetian approach is wrong. Discovery learning is a compilation of techniques. The issue is which techniques and what kinds of tasks produce adequate transfer.
> (pg. 45)

Discovery learning has its philisophical roots in the writings of John Dewey. Its theoretic base is in the school of cognitive development. It is known under various names depending on who the researcher was.

Discovery learning assumes that children should be allowed to learn in in their own way so that their inner nature will not be suppressed. But because inner nature in children is often weak they need discipline in order to deal with frustration, deprivation and to achieve ego-strength (Biehler,1974). The teacher needs to structure the environment to facilitate the acquisition of such disipline.

Bruner (1966) introduced discovery learning as Rart of a theory of instruction.

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To instruct someone in a discipline is not a matter of getting him to commit results to mind. Rather it is to teach him to participate in the process that makes possible the establishment of knowledge. We teach a subject not to produce little living libraries on the subject, but rather to get a student to think mathematically for himself, to consider matters as an historian, to take part in the process of knowledge getting. Knowing is a process, not a product. (1966, pg.72)

He outlined a set of techniques that would help structure the lesson or environment:

1) Emphasize contrasts

2) Stimulate informed guessing by asking students to hypothesize

3) Encourage participation

4) Stimulate awareness

Bruner claimed that the discovery approach that emphasized structure made the subject matter more understandable, minimized forgetting, was more likely to lead to transfer and made it easier for the student to progress from elementary knowledge to advanced knowledge. He also suggested it was likely to increase a student's self-confidence and self-reliance.

Bigge (1971) introduced the concept of reflection level learning. He suggested that one way of encouraging discovery was for the teacher to allow the

students to make mistakes and then ask them to reflect on what went wrong.

Another common name for the discovery approach is inductive learning (Cronbach, in Shulman and Keislar,1966; Cronbach, 1977). He states that guided induction at selected places in the curriculum would be favorable. By guided he means;

> The student should be given considerable help in amassing relevant experience and organizing it so that he will reach a conclusion. (Cronbach, 1977, pg.544)

Cronbach suggests that it is important for the teacher to monitor the students to make sure that their rough generalizations become sound conclusions and on occasion the teacher may have to reword what students have concluded. Cronbach also believes that induction activity is not an all-purpose instructional method. It should be considered as a technique of teaching that is adapted by the teacher according to the needs within the course being taught. Criticism has been raised about research where the inductive approach was not guided properly(Cronbach, 1977).

Teacher roles and strategies

To get yet another view of a discovery curriculum one can look at the work of Hunkins (1972) where teacher interventions, specifically questioning

techniques, are crucial to the success of such a curriculum. Process learning (in reference to Discovery learning) is not an end in itself but a way to provide a better understanding of the content of the subject being dealt with, whether at the concept or generalization level. The use of heuristic questions that can direct the students' discovery or problem-solving approaches must be considered. Discovery does not mean that the students are left to discover on their own, rather that they assume much of the initiative for their own learning and the teacher acts as a guide, co-ordinator, research director, manager, and motivator. By using effective questioning techniques a teacher can aid the students in evolving their own questioning strategies. Hunkins feels that the active involvement of the student in asking the right kinds of questions is similar to the techniques of problem identification, experimentation, measurement, and conclusion, which comprise what is known as the scientific method. The teacher is the key to managing the educational content and experiences in order to shape the students toward such an end.

Hunkins linked his question types to the Taxonomy of Educational Objectives (Bloom et al; 1956). He suggests that given a working knowledge of the effective questioning strategies a teacher will be

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better equipped in a discovery learning situation. This is done by analysing the students' readiness, abilities, and needs in relation to the objectives of the lesson or situation. The question types are then generated and analysed for their potential effectiveness in meeting the objectives. This approach is not unlike Polyas(1957) four steps of problem-solving or the five steps for general problem-solving developed by D'Zurilla & Goldfried (1971) :

   1) Establishing a general orientation or set. Making sure the student has the necessary skills to be able to address the problem.

   2) Problem definition. Describing and defining the problem as clearly as possible in concrete terms.

   3) Generation of alternatives. Coming up with as many solutions as possible to the problem stating them in concrete terms and without evaluation.

   4) Decision making. Deciding on which of the solutions generated would be the most effective.

   5) Verification. Using the Test, Operate, Test, Exit model (T.O.T.E. Miller, 1960) the solution is verified for its effectiveness.

If the results are unsatisfactory then the cycle is re-engaged at whatever point necessary, i.e. selecting another solution, or generating new

solutions based on new information gained from the last verification, or redefining the problem.

These strategies have been successfully incorporated in various areas of research. For example in cognitive behavior modification (Meichenbaum, 1979) the individual is actively engaged in changing his/her behavior. Learning effective problem-solving strategies is a key component. In a study of students at risk for failure, problem-solving, coupled with a series of mnemonic logos and a variety of imaginary and real-life situations was taught. Results showed that the student's general problem-solving ability improved with this training (Stevens, & Phil, 1980).

The use of questions and problem-solving strategies in a learning situation offer the teacher a way of focusing and then dealing with learning and behavioral objectives.

Dwyer (1980) describes a human teacher in the computer age as important for clarifying, inspiring, guiding, and propelling the students in an atmosphere of trust, expectation, and recognition. He accents the importance of continually reassessing, recognizing and dealing with the distinction between "transmitting accumulated experience and transmitting models of that

experience which are not valid for the new learner."(pg. 91)

^Given the descriptions of teacher roles and strategies that are possible within a discovery learning environment it is clear that teacher interventions may play a key role in the success of that environment. Indeed this is what the research that has touched on the teacher effect in Logo seems to be indicating. The nearest references to this issue come from Higginson(1984) and Noss(1984), in papers presented at the LOGO 84 conference. Higginson stated that;

> It seems that the factors that most influence the benefits that children get from working with Logo are largely related to the teacher. Especially important are her educational philosophy, pedagogic style and level of understanding of Logo. In those cases where the teacher's views about the purpose and preferred procedures of education are congruent with those of Papert, Logo has proven to be a very powerful tool for the development of significant learning.(Higginson, 1984, pg.35)

Noss, in his research on children learning Logo programming, stated that it was not possible to generalize about the teacher interventions that were made. However there were instances when interventions were successful. They were when:

> 1) The child had already tried out a solution to a problem unsuccessfully;

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2) The child expressed (implicitly or explicitly) a need for more power;

3) The child needed just a nudge to- get started; perhaps a reminder of an idea the child is familiar with;

4) The new idea would be welcome by the child because it would connect with other ideas that the child was familiar with.

It was suggested that these interventions should be made as unobtrusively as possible, because the danger exists of teaching rather than allowing learning. The kinds of interventions that were found to be effective were:

1) Offering a short pre-written procedure which illustrated a new idea; it was important that the child could, if he/she wanted, look inside the procedure _to understand and modify it;

2) Reviewing a piece of work with a child in order to encourage him/her to modify it, generalize from it, or otherwise improve it;

3) Suggesting a challenge which may illustrate a particular idea, or may lead the child to the need for a particular idea;

4) Helping a child to plan a project - often one which relates to another classroom activity.

The role of the teacher in the discovery learning environment is important. It is not a passive role. The interactions between teacher and student are among the determinant factors in how well the students aquire the information needed to succeed at the given

task. This study is a preliminary look at those interactions.

Interaction Analysis

The research methodology in the area of teacher effectiveness usually includes three types of data;

1) measures of effectiveness based on pupil learning

2) measures of behavior based on systematic observation of classroom interaction

3) information about the teacher's intention

One of the ways to measure teacher behavior is to use Interaction Analysis. Teacher interactions with students have been looked at in many ways in many areas of educational research. In such research it is important to yield accurate and objective descriptions of the behaviors of the teacher being studied. The most effective way of doing this is through the use of predetermined categories which are applied to observations and are recorded as frequencies(Mealey, 1979). The most often used scheme is Flanders Interaction Analysis (Flanders; 1970). It uses ten different categories for classifying interactions:

1) accepts feelings

2) praises and encourages

3) accepts or uses ideas of students

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4) asks questions

5) lecturing

6) giving directions

7) criticizing or justifying authority

8) student-talk response

9) student-talk initiation

10) silence or confusion

The first seven are used to describe teacher interactions. Categories eight and nine are used for student interactions. In most studies the observer records the number of the category which best describes what is going on, every three seconds within a period ranging from 20 minutes to one hour. The tallies are then entered into a 10 X 10 matrix and then are converted to percentages.

Rosenshine(1971) cites 70 different studies, from grades 1 to 12, in various subjects, that used this framework. In some cases the categories were changed or others added to suit the needs of the studies (Flanders; 1970).

In a recent review of the literature on academic work(Doyle, 1983), it was indicated that the major portion of the teachers day was spent on classroom management. i.e. organizing the students into working units and then maintaining this structure. It was also

stated that 60 to 70 percent of classroom time was occupied by seatwork as in completion of assignments, homework checking, and test-taking.

To summarize, Logo has been taken up by many schools as the new thing to teach. However, there is little consensus about how to teach it. To date the research has done little to illustrate how Logo can be used to produce the results that Papert suggests. Given the realities of the working classroom it is clear that the teacher's role is an important one in the learning process in any subject area whether using a discovery or a traditional structured approach to teach it. It would seem that this is also true for the teaching of Logo. The basic approach in this study is to examine the protocols of the interactions of a teacher with two students during the course of learning Logo. The emphasis in this thesis is on the establishment of a classification system that could be applied to an elementary school setting and to Logo. This system will be described in the following chapter. It is used to help answer the question: What is the nature of the teacher's interactions with students in a Logo setting?

CHAPTER 3

METHOD

Subjects

Data were collected on one teacher, working with two students. The teacher was part of a group of 15 adults taking a McGill University summer course for teachers which used Logo as its main content. She was selected from the total group on a voluntary basis. The only prerequisite was having to be a practicing teacher.

It was observed by the group over the duration of the course that she was an excellent teacher who was very successful at her task of teaching her two students.

The two students that she was working with were randomly assigned to her from a group of thirty children taking part in a summer computer school run at the same location. The two were both male, twelve years of age, in grade six, and of average intelligence. None of the students in the program had previous experience with Logo.

Setting

The setting was a large open area in a suburban Montreal elementary school. Along two of the walls were 15 computers, 7 on one side and 8 on the other,

each on a large table with three chairs. The target teacher's computer was at the end of one row. In the middle of the room was a series of large tables and chairs arranged in a horseshoe.

Apparatus

Hardware

The computers used were Apple IIe with 128K memory and 80 column capability. The data collection computer was equipped to give a video feed (a type of dribble file) of what was on screen to a VHS video cassette recorder. A microphone was also set up and attached to the video recorder to record the conversation that accompanied the occurrences on the screen.

Software

All the computers were using Apple Logo (DOS 3.3 version).

Teacher Training Procedure

The format for the course was to follow a series of information handouts called "Turtle Talks" that sequence Logo commands and provide exercises requiring problem solving using Logo. The sequence is based on what needs a student usually has in learning Logo (i.e. learning about FD, BK, RT, and LT before dealing with REPEAT). These handouts were used

according to the needs of the class over the duration of the course.(see APPENDIX B)

The daily format of the course for the period of this study ran as follows;

8:30 - 9:45 Teachers and children working with Logo.

9:45 - 10:00 Break (children go to other activities for rest of morning)

10:00 - 11:00 Teacher's feedback session. Sharing with the group ideas that had or had not worked with the students. Planning for the next day's session.

11:00 - 12:00 'ntroduction of new commands in Logo. Teachers worked on their own Turtle Graphics project. During this period the instructor modeled a way of teaching Logo. This was done by encouraging the teachers to develop general problem solving strategies such as deductive reasoning, experimentation, generating a hypothesis based on what was given and then testing it.

10:00 - 12:00 Students would go to a Phys. Ed. or expressive movement class during this time (both of these programs had an

orientation that encouraged problem solving, the use of directionality and movement in space).Students would switch activities at 11:00.

The teachers had all been required to read Mindstorms prior to the beginning of the course. The first day consisted of introducing the teachers to the Apple computer and how to start up the Logo language. The concepts of SHOWTURTLE, FORWARD, BACK, LEFT, RIGHT, and CLEARSCREEN were explored as a group and then by each teacher at their own computer. The differences between traditional teaching and discovery learning were also discussed. There was great concern on the part of the teachers that they would not be able to teach the students anything because as teachers they did not know enough. The idea of the teacher as a model of a learner or as a partner in learning was discussed. The teachers were encouraged to explore the basic commands and concepts with their students much in the way that had been done with them.

The second day began by introducing each teacher to a pair of students that they would be working with for the next two and a half weeks. It was then the teachers' job to introduce Logo to them. By being only one day ahead of the students themselves, teaching in

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the traditional sense was very difficult and frustration was the result for those teachers who insisted on operating that way. The feedback sessions were used to deal with those kinds of problems.

Within a few days the anxieties lessened as the teachers became more knowledgeable in Logo (progressing in most cases, faster than the students).

The next chapter will describe how protocols were collected on 1 teacher and 2 students, and the classification system used to analyse the data.

CHAPTER 4

DATA COLLECTION

The interactions of the teacher and two students were recorded on the second, seventh, and second to last day of the program for the children. The recordings consisted of a videotaping of what was occurring on the screen as well as the accompanying dialogue. These tapes were then transcribed into written protocols for analysis. Screen commands were listed on the left side of the page and dialogue on the right. The teacher was coded as C:, and the two students as A: and B:.

Each day was split into episodes. An episode consisted of "a succinctly describable segment of behavior associated with attaining a goal" (Newell & Simon, 1972, pg. 84). An episode began when the transcripts indicated a change in the general direction of the students activities. (see Appendix A for complete transcripts).

Coding System

Once the three days had been transcribed the teacher comments were extracted from each. These were then classified according to a set of categories that were based on Hunkins, Flanders, and the principles of discovery learning. They are as follows;

INTERACTION CATEGORIES

1) <u>REINFORCING</u>   Praises, encourages, or acknowledges the student's efforts. Saying "good", "um hm", "alright" are included.

2) <u>CLARIFYING</u> Taking an idea that the student has presented and expanding or clarifying it. Not to be confused with 6.

3) <u>HEURISTIC QUESTION</u> Asking a question whose answer guides the student towards the possible solution of a problem. Provoking thought.

4) <u>OPEN QUESTION</u> Asking a question that requires thought to be answered but is not intended to lead the student.

5) <u>DIRECT QUESTION</u> Asking a question whose answer is direct, but not pertaining to a particular problem situation.

6) <u>LECTURING</u> Giving facts or opinions about the subject. Introducing new concepts or information.

7) <u>MANAGING</u> Statements that manage the behavior of the students.

8) <u>DIRECTING</u> Giving directions or commands that the students are expected to follow.

9) <u>STRUCTURING</u> Statements that help structure the student's work habits.

10) <u>PROBLEM DEFINING</u> Statements that help to define or point out a problem situation for the student. Providing clues but not answers.

Comments like ahm, well, mm, oh were not coded when they were used as mazes (verbal place holders)

The transcripts were then coded and analysed to determine which kinds of interactions were employed by

the teacher and to what degree. Dialogue that did not have to do with the classroom or Logo was not included. (e.g. a conversation about the McDonald's Massacre which had just taken place.)

One episode, which contained 30 teacher comments, was used to establish an inter-rater reliability of the categories. A teacher who was not in the summer program and who had no previous knowledge of the Teacher Interaction Categories was given the transcript and a sheet listing the 10 categories. She was asked to categorize the teacher's interactions. This coding was then compared to the researcher's coding of the same data. Of the 30 comment codings, 25 were in agreement, 5 were not. That is to say 83% of the codings were in agreement. This would indicate that the Teacher Interaction Categories are reliable descriptors of the teacher interactions.

The coded data were then tabulated into frequency counts for each category within each episode as well as totals for each category for each of the three days. These frequency counts were then converted to percents in order to provide a better picture for interpretation of the raw data. The resulting tables will follow in the next chapter.

TRANSCRIPT INTERPRETATION

In all of the transcripts the teacher is noted as
C: for Connie. A: and B: are the two students Ali and
Basje. The left hand column of the transcriptions is
the record of what was typed in at the keyboard,
similar to the recordings of a dribble file. However,
these entries are listed as they occurred in time,
beside the corresponding dialogue. Some entries may
therefore seem disjointed in instances where there was
long discussion between those entries. The notation
for the categories has been done using numbers. They
are listed in the 21st column of the line that
introduces the speaker.

CATEGORY SAMPLES

The following are examples from the transcripts of
each interaction category. For some examples they are
grouped together as this best illustrates how they
actually occurred.

1) REINFORCING

	A: I think we'll change that.
1	C :K
	B: Well no Ali because then it'd just be a little mountain.
1	C: You're right.

. (from D1.E2.)

2) CLARIFYING

2

(from D1.E2.)

3) HEURISTIC QUESTION

3

(from D1.E2.)

4) OPEN QUESTION

4

(from D1.E2.)

5) DIRECT QUESTION

2

2

B: like a little round
thing.

A: 2

C: 2 and you wanted to
make it

B: ah! REPEAT 4

B: hey that didn't go
in a complete square

A: it's not supposed to

B: oh ya

A: now we'll do a whole
square

C: how could you have
done it so it did
complete the little
square?

B: ya

A: I don't know

B: that was..

C: cause you made it go
around how many
times?

C: 2 and you wanted to
make it

B: ah! REPEAT 4

C: I know you already
have this line here

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B: now REPEAT 1.....you don't have to do it

5,5　　C: well.. what about if we .. how many sides do we need to complete? 1? like you have 2 and how many more?

B: 1

4　　C: so what could that be?

B: REPEAT 3

1　　C: right!...

(from D1.E2.)

6) LECTURING

B: like To door To window

6　　C: ya but well you can't use the word window

B: oh ya

6　　C: because the machine won't take that but we can use win or..

(from D1.E2.)

7) MANAGING

up for me

8　　C: o.k. so would you mind shortening that

A: me.. Basje . ya

B: he can do it

7　　C: no no no you can do that cause you're the one that saw that

B: I don't know how

	2	C: you're still in the editor so you're still fine
		B: o.k.
(from D2.E6.)		
8) DIRECTING		
		B: K. um... Forward ..
40		
FD 40		iesh
PE		
BK 40	8	C: o.k. you're not keeping track though of all your angles so that you can have it in the same direction
		B: Your angles
	8	C: All of us. o.k. Let's go back and look at that I think we lost some of it by going back and forth.. but Ali you have it written down
CONTROL-T	6	
(from D2.E1.)		
9) STRUCTURING		
	4	C: ah.. What do you think
		A: ya it's o.k
		B: That's good . ya ..then . have you got any
		A: oh ya
	1,9	C: right . Why don't we get that down before we forget it.
CONTROL-T		B: There now... its after that.. ok. PEN UP
	9	C: gonna read it to

him?

B: o.k. FD 40.
RT 90.
FD 40.
ouch..
PD

1   C: o.k.

(from D1.E2.)

10) PROBLEM DEFINING

B: oh god

A: what did I do.......
what did I do
oh get back there

10   C: can you turn into
that .. turn that
into a shorter line
.. with a repeat is
there anything in
there that is
repeated that you
can turn that into

B: yes look . FD 50

A: REPEAT

B: RT 90 FD 20 RT 90 FD
50 RT 90

8   C: o.k. so would you
mind shortening that
up for me

(from D2.E6)

CHAPTER 5

RESULTS

This chapter summarizes the results of the data transcriptions and the teacher interaction categories. For easier interpretation, the frequency counts for each category have been converted to percents and are given as daily totals. The full tables of frequencies and percents are found in Appendix C. This chapter will be used to report the results from the data for each day, as well as describing what the students did on those days. A summary table of Logo commands covered on the three days follows at the end of this chapter(figure 1).

D1.

On the first day of the summer computer program the children were introduced to their teacher and partners. A general outline of the daily routine was presented. The students then went to their computer stations and commenced work. Ali and Basje's session began with an introduction to the computer. They seemed to be familiar with the basics of turning on the computer and loading procedures. (It was noted that they had both used Bankstreet Writer during the school year as part of their English program at school.) Connie then introduced them to Logo and the

FIGURE 1
TURTLE GEOMETRY COMMANDS USED

		D1.	D2.	D3.
SHOWTURTLE	ST	X	X	X
HIDETURTLE	HT	X	X	X
CLEARSCREEN	CS	X	X	X
PENUP	PU	X	X	X
PENDOWN	PD	X	X	X
PENERASE	PE	X	X	X
FORWARD	FD	X	X	X
BACK	BK	X	X	X
LEFT	LT	X	X	X
RIGHT	RT	X	X	X
REPEAT		X	X	X
CONTROL-T		X	X	X
CONTROL-S		X	X	X
CONTROL-L			X	X
CONTROL-G				
CONTROL-P			X	
CONTROL-N			X	
CONTROL-E				
CONTROL-K			X	
CONTROL-Y			X	
CONTROL-F			X	
CONTROL-B				
CONTROL-A				
CONTROL-O			X	
CONTROL-D				
TO			X	
END			X	
CONTROL-C			X	
EDIT			X	
POTS				X
POPS			X	X
LOAD				X
SAVE				X
CATALOG				X
ERASEFILE				X

threshold commands of ST, FD, BK, RT, and LT. As the session progressed and the boys worked at gaining control of the turtle commands, further commands were brought into play. They were presented as the need for them arose. They were, PE, PU, PD, HT, REPEAT, CTRL-T, and CTRL-S.

On the second day of the program the first recording of data was taken during the first 50 minutes of the session. The files for this session are noted as D1. and consist of three episodes, E1., E2., E3. All work in D1. is done at top-level, that is to say, commands that are entered at the keyboard by the students are immediately executed by the turtle. Due to this fact E2 is very long. (There are only three episodes for D1. because about half way into the recording the voice quality deteriorated making accurate transcription impossible.) The only new Logo command that was introduced during this time was CONTROL-L. The students spent their time using and further experimenting with the commands they had learned the day before in an effort to make a house.

The Teacher Interaction Categories occurence totals for D1. are as follows in rank order;

1)	Reinforcing	33.0%
2)	Open Question	16.7%
3)	Direct Question	14.6%
4)	Clarifying	12.4%
5)	Structuring	10.3%

```
 6) Heuristic Question    4.7%
 7) Problem Defining      2.6%
 8) Directing             2.1%
 9) Lecturing             2.1%
10) Managing              1.3%
```

These results show that, of the interactions that the teacher had with the students, one third of them were simple reinforcement of the students' efforts. They usually consisted of one word or short statements.

eg. from D1.E1.)

        B: it's there

1   C: there

        B: pretty good but....

1   . C: oh it is

eg. from D1.E2.)

        A: I think we'll change that

1   C: K

        B: Well no Ali because then it'd just be

           a little mountain

1   C: you're right

Considering that this is only the second day of exposure to Logo that these two students have had, this seems rather surprising. One would expect that there would be much more direct teaching going on, yet the two categories that represent such methods

(LECTURING & DIRECTING), account for only 4.2% of the interactions.

Open questions and Direct questions make up almost another third of the interactions (31.3%). They seem to be inter-related in that often the teacher would initiate an interaction with an Open question. If the answer of the students was not clear or she wanted to verify if they had really understood their own answer she would then ask a Direct question. The use of questions as an interaction overall, (Heuristic, Open, Direct) account for 38% of the interactions on D1.

eg.

To illustrate this use of questions, an episode in which the students have made an error is examined. They were attempting to create a square using the REPEAT command (REPEAT 4[FD 20 RT 90]). Basje presses RETURN before he has completed the whole phrase (after 20), resulting in the turtle going in a straight line on the screen for a distance of 80 turtle steps. The PENUP command was in effect at the time so no actual line was drawn, but the turtle is sitting in the wrong place on the screen to go on. It must first be returned to where it was prior to the error before they can go on with their drawing. They

want to use the BK command to do so but there is a
disagreement about how large the input should be.
Basje remembers his input as having been 20. All
realizes that it is actually 4 times 20 (REPEAT 4[FD
20...) as in the command that had created the error in
the first place. The teacher lets the students try to
resolve their disagreement and first uses an Open
question to verify if Basje really understood. When
she is not convinced she asks a Direct question.

B: B....K.. How much......20?

A: REPEAT 4

B: No .. remember

A: oh ya ...o.k. ...BK

B: 20

A: 80

B: 20

A: 80..80

B: 20 .. we drew all this

A: 80.. That's not all 20 there. It's 80

4   C: See why it was 80?

B: Hey what happened............Yup

5   C: Why?

B: Because he had on that 80 steps

4,3 C: How do you know?...How did you figure that

out?

B: Because.... cause it's 4 times 20

1   C: right.

(from E2.)

At this point it should also be noted that the percentage of statements made by the teacher on D1. account for only 26.8% of the statements made by all three. The students accounted for the majority of the interactions. (Ali 32.5%; Basje 40.7%; from TABLE 1)

TABLE 1

COMMENT FREQUENCIES DAY 1

	CONNIE		BASJE		ALI		TOT.
	f.	%	f.	%	f.	%	f.
D1.E1	14	19.2%	33	45.2%	26	35.6%	73
D1.E2	100	29.1%	140	40.7%	104	30.2%	344
D1.E3	55	25.7%	84	39.3%	75	35.0%	214
TOT	169	26.8%	257	40.7%	205	32.5%	631

These figures along with the percentages for the different interaction categories illustrate a teacher who spent the largest amount of her interactions reinforcing and supporting her students efforts as well as allowing them to converse freely.

D2.

Day two of data collection (D2), which occurred one week later, is divided into eight episodes, (E1.- E8) .These episodes consist of two different activities. During the first three episodes (D2.E1., D2.E2., D2.E3.) the students are engaged in planning out at top-level the moves required to construct a windmill. They are using a drawing they have made prior to the session as a plan for what they want to draw with the computer. One student keeps track of the moves of the turtle while the other enters them at the keyboard. The second part of the session (D2.E4.- D2.E8.) is made up of the students working in the Logo editor writing the programs that will draw their windmill. This is their first use of the editor to create a multi-procedural drawing and they are still a bit unfamiliar with all the Editor commands. The commands had been introduced in bits and pieces as the students required them during the preceding days, to create small procedures.

The Teacher Interaction Category occurence totals in rank order for D2. are;

            1) Reinforcing   20.8%
            2) Clarifying   14.1%
            3) Open Question   13.4%
            4) Directing   12.1%
            5) Structuring   11.4%
            6) Direct Question   7.0%
            7) Managing   6.7%

```
8) Heuristic Question    6.0%
9) Lecturing             6.0%
8) Problem Defining       2.3%
```

Although D2. contains a large section of episodes that involve the use of relatively new material (Editor commands), the major interaction used by the teacher is still that of Reinforcing. The second most used interaction is that of Clarifying. It has moved up from fourth position but only increased by 1.7 percentage points. Open questioning is now ranked third at 13.4%, a drop of 3.3 percentage points. Direct questioning which rated third on D1. has decreased by more than half, and dropped to sixth position.

Due to the nature of episodes E4. to E8., Directing has increased by ten points to 12.1% on the daily totals. This is probably the most noticeable change from D1. When looked at within those episodes it becomes clearer why it was used more frequently. From E1. to E3. Directing interactions are at 7.4%, but as the students get into more difficult work it increases to a high of 20.9% in E6.

Up to now no mention has been made of the personalities of the students or of the teacher. That is because personality is not one of the factors under scrutiny in this study. However it merits consideration in explaining the increased use of

Directing in these episodes. Basje-as a student had a tendency to give up when the going got tough or to be satisfied with less than perfect results. His school records support this. He was also the more dominant of the two students and therefore affected the group with his shifts in mood. In the following example they are working through a list of CONTROL commands for the EDITOR. The students need these to do some debugging of procedures. They have spent the prior episodes drafting procedures for a windmill and are now working on them in the Editor. However, Basje was not keen on the Windmill project after the drafting was complete and would rather be working on a car because he thinks it would be easier (see D2.E4.). His effort in doing the task at hand is half-hearted. Connie uses Directing to keep the students on task.

(from E6.)

CONTROL-K	B: there tada I did it I did it All look
	A: what
1	C: good .... alright
(moves second line of procedure up beside the title)	B: don't ask me what I did .. I don't know I think I went like this ..opps I'll have to do something else
	A: CONTROL-P

CONTROL-P

CONTROL-O

                    3

(trying random button pushes)

                    1

                    7

(only END remains on screen)

                    8

TO

    R1

                    8

REPEAT

B: CONTROL-P?

A: ha ha ha

B: you see what
CONTROL-P is
.....your making
a mess of this

A: I just erase it

C: how can you get down
to these two then

A: CONTROL-K
ya CONTROL-K

C: o.k.

A: CONTROL-K is the
fastest way

C: alright you guys

A: ya that's better

C: o.k. now I want that
done now

B: TO...

A: how do you make a
rectangle right

B: R1

C: alright I want that
instruction in place

B: k. it was repeat ..
repeat

A: 2

The comment frequency percentage totals for D2. are very similar to D1. The teacher again is responsible for only 26% of the comments. The students

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make up the rest with a slight decrease from Basje and
therefore an increase for Ali.

TABLE 2

COMMENT FREQUENCIES DAY 2

	CONNIE		BASJE		ALI		TOT.
	f.	%	f.	%	f.	%	f.
D2.E1	93	23.5%	155	39.1%	148	37.4%	396
D2.E2	14	17.5%	34	42.5%	32	40.0%	80
D2.E3	47	32.4%	51	35.2%	47	32.4%	145
D2.E4	10	38.5%	11	42.3%	5	19.2%	26
D2.E5	17	26.2%	21	32.3%	27	41.5%	65
D2.E6	63	26.0%	89	36.8%	9	37.2%	242
D2.E7	19	33.9%	16	28.6%	21	37.5%	56
D2.E8	23	25.6%	33	36.7%	34	37.8%	90
TOT.	286	26.0%	410	37.3%	404	36.7%	1100

The most prevalent point about D2. is its close
similarity to D1. in the overall structure of
interactions used by the teacher. Reinforcement is
still the most used category.

D3.

Day three of the data collection (D3) was completed during the last week of the program, seven days after D2. It also consists of eight episodes (E1 - E8). The first two (D3.E1.,D3.E2.) consist of disk file management. The students have a series of shape files on their disks and are deciding on which parts of those files to keep and amalgamate into one file. The rest of the session (D3.E3., -D3.E8.) was used employing the various procedures in that new file to create a new drawing of a clown.

The Teacher Interaction Category occurrence totals in rank order for D3. are;

1)	Reinforcing	21.2%
2)	Clarifying	14.0%
3)	Open Question	14.0%
4)	Direct Question	12.6%
5)	Structuring	9.9%
6)	Lecturing	9.5%
7)	Directing	8.1%
8)	Heuristic Question	7.2%
9)	Problem Defining	1.8%
10)	Managing	1.8%

Although D3. occurred very close to the end of the program, and the student's knowledge of Logo had greatly increased, the interaction used most by the teacher was still Reinforcing. Clarifying and Open Questioning followed with percentages that were quite similar to those of D2. The use of Direct Questioning

increased from 7% to 12.6%. Structuring decreased by 1.5 percentage points and Lecturing increased by 3.5. Directing has dropped back to 8.1%.

When the three question categories are pooled they account for 33.8% of the interactions on D3.

The Comment Frequencies for D3. indicate a decrease in the percentage of comments made by the teacher. She now accounts for only 21.4% of the comments made on D3. Basje and Ali make up for 38.4% and 40.1% respectively.

TABLE 3

COMMENT FREQUENCIES DAY 3

	CONNIE		BASJE		ALI		TOT.
	f.	%	f.	%	f.	%	f.
D3.E1	26	21.8%	46	38.7%	47	39.5%	119
D3.E2	61	20.2%	120	39.7%	121	40.1%	302
D3.E3	67	18.9%	145	41.0%	142	40.1%	354
D3.E4	43	33.3%	41	31.8%	45	34.9%	129
D3.E5	4	11.8%	14	41.2%	16	47.1%	34
D3.E6	8	25.0%	10	31.2%	14	43.8%	32
D3.E7	5	23.8%	6	28.6%	10	47.6%	21
D3.E8	27	20.6%	49	37.4%	55	42.0%	131
TOT.	241	21.5%	431	38.4%	450	40.1%	1122

A bar graph illustrates the Teacher Interaction Categories compared over the three days (Figure 2).

FIGURE 2

Teacher Interaction Category Totals
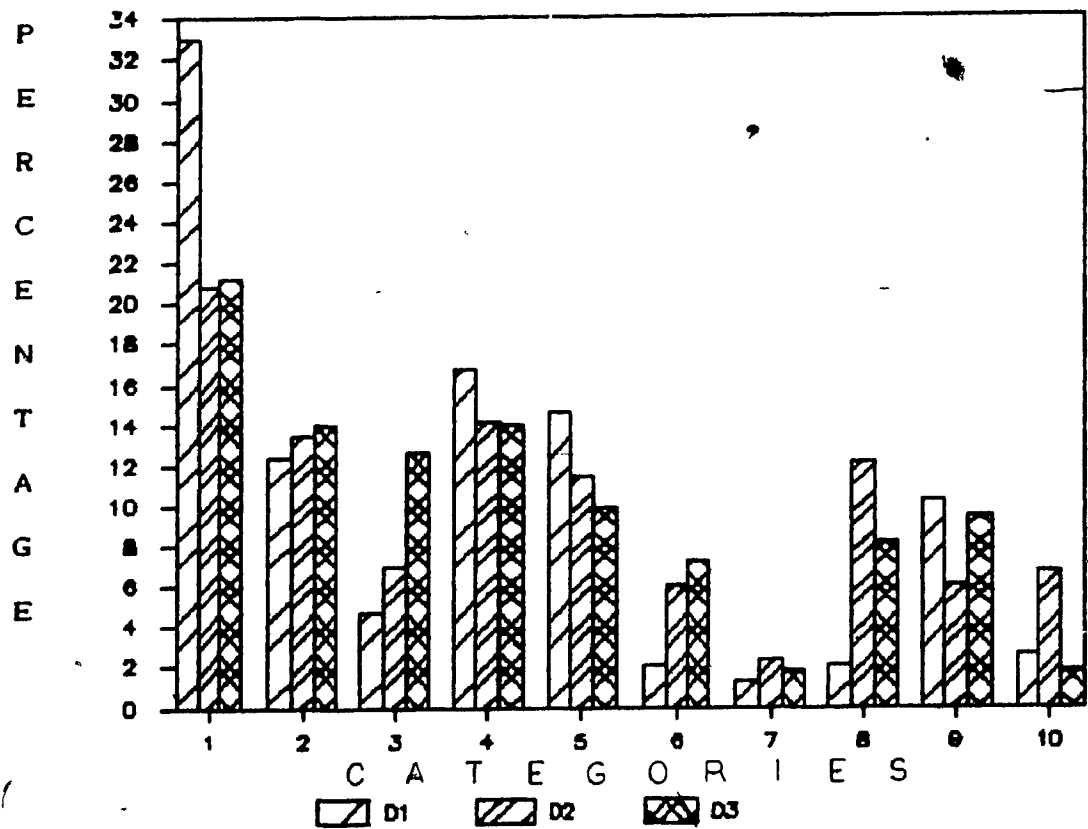
A statistical procedure was undertaken to determine if there was any significant difference between any two proportions for the ten categories over the three days. A comparison was done between D1. & D2; D1. & D3; D3. & D2. Any z score having a value greater than or equal to 1.96 or less than or equal to -1.96 is considered significant at the .05 level. Table 4 shows the resulting z values.

TABLE 4
z Values for Teacher Interaction Category Totals

CATEGORIES	D1.- D2.	D1.- D3.	D3.- D2.
Reinforcing	-.1551066	-.1493225	-.0060277
Clarification	.0222501	.0349113	-.012687
Heuristic Question	.1043979	.2499438	-.1583782
Open Question	-.049891	-.051948	.0020702
Direct Question	-.0707339	-.1093087	.0394082
Lecturing	.2509023	.2875653	-.0333565
Managing	.1414347	.0819148	.0622518
Directing	.3790233	.3099238	.1101334
Structuring	-.2323477	-.0382926	-.1223883
Problem Defining	.187802	-.0577392	.301029

There was no significant difference between any of the comparisons made. This indicates that what the teacher did, as described by the Interaction Categories, is very consistent from the beginning of the program to the end, even though the data gatherings were at 7 day intervals and the activities, over the three days varied greatly in difficulty and nature.

In the next chapter, conclusions will be drawn based on the results described in this chapter.

CHAPTER 6

DISCUSSION

This exploratory research has attempted to answer the question, "What is the nature of the teacher's interactions that made this a productive learning experience?"

It should be noted that as with most single case exploratory studies, the findings of this research are limited in their generalizability. Further research is needed to replicate or expand this work in order to to address this issue. An exploratory descriptive design lays the groundwork.

In this study most of the time was spent reinforcing in supportive ways, the efforts of the students. A lot of questions were asked of the students when they had a problem with their work. They were encouraged to be aware of the processes involved in each task that was done. In order to do this, questions were asked to determine how much the student really understood. In many cases a clarification was all that was required to solve a problem. When there was a greater problem, and the student's perception of the problem was not clear, the use of questions was

effective in helping the students to generate hypotheses about what the problem may have been and then solutions to those problems. At first the students had difficulty with not being given answers when they were stuck. i.e. "Why doesn't this work?" However with time they got used to the idea of asking themselves questions similar to those that would be asked by the teacher and thereby started to solve the problems themselves more often. Actual teaching of new information or lecturing was done when students were felt to be ready for these new pieces of information. The role of the teacher was one of consultant, technical advisor and quite often as a kind of mentor. This is quite similar to the methods used within the graduate seminar programs of many universities.

As stated at the beginning of this paper, Connie was observed as being an excellent teacher as well as very successful at her task of teaching Logo to her two students. It was therefore possible to conclude that the teaching behavior described by the interaction categories illustrates a successful Logo experience.

In glancing at both the category distributions and the infrequency of intervention by the teacher in this study, it would appear as though the teacher

plays a background role. But, when looked at more closely one sees that from that position she was able to orchestrate what transpires. This is one of the most important findings of this study. Many teachers feel that it is their job to _give_ knowledge to students and attempt to do so through constant direct instruction (Lecturing). Indeed many people assume that this is what teaching is all about. Lecturing in itself is not an effective way of teaching if higher level knowledge structures and generalizations about the information taught are desired(Becker & Gersten, 1982). It is also not congruent with discovery learning and in this study was not used by the teacher very much.

It is quite clear that based on the Teacher Interaction Categories, the most frequently used interaction was that of Reinforcing the students, simply being there to lend support to the efforts that they made in their work. This is not the interaction category one would expect to represent the most frequent interactions by a teacher, either in a Discovery Learning or a traditional teaching setting. However it is not congruent with the theories of behavior modification, where there is strong support for the power of reinforcement on learning.

If the Question categories are pooled they account for a third of the teacher interactions. This would appear to be in agreement with what Hunkins(1972) has said about the importance of effective questioning as a teaching strategy.

Based on the work of Doyle (1983) one would expect that the teacher interaction category #7 (MANAGING) would have occurred frequently, yet it on average accounted for only 3.28% of the teacher's interactions. Granted, in this study the teacher pupil ratio is not comparable to that of a regular classroom but this alone should not account for the low percentage for Managing.

A question that is not asked in many elementary schools where Logo is taught is; "Why should we be using Logo?" and more importantly; "How should we be using it?" Within the parameters of the standard elementary school curriculum, do we need to introduce computer programming as a subject? Teachers are having difficulty trying to meet the demands of the curriculum within the core subjects. To introduce any computer language as an addition to everything else that an elementary student is expected to learn, simply because computers are now there is faulty reasoning.

To introduce Logo as a subject unto itself would seem contradictory both to the new curriculum guidelines and the learning theory behind Logo and yet this is what is happening in many schools. I would suggest that Logo is very well suited to the goals of the new curriculum, if it is taught as an integrated part of the math program, respecting the importance of process for the student.

Some people would claim that in order to teach Logo successfully a teacher needs to be well versed in programming with Logo. To a certain extent this is sidestepping the issue. Being a successful Logo programmer does not guarantee good teaching. Not being a Logo expert does not eliminate one from teaching it well. In this study the teacher was learning Logo one step ahead of the students with whom she was working. She was able to accommodate and assimilate more information at a quicker rate than the students and by the end of the three weeks had an excellent working knowledge of turtle graphics as well as a general idea of the possibilities of using words and lists in non-graphic procedures. One could not say that her success with the students was due to her expertise in programming because she started out as a novice. If expertise were a factor in this study then there should have been a marked change in the nature of the

interaction categories from D1. to D3. and there was none. This brings out an interesting point. The key to this being a successful Logo experience on the part of the students was the nature of the teacher-student interactions. The teacher was the catalyst. This is an important observation for both educators and administrators of school programs.

The teaching approach used does not fit into any strict category such as discovery learning or traditional structured approaches. For lack of a better descriptor I would venture to call her approach "client centered". Within the overall framework of helping the students to learn about Logo, she determined what to do, by the needs of the students. The computer helped to make this possible. The microworld of Logo was the focus point around which the activities revolved. The screen was an open window through which many of the students strategies were revealed, giving the teacher clues about where to head next with her questions, clarifications or reinforcements. The teacher-student relationship was not one of, "I teach, you listen", but one of, "let's see if you can get the computer to do what you want". For the students much of the responsibility for what went on was in their hands. The environment was neither rigid nor simple. It was certainly not a

cook-book approach to teaching. It was open ended with many possible directions for solution of any problems that arose, and it was the teacher who was instrumental in its success. It should however, not be thought that it was a, "let's see what happens" or "laissez-faire" approach either. Largely through her support and with very little structuring(8.6% on average) she was able to keep the students on task and progressing.

This approach to teaching Logo allows the students to learn about learning, by providing them a more personal relationship with both knowledge and other people, much in the way that Papert(1980) describes it in "Mindstorms". Problems may arise when a teacher who is willing and able to do this on a classroom scale is needed. Although in this study the teacher-student ratio was ideal, the teacher came to the course as an experienced classroom teacher. As stated earlier, her interactions with the students were very consistent from beginning to end. One could hazard a guess that her approach to Logo and teaching in general would not be that far apart. Indeed she has gone on to teach Logo to adolescents on a classroom scale, with much success. Further research might endeavor to look at what the teacher interactions are in the Logo classroom. It may also be useful to do

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further exploratory descriptive studies to highlight other approaches to teaching Logo so that comparisons can be made. It was fortunate that in this study the teacher turned out to be one of the best in the class. The Teacher Interaction Category results may have been quite different with other teachers. Information about what approaches discourage the kinds of positive growth that the two students showed in this study needs to be teased out, and we need this information now. Logo is being integrated into the elementary school curriculum at an astounding rate, in many cases with little regard for its potential as a teaching tool. Young children are being "turned off" using computers by the ineffective teacher use of Logo, the very language that was created to ease children into the computer age. Teacher education needs to not only teach the teacher the technical aspects of Logo and computing, but to deal with the pedagogical approaches and potentials of the language.

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APPENDIX A

D1.E1.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

PU
LT 90
FD 100
LT 90

                  A : FORWARD 45

                  B: pardon

PD

                  A: FORWARD 45

       4,4   C: well how did you get to this stage? With no
                     mistakes. What did we have to do yesterday?

FD 45

                  B: we made mistakes

       1   C: right..... o.k.

LT 90

                  A: FD 150

FD 150

                  B: I like that straight line

                  A: FD 60..... FORWARD 60

FD 60

                  B: You should have put 210

       9,1   C: why don't we note that change now so we
                     have it for next time..   That's right

                  B: because you have to type two times

                  A: LEFT 90
LT 90   FD 100
FD 100

                  B: how much was this was this 60?

                  A: aha that was...

                  B: o.k. first we did here

                  A: 45 that was..

                  B: o.k. so then we need ah..

```
                                        A: LEFT 90
LT 90                                      FORWARD 210
FD 210
                                        B: pshu

                                        A: and LEFT 90......
LT 90                                      FD 55
FD 55
                                        B: see?

                    1                   C: good

                                        A: PENUP

                                        B: how far did we go?

                                        A: till..

                                        B: to this here.  the door knob

                                        A: PENUP
PU                                         LEFT 90
LT 90                                      FORWARD 95
FD 95
                                        B: PENDOWN?

                                        A: PENDOWN
PD                                         RIGHT 90

                                        B: RT 90
RT 90
                                        A: wait.. wait a minute

                                        B: we just put down the pen

                                        A: wait don't don't put return it's FORWARD 20
(erases RT 90)
                                        B: the pen is down already

                                        A: and FORWARD 20
FD 20                                      RIGHT 90
RT 90                                      FORWARD 45
FD 45                                      RIGHT 90
RT 90                                      FORWARD 20
FD 20                                      RIGHT 90
RT 90                                      FORWARD 45
FD 45                                      o.k.? then it's

                                        B: PENUP?

                                        A: yes.
```

PU

REPEAT 2[

    RT 90 FD 20
PD
REPEAT 4[FD 1 RT 1]
erases 1
      90

HT

1

1

4

5

2

9

ST
1,8

then take the short route REPEAT 2..
because we have to put 90 two times..
REPEAT 90 two

B: REPEAT 2

A: RT 90 FD 20
then... PENDOWN
REPEAT 4 FD 1 RT 1

B: 90!

A: yup.... HIDETURTLE... mmm

B: it's there

C: there

B: pretty good but...

C: oh it is

B: ya

C: why... did you want it different? do you
want it changed?

B: kind of

C: did you want it bigger smaller

A: maybe bigger

B: how can we fix it... SHOWTURTLE ?

A: ya this is good

C: ya well we_could just go back SHOWTURTLE
again..... and then make one just around it

A: ya

B: alright

C: well let's see what happens anyway
we may have to go back

B: k so we just keep on going to the window?

C: ya and show it

63

B: now we'll go to the window?

A: we're supposed to do the door knob

B: we'll do the door knob last... hold on
   what do you think ? we're going to do it
   now or?

A: now!

B: now ya now

3   C: o.k what will be our commands

A: REPEAT 4 FD 2

1   C: ya let's try it out

REPEAR

(erase R) T[FD 2 RT 90]

B: oops
   eeee
   finished

A: HIDETURTLE
   yes that's better

HT

1   C: ya ya I like that

B: That's good now let's see how much we got

CONTROL-T

A: we got more than that

B: ya there's some up there

D1.E2.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

.5,8,4   C: Do you have all the commands down? Oh
           you don't have the last command down to
           change the ... ah door knob .
           Did you want to leave this one on or
           change the other one?

           A: I think we'll change that.

1   C : K

           B: Well no Ali because then it'd just be a
           little mountain.

1   C: Your right.

           B: like a little round thing.

2,1   C: The thing in the middle....o.k.

CONTROL-T

           B: Push the s to go Show Turtle
           Did you get HT down?

           A: Now it's gonna be a

           B: Oh ..ya

           A: Control-S

CONTROL-S

1,5   C: There .. o.k.
           Now where do we go?

           A: The windows

ST

8,9   C: Let's look at our diagram...ok...we're
           going to try..

           B: The windows?

1   C: The windows.

           B: alright.

PU

           A: First we'll right 180.

           B: penup

65

RT 180   A: right 180
                          forward...

FD   B: march

(erases FD)   A: How much did we take to get down here?

                     B: K. that ..was..

CONTROL-T   A: I think it's in here.

                     B: K. check

      1   C: K.

                     B: There's an easier way where we can go up
                        here

                     A: Where?

                     B: I forgot which one it was.

      2   C: But I think this is all we need here?
                        Cause then we went pen down   and then

                     B: Oh wait don't you have it in your notes?

CONTROL-S   C: Did we go down that much? I think that
    5,2   was the sides

FD   B: Just go up here and then here and then
                        ah I don't know

                     A: o.k then

                     B: Let's put circle windows

                     A: Circle windows? no

                     B: Ya...

                     A: Let's make a regular house

                     B: awk

    40   A: K...forward 40....k..right 90
RT 90   k.forward 40
FD 40   now pen down
PD

                     B: K. now for the square.. what was the square

ah repeat ....

B:+A: Repeat 4

REPEAT 4[

A: 4.. wait lets see how much of the sides
will be left

5,4   C: How big do you want the windows? Do you
want it the same .. are you gonna use
the same dimensions as that? or are you
gonna make it alittle different

A: Leave 20

1,5   C: Alright. Lets What was the original one ?

B: It was fd 68 rt 90

1,4   C: O.k. so what did you say? .   -

B: That was pretty big.

A: K. we'll make it .. 20... each square.

5   C: What's that called?

A: 20 square

1   C: o.k.

B: FD .. how much?

FD

A: 20

20 RT 90

B: That was close. OH. You really don't
have to put the bracket.

1   C: no.. That's interesting

B: That's pretty small.

4   C: ah.. What do you think

A: ya it's o.k

B: That's good . ya ..then . have you got
any

A: oh ya

1,9   C: right . Why don't we get that down

67

before we forget it.

CONTROL-T

B: There now... its after that.. ok.
PEN UP

9   C: gonna read it to him?

B: o.k. FD 40.
RT 90.
FD 40.
ouch..
PD

1   C: o.k.

B: PD .. pendown. then after repeat
REPEAT 4 FD 20 RT 90.......... ha..

S (erased)
CONTROL-S

1,2   C: Alright . you've got one of the windows

B: now..

A: Forward 10

B: No we're not

A: Yes we are.

B: No we're not.

A: Look at the line...... Yes we are.

B: Don't you want .. the .. pen up?..
it doesn't matter.

FD 10

1   C: That's right.

B: Hm.. not in the middle...

A: o.k.   RT 90

RT 90

B: zhew...How big was that thing 20?

A: Ya . forward 20

FD 20

B: zhew

A: RT 90

RT 90

B: zhew

```
                                      B:+A: forward 10
          FD
                                      B: ah! This went like that and moved forward.

                              1       C: I guess you can do that.
          2
          (2 erased)                  B: 10 ?...
          10
                                      A: right

          TR                          B: am not good
               (erased)
          RT 90                           90?.. ...
          FD 10
          RT90
               (erased)
          RT                              Ah .. there's a easier way  .

                              4       C: What was that
          90
                                      B: To repeat

                              1,9     C: O.k. .. ahm.. alright let's finish and then
                                         we can go and see

                                      B: ya on this one

                              1       C: o.k.  ya.  alright.

                                      A: o.k.

                                      B: R T 90

                                      A: forward 20
          FD 20
                                      B: yaho

          PU                  1,2     C: O.K. when you look back ... remember
                                         when you were down here when the turtle
                                         was facing down

                                      A: ya

                              3,10    C: What could we have done to make it flip
                                         right over to go back up?  ... So that
                                         you wouldn't have to go right and then
                                         right and then right.

                                      B: repeat  a repeat..........rt  90?

                              2,4     C: to make the.. to make the turtle go flip
```

over.. like to turn and go the other way?

A: ah .. that 'd be ..

B: Oh ya

A: rt...

B: back

A: rt 180

B: it's the backward

2,5   C: o.k. we could have gone backwards or we
        could have ...

B: 180.. rt 180

1,2   C: rt 180 alright. o.k.   this is right though
        but there are so many ways to do it.

B: pen up

A: hey I'm gonna write this down now.

B: Aha...
   see that was a 180..

5   C: is he missing another step to write down?

B: ya want to see something....?

A: K. Basje .. control....
   let's see...

B: I don't want this

   if we're really really really good we
   can put everything there and when...
   wait a minute Ali.. FD 10.. 90 ..20..
   FD 10

A: FD 10.. 10

B: wow where are you?

A: rt ..

B: FD 20

CONTROL - T

(erased BK)

BK

BK

70

4	C: do you want to look ....
	B: it looks like there's an easier way cause 90 20 90 20
1,9	C: k. let's read those off to figure out the repeat
	B: k. FD 10 .. RT 90 . FD 20 . 90
8	C: RT
	B: FD 10 .. RT 90 .. FD 20.. PU. backwards how much? How much .. how many's up here
	A: no first let's see how the screen looks
9 _	C: you can figure that out when we looked back
	A: BACKWARDS ah...
5	C: How much was it from here to there?
	A: an 20
5	C: o.k. and from here to the door?
	A: that was 40
1,5	C: k. so that's and the door width? was
	B: 1...20
1,5,5	C: o.k. so that's what ? now where are we?
	A: at right
2,5	C: at .. ahm.. 20 .. 80 ..o.k. and then we want them the same distance what would we have over here?
	A: 60
1,8	C: o.k. so let's try that
	B: k. 140?
	A: 40

CONTROL - S

M55S2 (B typing)

(erases M55S2)

149
(erases 9)

B: excuse me! gees !
.. zhew
and then we start making it here

4   C: there?

A: this is the end of the square

4   C: ya which way that way or this way?

A: this way

1   C: o.k.

A: k. make the line now

1   C: alright.

A: k PENDOWN

PD

B: not enough room ...take the whole book
(talking about table space)

A: PENDOWN there

B: wait (yawn)

A: FORWARD 20.......FORWARD 20!

FD 20

   RT 90 ....rt 90

RT

B: (making noises).......how much?

A: RT 90

90

B: see I just pressed those two (9 & 0)

A: wait... maybe we can make it a shorter
way   with repeat maybe

B: ya . repeat these little squares here!

A: o.k. REPEAT 2

(erases RT 90)
REPEAT 2

B: REPEAT 2.....o.k

A: REPEAT 2.... bracket

[

B: alright LT 90

LT 90

A: 90 o.k. .. and there was FORWARD 10

72

RT (erased)
FD 10

B: hey that didn't go in a complete square

A: it's not supposed to

B: oh ya

A: now we'll do a whole square

3   C: how could you have done it so it did
        complete the little square?

B: ya

A: I don't know

B: that was..

4   C: cause you made it go around how many times?

A: 2

2   C: 2 and you wanted to make it

B: ah! REPEAT 4

2   C: I know you already have this line here

B: now REPEAT 1......you don't have to do it

5,5   C: well.. what about if we .. how many sides
        do we need to complete? 1? like you have
        2 and how many more?

B: 1

4   C: so what could that be?

B: REPEAT 3

1,9   C: right!... alright let's try it then.

B: back?

.1   C: ya I guess we'll have to go back.

A: PE

PE   B: PENERAGE

73

	1	C: o.k.
BK		B: back how much?
REPEAT 2[LT 90		A: REPEAT LT 90
		B: I wish they had this in alphabetical order
FD		A: me too
	2	C: but our letters were in alphabetical order
		B: they aren't A B C D E F
	4	C: ya but were
		A: that's true
	10	
		B: I never heard of a word....
REPEAT DIDN'T OUTPUT TO BACK		
	10	C: repeat didn't output to back
		B: I knew that would happen
	10	C: repeat ..didn't. output ..to . back
		A: I know what that means
	5	C: what does that mean?
		A: it means you can't back erase
		B: hey Ali we just erased this thing here
	1,5	C: alright let's start from that point what do we have to do with the turtle?
		A: make him RT 90
RT 90		B: are you writing them down?
		A: ya
		B: sort of
	2,1	C: if they work .. ya.........O.K.
		A: BK..REPEAT 2 [LT 90..
		B: You don't have to write that.

FD

4	C: Where is the turtle facing?
	B: down
5	C: O.k. so which square are we gonna make first
	B: this one
1,5	C: o.k. alright so what's the command?
	B: REPEAT 4 because that ones erased.
1	C: o.k.
	A: first get it back

REPEAT

(erases FD REPEAT)

B: REPEAT

A: Wait Basje, you put 20 and it's gonna voom . it's goona go. it's gonna go up to here 10. this part. .so put it backwards

BK 10
RE

B: why back? .. o.k.
now we can do it.

| 4 | C: Could he have done it the other way though too? |

A: No. If he did it it would have gone ..
like these are little squares? ..

B: But no me!...

A: or would it be the bigger one

(erases RE keeps pressing back arrow)

| 2,5 | C: See he was gonna go .. He was .. He had the turtle right there.. and how much were you gonna go down? |

B: just enough as this one here.

A: Then to make .. Then you'd only need to make a square here.

B: Right that's it   Then we'll do this here and then that one and that one and that one

A: let's make the whole squares

REPEAT
    4[

FD

    4

20 (cr)

B

K

1,9   C: O.k. well let's try it and see where we go
          alright?

        B: REPEAT.......REPEAT how much times..4?

        A: ya....forward 20 RT 90

        C: Were you going to make the little squares
          or the big squares first then?

        B:+A: the big square

        B: then we'll make the small ones.

        A: 20

        B: I'll do it.

        A: Bash NO-O !......you forgot RT 90

        B: oh ya.

1,9   C: That's o.k. let's put it back.

        B: just don't write that then. Ali don't
          write that..:...... We're lucky the pen
          didn't go down.

1,0   C: That's o.k. we can just put it back up
          no problem.

        B: B.. K. how much ... 20 ?

        A: REPEAT 4

        B: no remember?

        A: oh ya o.k.
          BK

        B: 20

        A: 80

        B: 20

        A: 80 ... 80

        B: 20 we drew all this

        A: 80 ... that's not all 20 there.   It's 80

88

4	C: See why it was 88?
	B: Hey what happened? .... Yup.
5	C: why?
	B: because...he had on that 88 steps.
4,3	C: how do you know?... how did you figure that out?
	B: because .. cause it's 4 times 20.
1	C: right.

A: I'll do this
      FD 20

REPEAT 4[FD 20   RT9

B: Ali if he doesn't....

(corrects spacing) 90

A: PENDOWN

1 . C: o.k.

B: go again

A: oh boy.

PD
REPEAT 4[FD 20 RT 90   1 C: great

A: PENUP

1 , C: o.k.

FD 10   A: now.... forward 10.... RT 90
RT 90

B: Are you writing that down?

A: I'll write this
        forward 10
FD 10   o.k. now RT 90

B: now just do that one there.

RT 90   3   C: yes so what do you have to do with that?

FD 10   A: forward 10 .... now BK 20
BK 20   k?.. there's the window.
HT

1   C: Good.   .. There

B: now the roof

1,9,4   C: not bad.... o.k ..let's ah... let's
             get the commands down   o.k.
             There's some that we didn't need though
             are they there?

             A: BK.......

             B: Where are you Ali?

             A: here

             B: oh my god
             holy moly..... with sugar on top

             A: wait we don't want that ......erase bk 80 .
and ..

5   C: did we even use this one though?

             B: yup

4,18   C: do you remember what happened to that one?
             what was the problem with that one?

             B: we didn't have to write this one

18   C: alright how about here this is when we went
             right over to the window

             B: I'll be right back. I'm getting a
             drink of water.

1,2   C: o.k. .. and then PENDOWN and we went
             FORWARD 20 ....and then I wonder how far
             we can go down?...................cause we
             went forward and then we started

             B: Later we'll make a funny design

1.   C: o.k.?

             B: If we have time we'll make a funny design.

1,4   C: Good. What would you like to make?

             B: I don't know.

             A: a rocket

CONTROL-T

1,9,2   C: o.k. Do you want to give some of these
           to him? From here he just finished this
           one

         B: REPEAT ah BK 88.. no we don't have to do
           that. REPEAT

         A: Wait

4   C: no? did we need this one?

         B: We didn't need these two.

1   C: right

         B: so we just

         A: well let me finish

         B: REPEAT F .. bracket RT 90 .. RT 90..
           we don't have to do those two
         A: o.k................

         B: oooohhhhh.

         A: we don't need BK 10 either?

         B: nope

         A: Basje how could we.,

         B: well look we didn't have to put these two
           cause here are mistakes right?

         A: ya but we need our mistakes

         B: no we don't

         A: those two.   .... oh... we'll ask
           Mr. Stenzel

6   C: Well no wait a second now. Here you
           didn't need this one

         B: and this one

9   C: and then you didn't need this one... o.k.

         B: We can ask Mr. Stenzel how to do the door
           and all that

7	C: No I think we can manage that
	A: ya we can do it
	B: for the whole house though
	A: ya we'll call it..
9	C: Oh no we don't want to do the whole house though. We just want to do parts Like say we want to..
	B: No we'll do the whole house.
	A: ya call it ah......
	B: a house
9	C: see the only thing is is that. I. the way that you'd like to learn it is to do it in chunks
	B: like To door To window
6	C: ya but well you can't use the word window
	B: oh ya
6	C: because the machine won't take that but we can use win or..
	B: aop
1	C: ya
	A: or to cross
9	C: ya ya........alright why don't you get the plans and we'll see if you can do that
	B: well we have to do the roof
5	C: o.k. do you want to do the roof first? or do you want to see if we can call up those ah
	B: do the roof first.
5,1	C: roof first ? o.k.

D1.E3.G3

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

B: RT 90   Where are you? PD...PD Ali

A: PD?

B: ya 'n then the REPEAT. Hu? how come..

A: REPEAT here

B: and then the same thing .. the same thing
   the same thing here!

2   C: The only reason he had two down there was
        because the pen wasn't.. the pen was up

B: FD 10 ....fd 10 .. RT 90 gonna keep on
   goin everything b.k.? So it's 10 RT 10

A: FD 10?

B: FD 10   RT 90. FD 10. back 20 hideturtle

A: I'll do it.

E990I

(erases E990I)   B: Ali ! Your the writer

A: since when?

B: since I can't write

CONTROL-S
ST   5   C: How are we going to do that?

A: PENUP

1   C: alright

PU
FD   A: forward ... wait 20

B: k. this was 20

A: wait ..so this

B: and I think we have another 20

A: 35.....FORWARD 55

81

B: oh ya because that's the half here. LT 90
   LT 90

LT 90

A: FORWARD....

B: that was a 100

A: FORWARD 30

FD 30
FD 5
FDS (erases 8)
   5
FD 5

FORWARD 10
five more

B: k. now all we have to do is write 5 10 15
   FORWARD 15

3   C: plus .. do you have to put something else?

B: ya you have to put the angle

2,5   C: no I mean in the addition was it only 15
      to that part?

B: no it was...

CONTROL-T

A: it was more

1   C: yup

A: it was ..

B: write them write them down

A: 45   o.k.

9   C: how about turning the page

A: ya

B: I only got two things in my book

7   C: well maybe when you start to do the next
      project then you can do the writing

B: ya but he tells me what to write

7   C: no

A: k. FORWARD 45

B: we'll make the rocket on the angle like
   that

1,2   C: sure fine ...once we know how to do the
       angle then we can use that to make the
       rocket

SS (erases SS)
CONTROL-S
RT

B: RT....

A: 135

B: here it's just like that

A: 135
   then FORWARD.. 90

135   4   C: why did you choose 135?
PD
       B: cause it's the angle.

       A: cause this is 90 here and 45 in here

       B: you forgot to put the PENDOWN he he he,

3   C: so you think that's the right one so
       that both are gonna meet ?

FD 945   A: FORWARD .. wait   95
          not 945

(erases 45 puts 5)   B: o.k. I'm sorry cheese
                      Let's put a double thing in here

A: o.k. ..Where's the turtle?

B: The turtle's right over here because this
   is where the screen ends.

A: o.k. then FORWARD ...

B: Well you want it to go up more? We have to
   put the angle down here .

A: oh ya o.k.

B: right?

A: k. .. RT 9...

1,3   C: Good . What happened ?

B: k. well the screen ends here? and then so

A: it stops here

B: no it kept on going. Well it stopped there
   because that's how much we made it, so it
   didn't keep on going if we . if we made it
   more ..then it'd just came back out here
   well here, on the screen like this.

6   C: There is a command that we can use that we
        can just use only the screen. If you wanna
        see where it is. Here we have it here......
        CONTROL-L

B: oh ya

A: oh Basje

L   (erases L) CONTROL-L

B: See it came out there.

A: Bring it back...... BK... 10
   BK 90 90 90.... BK 90

B: push the thing to put the thing back

CONTROL-S
I DON'T KNOW HOW TO 10   I don't know how to 10

A: o.k.

2   C: because it. you needed .....

A: BK 90
BK 90   agh forgot to put PENERASE
PE CONTROL-T   FORWARD...

B: You didn't write everything down did you?
   FORWARD 45 we didn't have one ..except there

A: We don we don't need this Basje cause

2   C: Nope cause it wasn't ah

B: right

2,4   C: We didn't take it anyway.   o.k.
CONTROL-S   how are we going to get that line erased?

A: We'll ... we'll FORWARD the line

FD 90

1,4   C: Alright .. how are you going to get it

84

back down?

A: BK 98

BK 98

B: We still have those things so we have to keep on going till it's gone.

1

C: Alright . Try

A: FORWARD 95
95!!

FD 98

B: Why 95?

A: Because!.. we ahh da When we went up .. 95 FORWARD 5

FD 5

B: Ali .. shut up

A: BK 95

BK

B: Are you writing them down?

A: no

4

C: But do you need all this stuff?

95

B: nope. .. k. it doesn't matter about that (dots left after erase) we just go like this , there there and there

A: Just wait I know. We want a equalateral there?

B: Oh ya we have to. We want to see the triangle

A: Oh well no. no it'll be to big.. so we'll..

B: So we'll put double triangles . It'll be funny we can have ..

A: no

B: ya

A: no

B: Come on

1

C: If you'd like to you can, try it

		B: come on
		A: RT 15
		B: RT 15 ?.....rt 15
RT 15		
	5	C: Why did you change it like that?
		B: oh so we can just go like that.
		A: FORWARD 90
FD 90		
		B: yuk .. forgot to put the PENDOWN
BK 90		
		A: PENDOWN
PD		
	4	C: Was 90 enough?
		B: nope. How much?
		A: 95
FD 89 (erases 89) 95		k.
		B: Not enough
		A: o.k. FORWARD 10 . no FORWARD 5
		B: I wouldn't do that
		A: I would.
		B: It's gonna come right off the screen
FD 5		
	5,4,3	C: How's that ? Does that look like it's in the center? How could you tell?
		B: o.k. The doors in the center
	1	C: good.
		B: so that's
	3	C: so what will you do?
		A: FORWARD 5
FD 5		
FD 5		It's in the center now.
	1	C: right..
		A: so RT 60.... wait RT 90

RT 99

4,4	C: RT 99? Where's that gonna go? o.k. what are you gonna do then make it more or less?
	A: less
5	C: so what would it be?
	B: LT ..
4	C: what do you think?

LT

45

	A: 45
	ya
1	C: try it

FD

110

	A: FORWARD wait ... ah 110
4	C: ooo What happened?
	A: That was the wrong angle.
1,2,2	C: Alright so we. That was 45. 90 didn't work.
	A: So we go in between ... 60
9	C: o.k. let's go back to try..
	B: That's what he said in the beginning.
1	C: ya .

PE
BK

110

	B: How much?
	A: 110.
	now..
1	C: o.k.
	A: RT 15

RT 16 (erases 6) 5

| | B: Notice how we always use the five numbers with the five thing |
| | A: now FORWARD 110 |

FD110

3	C: Is that gonna work?
	B: nope
	A: yes .

B: nope

(erases 110)

    4   C: What's missing?
          ah ha.

(erases FD) PD

A: oh ya

FD 110

    1   C: aaaaa

B: Almost

A: Close

B: It's good enough

    9   C: Well wait a sec now no it's not good enough

B: GRRR!   I want a print-out.

    4   C: What do you think?

B: That wasn't good enough ?

A: Wait now .. k. get it back.

  2,9 C: But everything else is right. Alright so we
           just have to get a few more steps and get
           back..

B: Could we get a print-out later?

    2   C: I don't know I imagine he's gonna get
           everything printed out ya for us
           later I imagine .

B: Where is he?

  2,9 C: We'll get him later. I'm sure he's gonna
           have a print-out. o.k.? Let's go on.

B: Alright. we can get a double print-out
       It goes "would you like another print-out?"

BK

A: PE

(erases BK)

B: and would you like doubles and it tells ya
       to say yes or no ..... cause like that's
       what happened in Bankstreet remember?
       Would you like another one?

    5   C: So I'm supposed to ask him for two.

B: yup

C: unhun.   o.k.

B: Unless he doesn't want one.(referring to Ali)

A: BK 11\#

B: I want to get a computer
   I'll steal this one.

1,4   C: alright. Then how. What are you gonna do to
          get that angle back?

A: fix the angle. ya

B: No we're gonna go all the way there

A: LT..

5,5   C: What did you put it down to? What did we
          put it down?

B: ̄6\# .6 ..... 6\#'

1,4   C: 6\# . So to get it back..

A: O.k. then um ... LT 6\#

1,2,9   C: Um . That's what you made, O.k. try it

B: k. LT 6\#

1   C: good .

A: That's it.
   FORWARD 5

B: now.. FORWARD

A: 5

B: 5
   now let's

A: Basje.

B: It's not my fault.

1   C: It's coming.

B: Except these little things.

9   C: Ya we'll just see what we can do to get rid
        them.

B: doesn't matter.

1,4   C: o.k.

FD 5   alright is that gonna be accurate?

A: yes
     FORWARD 100....

B: FORWARD a hundred and? Don't you mean
    right?

A: RT ..
RT 60   FORWARD 110
FD 110

B: It's close enough

A: FORWARD 5
FD 5

B:+ A: there

A: now disappear the turtle.. HT
HT

10   C: ah ah ah no

A: we didn't get it Bas
ST   FORWARD 4
FD4
I DON'T KNOW HOW TO FD4   What did you press?

(presses return 4 times)   B: ha. no one will see that
FD   How much?

A: do 5
5   HT

B: ya

A: ah that's better.

B: Now the chimney . I can put the chimney

D2.E1.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

B: k. we have to do our window.

A: I'll put my disk in.

B: calmly .   No Ali.

A: Yes. To do the number of patterns.

B: at the end. ....see we don't ha..
oh ya we can do our house by now.

A: ya... Not yet .

B: See if we're gonna do that little.. thing
there... We're gonna say house.

1   C: Alright.

B: O.k. tell me what to do.

A: o.k. now PENUP
PU   BK 90
BK 90

B: Speak up.

A: o.k. RT 90
RT 90   PENDOWN
PD

B: Just a minute.

CONTROL-L

A: FORWARD 30
FD 30   RT 180
RT 180   FORWARD 60
FD 60   RT 90
RT 90   FORWARD 5
FD 5   RT 90
RT 90   FORWARD ...
FD 60   RT 90
RT 90   ....
FD 5   FORWARD .. oh
                        RT 90
RT 90   FORWARD 5
@FD 5
I DON'T KNOW HOW TO @FD 5   oh.
FD 5   CONTROL-L   Do a CONTROL-T that'll show.. give a list

91

CONTROL-T

B: alright
   wha?
A: I don't know what that was.

B: FORWARD 5

A: ---------

S
CONTROL-L

B: See right down there ..and RIGHT 90 and
   whatever that is.
A: FORWARD...

(all moves under CTRL-L based on dialogue and what occures on screen)

4,4   C: What does that look like more? Can you..
          What did you go the other way?

       B: Well here is FORWARD 5.. its going there.

       A: And then after FORWARD 5 its RT 90 .

1,2   C: M ha and what would be .. the ..

       A: RT 90
RT 90   Then its FORWARD 130

1,8   C: Good . You should clear your instruction
          up for next time.

       B: That's true.   What's this for?

2,9   C: Well remember yesterday you said that you
          wouldn't mind having a list? So I thought
          we'd have them handy just in case we'd
          refer to them instead of going back to the
          sheets.

       A: LT 90

       B: Where are you?... LT 90
LT 90

       A: FORWARD 50
FD 50

       B: 50?

       A: Ya
          Then it's LT 90 again.
LT 90   FORWARD 130
FD 130   RT 100
RT 100   FORWARD 130
FD 130   RT 30
RT 30   FORWARD 50
FD 50   RT 120

```
RT 120          FORWARD 50
FD 50           o.k.    BK 50
BK 50           FORWARD oh ya o.k. FORWARD 80
FD 80           Wait.. sorry      LT 90
LT 90           k. FORWARD 20 ... but we're doing it more
                down .
```

1   C: un hu

    B: Did we?

4,4,5 C: Did we? When did we start? Did we start
     with the same instructions?

    A: yup.

3   C: So..

    A: So we've lost it.

2   C: MM that's going to be our problem.

    B: CLEARSCREEN?

3   C: But what else could we do to just leave it
     like that?

    B: CLEAR

6,2,3 C: No no. But I mean if we left it like that?
     How could we change it now so that we won't
     run into the problem we had last time? Is
     there anything that we can do?...........
10   O.k. remember what the problem was
     yesterday?

    B: Ya we had to do the thing there to..

4   C: So what was the real problem?

    A: The angles was wrong.

4   C: Or?

    A: Or the length

5   C: So what could you do?

    A: Shorten the length.

1,9   C: Good. Let's try that then and see but

RT 90

PE

BK

20

PD
FD 10
LT 90

FD

15

LT 112
FD 75

HT

before we do that there's something we
have to do.

B: I'm not so sure to put him back

A: PENERASE
BK....

B: (big sneeze) Excuse me

A: Bless you.

B: BK..

A: 20

B: oh o

A: Ya that's o.k. k. FORWARD 10.
Put your PENDOWN

LT 90 we go?

B: ya . Then FORWARD..

A: smaller this time 15

B: How much did you put 20 before?

A: ya ... k. then LT 112
FORWARD 75

2   C: Me Last time.

B: Oh god.

A: That's because we had last time..

B: We had less than this.

4   C: Less?

A: ya

B: Well you put 15 when it was supposed to be 20

2   C: That is 20 now.

B: No it's 15.

94

A: 15

C: So how can you work that so it does meet?

A: Put it back and change it.

C: k.

(assumed) PE
         BK 75

B: Oh god Al:.. Al

A: hm

B: It's gonna be covered

A: SHOWTURTLE

C: We could always do something else too.

ST
RT 90

A: Now,.. RT 90

B: We're making this more remember?

A: No no.

B: k. I did RT 90 here.

A: And then you RT 5
RT 5   RT 10 then

B: That's better.

A: Now FORWARD 5

FD 5

BK 5
PD
FD 5
LT 112
FD 70

A: FD 5
Now LT 112
FORWARD 70

B: That's better.

A: RT 90
RT 90   FORWARD 70

B: Pardon?

A: FORWARD 70

FD 70

B: Ha-ha.. nope

A: aw

B: Well we can just like 10 to there and then
we put.. we'll come back here and put
that one like that so the 10 is like this..
looks more real.

C: Could you repeat that?

B: Like we'll just come back here and make that
other line...

A: We have to go in here

B: Ya I know that so it's like the real picture
because .. say .. say it were taken by a
camera it might not get the whole thing if
you go to far

C: Do you see what he means?

B: So PENERASE

C: alright

A: BK 10

B: I didn't have my PENERASE

It's alright

A: K. now LT 105

B: Hey no.. We'll put it back here ..
we'll make our angle

A: O.k. PENDOWN then

B: k. but first we have to fix our angle

A: RT 105

B: RT ?

A: PENERASE

B: PENUP cause we don't want to erase that.

A: oh ya . I don't have to write this. BK..

B: how much was this whole line? 70?

A: 55

PE

BK 10
BK 10
HT

LT 105

RT 105

BK

B: It was 70. then minus 10 which is 60

A: 15. that was 15 . we 10 then we did 5 so it's 15

55

B: Now fix the angle to go there

A: So LT

LT
NOT ENOUGH INPUTS TO LT
LT

B: oh

A: 30
LT 15

30

B: What?

A: LT 15

LT 15

B: That won't be good Ali. It's gonna go straight up. We want the angle to go... that way.

4   C: How can you ahm..

A: Oh . then RT it back 15

RT

3,4   C: How are you gonna be able to figure out that angle? What do you have that would help you figure out

A: Oh this here kind of 90 I guess?

1,2,5   C: O.K. If you look at it like this.. it's almost like this? What did you make this angle here?

A: 90

2,5   C: So you know one angle.And what did you make this one?

A: oh wait... 120
CONTROL-T   ya 120

2   C: It was going..this way
CONTROL-S

A: It was 120

2,5   C: 120 you made it? So what would this one be inside here

A: 60

3　　C: So how would you be able to find out this angle?

A: 60 90 .. 30

1,2　　C: k. so now you have all the angles for this one and you should be able to make up the angle for the other one

B: 30 so minus..

RYT (erases YT)

A: k. so LT 15

B: LT? RT'

A: Oh RT

B: RT 10 cause I put 5 there .. by accident

T 10
/
FD 55

A: K. now FORWARD .. 50

B: PENDOWN

A: Do a CONTROL-L I want to se where the turtle is

CONTROL-L
CONTROL-S
BK 55
PD

oh-o....   forget about ----------

B: Well

A: FORWARD

FD

B: 40 well ya because

40

A: 40 40
that's good —

B: Waha... wrong angle

A: no it's o.k.

B: I think it's the wrong angle.

A: It's o.k.

B: NO look

A: it looks just like that

B: oh my god this is smaller than this one
                                                   see cause look how thick it is there
CONTROL-L   no

                                                A: ya
CONTROL-S

                        10   C: But it doesn't look the same

                                                A: no

                        9   C: Let's try to fix that one

                                                A: PENERASE
SSSS (erased)
PE   BK... 40
BK 40
RT 2   4   C: 2?

                                                A: RT 3 maybe
RT 3
                                                B: ya

                                                A: That'll do it

FD 40   B: That would have been perfect.. but one thing

BK   A: PENDOWN BK didn't PENDOWN

(erases BK)
PD
BK 40   B: That looks better

                                                A: ya that looks better eh?
                                                   ya let's see how it looks without the turtle
CONTROL-L   o.k.

                        1,6   C: Not bad but.

                                                B: This is thicker still

                                                A: no it's o.k.

                                                B: No it isn't
CONTROL-S
RT (ERASES RT)
PE   A: Ya that's it
FD 40
PU
BK 40   now RT 5
RT 5   now it should make it
FD (erases FD)
PD

                                        99

FD 40		B: That's better
		A: That is better
		B: Really betta
BK 40		A: now...... now.. make the other one
		right there LT 90
LT 90		hey it's sort of cute this is .
		B: K. um... Forward .. 40
FD 40		iesh
PE		
BK 40	8	C: o.k. your not keeping track though of all
		your angles so that you can have it in the
		same direction
		B: Your angles
	8	C: All of us. o.k. Let's go back and look
		at that
CONTROL-T	6	I think we lost some of it by going back
	8	and forth.. but Al: you have it written down
		B: POPS you can write POPS.
	4	C: What will that give you?
		B: The procedures.
	1	C: O.K. try that
POPS		B: oh ya
	3	C: Why doesn't it do anything?
		B: Because it's going up ..up
	3	C: But what does POP stand for .. remember?
		B: procedures
	1	C: ya
		A: And how um
	5	C: So what is a procedure?
		A: It's ah .. what you teach a computer.
	1,5	C: o.k. and did you teach it?

100

B: no

5 C: To do something

B: Nope

A: no.. we couldn't get to it cause we didn't
   teach it today

SSS

CONTROL-S

4 C: If you wanted POPS to appear what would
   have been in there?

B: The ah procedures.

A: The house and..

1,9 C: o.k. alright...... how much are you gonna
   know to turn that angle?

A: RT 5 because these angles are close to aha 90

LT 5
RT 10

2 C: Close to ? 90

B: k.then RT 5 well I put LT 5 so it went like
   this and I just put 10

3 C: Can you start with ahm something else that
   you know?

A: ah....... 30.....

10 C: When we started to do.. to do it

B: oh wait a minute

A: We'll do this one right here

B: Wait a minute.

A: this way and put..

4 C: Why would that be ah..

B: oh look we can just go back here.. and this
   was 70 right? right this was 70 AL? So we
   go here. go back here .. BACK 70 if we get
   there try'n get there.. that'd be FORWARD
   70 plus 40 ....and we'll have it lined up
   there

C: Are you sure of your angles? Are you sure that was what you had given it?

B: Oh no we'll have to go here cause then it will go

A: Basje couldn't we get if we're not doing this here just put it this angle that equals here an...

B: So LT .. 20 ?

LT

  30
LT 15
LT 30
RT 2
RT 3

A: Let's try 30
  LT 15
  LT 30
  Let's do RT
  RT 3

B: K.

A: FORWARD 70

FD 70

B: Would've been bad

A: ya ...   BK 70
  LT 15
  LT 15

BK 70
LT 16(erases 6 puts 5)
LT 15

RT 15
RT 5

B: No way.. its gonna go down here

I DON'T KNOW HOW TO '
RT 5

see I knew that would happen.

A: You pressed this

B: No I pushed it

I DON'T KNOW HOW TO '

Ali'

A: What?   What were you doing?

B: Was gonna go this way down
  That would have been bad too

FD 70

A: so you'll have to LT it

B: BK ..

BK 70

A: LT 10

LTY (erase y) 1-(erase -)

B: one minus
                                              it's good

                                           A: no

                                           B: yes

                                           A: RT
PR (erase PR) FD (erases FD) PU
                                           B: see it's been erasing

                              1   C: It's a good trick
BK (erases BK)FD C (erases C) 70
                                           A: That would be o.k.

                                           B: kind of

                                           A: Wait PENDOWN

                                           B: No
BK
                                           A: Yes when you go BK so he puts the line down
    70
PD
FD 70   B: You aren't writing this down are you Ali?

                                           A: No........ it's not perfect.
LT 90
                              9   C: Well wait a second

                                           B: opps RT
RT 90
                              5   C: Ali what did you say?

                                           A: It's not perfect here

                                           B: doesn't matter

                              2   C: Yes it does

                                           B: No it doesn't... look it's.... perfect

                              3   C: O.k, so how could we just make that right

                                           B: PENERASE

                              1   C: It'll be worth it when it's done.

                                           B: PENERASE
PE
                                           A: Want me to type ?

B: no

4   C: What if they made a shirt for you and one
       shirt was longer than the other.

B: I'd cut it.

10 C: So you'd wanna have it the same.

B: ya

6   C: So the poor guy that's gonna live in this
       windmill is not gonna be very happy is he.

B: awk

A: ok we'll make a man for it after.

1   C: alright

A: with a square head

B: no a circle

5   C: square?

B: a stick man a stick man

A: a man

8   C: alright let's go

BK 70

B: anew

RT 2   A: RT 2
RT 3   RT 3 ?

B: Why didn't you just say RT 5?

A: I wanted to say....... This is better..PENUP

PU

B: Pen was already up.

A: No it was PENERASE before

B: so

FD 70

A: we could'ov erased it all

B: That wouldn't be good

A: We just can't get the thing

B: You can type........ no I will
   BK 70

BK 7- (erases -) 0

A: LT it

C: O.K. what seems to.. Where is it heading?   3

A: From here to here.................... ya

C: So do you want it to go a little bit..   3
   in which direction would you like it to go?

A: LT

C: If it moves LT which line is it gonna draw   10

A: This one

C: Is that what you want? .. alright   5,1

LT N (erases N)   2

B: what

A: RT 1
RT 1   This is better let's try it
FD 70   ya
BK 70
PD
FD 70   C: Can you look at it... can you see what the   3
             problem may be?

A: ya it's at the corner

C: it's what?   5

A: It's in the point here

C: Right .. do you see that?   1

B: oh ya

C: We're trying to do same thing but what   2,4
   didn't we do before hand?....... You
   started to say

B: We didn't put the thing exactly on the
   corner

C: So you can't make the same angle   10

PE

BK 70

3

BK

   5
FD 4
RT 90

CONTROL-T

CS

(erases CS)

B: oh

A: HOME

B: HOME would be right here

A: without a line though
CONTROL-L

B: why

3 C: But can't you fix it for now? Can't you B
something ah...

A: ya after BK and then..

1 C: O.K. ya

B: What?
How much?

A: Ah.. no
no .... FORWARD
RT 90

B: Your not writng this down. Write it!

A: O.K.

2 C: It's difficult to write it now isn't it.
Your not exactly sure.

B: Why don't we clear screen then we'll make
it pr.r.r.

A: Come on Basje no . Forget about clearing
screen after we went this far.

1 C: alright we're getting there

B: Oh ya.. watch

8 C: OH no don't
1   o.k. _

```
50T (erases 50T)
FD 1
LT 90
PD
FD 1
FD (erases FD)
```

A: FORWARD 1
We're pointing the wrong way.. LT 90.
FORWARD
1_   :
now RT 90

B: You want it that way?

A: ya

B: why?

A: cause it's not centered

B: watch.. figure it

A: ya o.k.

`FD 70`

B: It's good enough. Come'on. Next time we do
it it'll be better.

`2`

C: Ya but your so close

A: Still not in the center this

B: Hrrrr
they sure hate us

```
-P(erases -P)
PE 70
I DON'T KNOW WHAT TO DO WITH 70
```

A: PENERASE 70? BK just say BK see what
happens return

```
BK
NOT ENOUGH INPUTS TO BACK
```

B: Ali your not funny
PENERASE

```
PE
```

A: Not enough inputs to PENERASE
you always get that dash in

```
BK 70- (erases -)
```

B: cause I keep on going like this

```
0- (erases 0-)
```

`9`

C: alright before we make any decision now

B: see

`5,4`

C: how.. what are we gonna do with that angle?
gonna make it bigger larger?

B: we're doin it this way more

A: RT 90 then we're going like

B: Ow

C: O.k.

A: RT 90 can't I type ?
   FORWARD 1
   make it 2
   make it 3... no

B: Grrr

A: that's better
   LT 90
   now total works out to..
   wait a second. No it's o.k. do it
   70

B: wouldn't be good

C: pardon?

B: wouldn't be good.. Let's put this back here
   oh no because if we do then

C: but you almost had it

B: oh

A: BKJ ha

B: Basje Kroon ...

A: junior
   07 .. double 07

B: oh

A: LT
   54 hn
   now let's try .. FORWARD whatever
   now that looks better

B: wait PENDOWN. Ali!

A: Basje.. with PENDOWN .. then when we put it
   back it'll ..gee
   it was (??????)

B: this is as far as to.. oh

RT 90
FD 8 (erases 8) 1
(erases 1) 2

LT
  90
DF (erases DF)
FD 70

BKJ 70
I DON'T KNOW HOW TO BKJ

BK 07

BK 70

LT 54
  (erase 4)
FD 70
BK 70

PD
FD 79 (erases 9) 8

1

5

1

A: hey Basje . you know Robert B. right?

B: hu?

A: suppose he. Robert.B right. like

B: hn hn

C: (whispers ???)

A: oh ya

B: he was playing soccer

A: ya.. good

B: and you beat him right?

A: right

7   C: alright back to our..

A: even though I'm not in his league I beat him

7,5 C: windmill. shhh........... how close are you now?

B: bout LT 1? hn hn

A: no um..

B: It's perfect

A: LT 2

1   C: it's almost perfect ya

B: LT 3

8   C: let's give it a try

PDLLLLLLLLL

B: augh god I hate that

(erases PDLLLLLLLL) PPPPPPPPPPPPPP (erases PPPPPPPPPPPP) PE

BK 7B   that was a long time ago

A: ya ... he didn't record our voices on Thursday right?

B: no he didn't

2	C: ya I think he did ya
	B: on Thursday he did
1	C: yup
	B: he did
	A: oh k. hn hn
9	C: alright let's get this
	A: now let's try it
	B: wo ho no no
	A: I think the pen is down already
1	C,B,A: Ya

BK 78

LT 2

FD 78

(erases FD 78) PD

FD 78

D2.E2.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

<table>
<tr><td></td><td></td><td>A: RT 90</td></tr>
<tr><td>RT 90</td><td>1</td><td>C: right</td></tr>
<tr><td>FD 20</td><td></td><td>A: FD 20
RT 120</td></tr>
<tr><td>RTC 120 (erases C120) 120</td><td></td><td>B: ALI</td></tr>
<tr><td></td><td></td><td>A: FORWARD 70</td></tr>
<tr><td>FD 79 (erases 9)
90 (erases 90)
0</td><td></td><td>not 790 or 79</td></tr>
<tr><td></td><td></td><td>B: ahh haaa!</td></tr>
<tr><td></td><td></td><td>A: oh no</td></tr>
<tr><td></td><td></td><td>B: that was your fault</td></tr>
<tr><td></td><td>2</td><td>C: nobody's fault</td></tr>
<tr><td></td><td></td><td>B: his fault</td></tr>
<tr><td></td><td>6</td><td>C: it is not</td></tr>
<tr><td></td><td></td><td>B: is so</td></tr>
<tr><td>PE</td><td></td><td>A: ha it's PENERASE .. now holes</td></tr>
<tr><td></td><td>8</td><td>C: yes I want I want before it happens I want
to tell I want you to tell me what happened</td></tr>
<tr><td></td><td></td><td>A: wrong angle</td></tr>
<tr><td></td><td>4</td><td>C: but what was the problem</td></tr>
<tr><td>BK 90</td><td></td><td>B: hm.</td></tr>
<tr><td></td><td>5</td><td>C: alright what direction was the turtle going
in</td></tr>
<tr><td></td><td></td><td>B: just a minute</td></tr>
<tr><td>CONTROL-T</td><td></td><td>A: 120</td></tr>
</table>

111

LT 20

9   C: wait a sec. wanna figure that out on paper?
        before we do anything

    B: now we got it back there

5   C: what is the angle there.. do you have that

    B: ya I just put LT 20 so now its 100 so

2   C: now its 100

    A: well I guess

    B: ya cause that's what we did here

8,5   C: can you put it back to where it was when we
        made a mistake then... we'll just have to
        there o.k. if.. in which direction is the
        turtle going?

RT 20

    B: that way

4   C: so where do we it where do we want him to
        go?

    A: we want him to go left and left would be

    B: about 5

    A: no.. say 15
        yes

LT 15

5   C: what would have made that total angle

    A: 105
        ya... FORWARD 70

PD
FD 70

    B: not bad not bad not bad oh oh.

2   C: at least now we know ...the angles so that
        when we do it .... o.k.

    A: RT 90 5
RT 90   5

    B: you said 90-

    A: 5 I said
(erases 0) 5 —   I ment that

B: dog gin it

A: ?????????? now where's it pointing

B: augh
    now where's it pointing

A: why did we put RT instead of LT

B: (laughing)

LT 190

A: LT LT 190

B: your sure not 95

A: no

B: oh!

A: now FORWARD

B: 40

FD 40

A: no good
    LT 90
    FORWARD 20

LT 90

FD (erases FD

B: no we don't no you don't
    we want to pretend that it's like that so
    PENUP something and then we'll go back like
    that one there

A: here?

B: here!

A: wait put it back and put it a bit longer

4   C: what did you do to the other one

RT 90

A: we did one .... then .... (mumbles)
    you want it off too... put 5 again

FD 5
CONTROL-L
FD 5   now BK.. BK it
CONTROL-S
BK

B: how much

A: how much you did

B: how much did we do

113

50

RT (erases RT) LT 30
I DON'T KNOW HOW TO 30

LT 3

LT 27

FD 50

A: .... hhhhn... 50

B: hbhn ...hhhn

A: now change the angle.... LT.. 30
   L T 3 0
   aw..

B: ha

A: aw

B: stop that

A: your making me........ no

B: stop it

A: 27?

B: yes because we did 3 here

A: oh o.k.

B: henn henn (snicker)

A: now FORWARD....... 50

B: tooa

A: ya

B: oh my god

A: alright alright

B: it's not o.k.

A: I'll type from now on

B: o.k. I'll write it

D2.E3.63

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

PE   A: PE return
                               o.k.

                            B: back 50
BK 50
                            A: BK

                            B: back

                            A: BK

                            B: back

                            A: BK

                            B: back.. it doesn't matter if you write back
                               it's gonna work... RIGHT

RT   A: wait I'll see .. here
(erases RT)
                            B: ALI

                            A: wait I just want to see what happens
RIGHT   R.I.G.H.T.

                            B: oh god

     TURN   A: T.U.R.N.

                            B: god

              4   C: what do you think that will say now

                            A: that'll say I don't know how to right turn
                               I want to see what happens o.k.   o.k.

              10
                            B: you were doing it for the past seven days
I DON'T KNOW HOW TO TURN   TO TURN ah ha.

                            A: he doesn't know how to turn either
                               RT 10
RT 10

                            B: does not know how to turn godoy
                               that's better

115

```
                              A: now forward bla bla
          FD
                              B: forward 10

              ~
             50               A: 50

                              B: oh I was looking at this one

                              A: oh PENDOWN
          PD                     PENDOWN    like you you don't know that
          BK 50                  BK five..

                              B: forward

              1               C: alright

                              A: FD
          FD 50
                              B: 10

          RT 90               A: RT.. return
          FD
                              B: FORWARD   it's gonna look funny
              10
                              A: return......


                              B: o.k.

          HT                  A: here's our windmill now let's get our
                                 pattern

                              B: no we have to do this

                              A: I know

                              B: o.k. HOME

              8               C: OH wait a second before we put HOME
          HOME
                              B: watch out it's gonna make a line
          (erases HOME)
              8               C: don't do it just yet please

                              B: PENUP

              9,4             C: well before we do that .. since we have it
                                 now do we want to make procedures out of
                                 this or do we want to make a few changes

                              B: no we'll keep it like this


                                   116
```

8   C: take a look at it from behind here.......

        A: no it looks good

        B: we made some bo bos (chanting)

3   C: isn't there some way we can figure out
           exactly where we can put those angles

        B: no (laughs)

        A: look at that (laughs)

6   C: yes there is

        B: no

10,4   C: o.k. let's look at this here .. this wasn't
           a problem.... right we had this..(students
           are making noises) but what do we have to
           do with that when we start it again

        B: (without hesitation) I don't know

1,3   C: yes you do. what was our problem at the top

        A: equalateral

        B: what

6   C: no no no

        B: no it was equalateral

10   C: remember when we started...building.... and
           then we remembered that we hadn't done
           something

        A: put it down

9   C: alright let's not forget that thing

        B: hey why'd you hit her

2   C: he didn't

        A: I hit the book

        B: oh

5   C: what was this angle here

B: 50 ... 50 (snorts)

2   C: I think you have it down Ali on your

         A: ya it was 30

         B: 30'? blblbl
           RT 30 ya

         A: see what RT 30 was doing

4   C: so what would make that inside angle

         A: 60

1,4   C: alright
           the one up here

         B: 60

         A: 120

4   C: and so what would make the inside angle

         B: 120 .. ah

3   C: so what happened here

         B: 60 .. that was alright

1,6   C: alright yes that was alright but we have to
           use this stuff so that we can find out what
           the other angles are

         B: oh god

4   C: now

         A: oh brother

2,5   C: if we had a line right across here.. right
           across there..o.k. and this is the top half
           and this is the bottom half..... this you
           know is 60 ... what is all of this

         A: you know what we can do.... 180

         B: we can just do this.. make another triangle

         A: oh so

B: then this is 60 and this is 60

A: ya ya

1   C: good now we're getting some place

B: what did I get

9   C: alright we still need a few things then
         we just
     B: this has to go there... right

1   C: ahm

B: look at the messy drawing here

1   C: no no that's not a mess don't worry about
         that

B: .... I'm just thinking

10   C: alright this we know is ......

A: 180

6   C: 180 ..and this we said was 60

B: ya

A: so this is 60 and this is 60

1,2   C: that's right that's 60 and that's 60
         so if we looked at that and could we sort
         of divide that up

B: nope... oh ya we could oh ya

A: ya we can make an angle here then find the
     differnce and from the ah from the from the

B: ya

A: wings to the middle thing .. and the same
     distance from from the outside

B: like here to here probably the distance
     from there and we'll know that's the same
     distance

3   C: so how are you gonna do that

119

B: by getting rid of it

A: I have a better idea like ... suppose ..
   we make our ah thing in here .. so then we
   calculate our distance here

1   C: a ha

A: and then do the same distance here and then
   make another ah thing here

B: ya that's better

1,4 C: good.alright so what what would you like to
        make that so that we can put it on the
        paper now

A: 60

5   C: but this is how much

A: ah.. 60

5   C: so it would be more or less than 60

A: less it'd be ....30 no 35

2   C: we can try that .. so that from here this
        imaginary line to here .... so that this

B: 15

5   C: would end up being......

A: 15

4   C: and then .. what did you do here

A: um .. I turned 90

C: so that would be what angle

A: um 90

10   C: alright. and then this one now we know what
        this would be

B: ya

3   C: and how do you calculate that

120

B: this would be 90 here

4   C: ya .. and then what else do we know

A: 75 would be the line here

2,4   C: you're working ahead that's right .. so
           this one would end up being..

A: 75

1,2   C: good ... so now we have one hole triangle
           .. and maybe we can aha.. once we get it
           again then we can go ahead

A: clearscreen

ST

1   C: alright

A: make a new design

8   C: well maybe now ya we can try

CONTROL-S

A: o.k. let's put a disk in there

CS

B: k. we'll put yours in

5   C: do you want to change

B: no no no at the end at the end

D2.E4.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

5   C: now who's going to be the secretary.....
              who's going to be the secretary who's gonna
              write down all the instructions now

       B: guess I have to

5   C: alright.. can you pass it over to him

       B: k. well no I'll write it in my book

       A: good

       B: now can I ask you something

1   C: you may

       B: what are we going to do

8   C: you tell me

       B: a car

6,5   C: no no no no aren't we gonna finish this

       B: no a car we'll do a car

       A: thanks for lettin me say
              .. a windmill?

1   C: yes

       B: no no nooo

       A: no

6   C: oh I think we should

       B: car .. see cause a car we just have to do a
              circles for the tires

       A: can't do it without mistakes today... if we
              do it with mistakes today then tomorrow
              we'll have to do it again

1   C: we have lots of time now to do the windmill

but do it right... O.K.

A: if it's o.k. with Basje

5   C: Basje

B: mhm

6   C: alright and then that can be our next
      project though because I would like it if
      you finished one thing at a time

B: k. so let's make this

D2.E5.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

A: we'll call a procedure or what

3 ___ C: well it depends what do you want to do
which procedures could you make

A: well the X maybe... and then

B: the rectangle.. triangle

1 C: alright

B: let's go .. but we never had a rectangle
how about TO .. something..

A: repeat does it .. REPEAT TO ..... these and
repeat TO WING....

1 C: alright try it... o.k.

B: great what are we making again..... TO

TO R1
>REPEAT 2[FD 50 R   A: 50

B: I got news for you Ali... it's gonna come
that way

A: o.k. that's not so bad
T 90 FD 20[90 FD 20 .. end
>END
B: end
R1 DEFINED
R1   A: I can't think which way it'll go now

B: you'll see

A: CONTROL-L
CONTROL-L
(presses return to execult procedure)
3 C: what happened............

A: I don't know

10,5 C: look at the instructions
CONTROL-S   now what can you write in to see it

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```
POPS                          A: POPS
                                 wait Basje

                              B: here Al I'll do this one

        W                     A: CONTROL-W

I DON'T KNOW HOW TO POPSW     B: k. ready ..go

POPS                          A: oh well POPS again....
                                 I'll do it then you do it.. go

                              B: perfect
                                 REPEAT 2 FD 50 ..

                8             C: o.k. so the turtle so show me with the end
                                 of your eraser

                              B: FORWARD 50

                3             C: o.k. then what did it do

                              A: RT 90

                              B: oh shucks

                              A: didn't repeat

                7             C: let's not have an accident here guys

                              B: it didn't repeat that's true

                5             C: o.k. you told it to do what

                              A: REPEAT... REPEAT 2 FORWARD 50

                8             C: k. so start it off

                              A: FORWARD 50 then RT 90

                1             C: right
```

D2.E6.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

A: FORWARD 50 then FD 20.....   so..

B: so it's wrong.. pretty good eh?

3   C: so what do we do to fix it

A: ya .. EDITOR... E.D.

WED *

B: wed...

A: weady

B: wedding
(erases WED *)   miss it..miss aw (reference to * on
                       keyboard
ED *R1   R.. 1
                       ga.aaa.a o.k.

(now in the editor)   A: I want to learn the things that were like N
                       and O

B: I got it.... CONTROL

8   C: do you want to explain to him as you go
          ahead and do it Basje so that he can ahe..

A: CONTROL-N is next line .. ya

B: that's what we did

A: what's the CONTROL-P

B: up one .. PREVIOUS

A: D is for.. what does D stand for... DELETE?

2,5   C: right so if you wanted to delete something
          you know what delete means

B: no

A: ya.. take away

6   C: take away

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A: so .. K erase to end o.k. K CONTROL-K

B: where are you

A: there K

CTRL-K (erases top line)
                    8   C: try now the next one .

A: Y

          5   C: what does that do

B: (reading) inserts what K kills

A: oh ya that's neet

Y(erases Y)
Y(erases Y) CONTROL-Y   1   C: neet eh?

A: ya .. what do you need those controls for

          6   C: what if you make a mistake

A: ya but who would take away and then put it
back again

          4.   C: well when do you think you could use one of
those things

B: if you said

A: you don't like it and you took it away but
then

(CR at top line).
                  B: like

          8   C: alright let's fix that one up

A: oh Basje you must have made a CONTROL-O

B: I didn't.. oh I must have

A: ya you did

CONTROL-P   K CONTROL-K
(leaves K on screen erases it) B: phooey on that
CONTROL-Y   it's neet

          8,3   C: alright but now what about fixing that one
then.. how did you make that

A: this line

N CONTROL-N

B: let's see that..
   I'll have to erase that later

A: oh I know why

B: right now I'm busy

A: I know why .. we could first . before we
   write repeat we could write the whole thing

CONTROL-K

B: there tada   I did it I did it A: look

A: what

1   C: good .... alright

(moves second line of prcedure   B: don't ask me what I did .. I don't know
 up beside the title)   I think I went like this ..opps
                                      I'll have to do something else

A: CONTROL-P

B: CONTROL-P?

A: ha ha ha

CONTROL-P
CONTROL-O

B: you see what CONTROL-P is .....your making
   a mess of this

A: I just erase it

3   C: how can you get down to these two then

A: CONTROL-K
(trying random button pushes)   ya CONTROL-K

1   C: o.k.

A: CONTROL-K is the fastest way

7   C: alright you guys
(only END remains on screen)

A: ya that's better

8   C: o.k. now I want that done now

TO

B: TO...

A: how do you make a rectangle right

RI

B: RI

REPEAT

2[

FD 50

FD
(erases FD puts RT 90)

8	C: alright I want that instruction in place
	B: k. it was repeat .. repeat
	A: 2 _ _
	B: but 2 it'd only go 1 and 2..... 4
5	C: what were you gonna say
	B: k. keep going REPEAT 2
	A: FORWARD 50
4	C: so where is the turtle going travel with the turtle
	A: FD ... then FORWARD 20....R no no no put it back RT 90
1	C: o.k.
	A: FD ... no not 30 ....
	B: well Al:
	A: FORWARD...................
	B: o.k. o.k.
	A: I don't think we can make a rectangle
1	C: ya
	A: with repeat
9	C: I don't know we have to do it let me think
	B: but Ali we want it this way we want it like this.... like that so then we just go
2	C: oh alright then o.k. so we went here and then we told it to do what
	B: RT 90
1	C: alright then
	A: REPEAT 50
	B: no 50 it'd be a complete square

129

4	C: is that what you want
	A: no
8	C: so tell him something else to do
	B: FORWARD 20
2	C: so here I am FORWARD 20 ... and then

FD 20

A: RT 90

.....RT 90

| 2 | C: o.k. and so I'm here |

A: I'm lost

.................FD

B: FORWARD 50 then RT 90 and FORWARD 20

...................50 RT 90 FD 20)

| 9 | C: let's see if that works |

B: return?.. I know .. CONTROL-C where are you C

CONTROL-C

A: R1

RI

I DON'T KNOW HOW TO-RI   B: I DON'T KNOW HOW TO R1

A: not RI

B: R1... yeah

R1

| 1 | C: Ahhhh |

A: hey ya nice drawing

B: looks neat though

A: let's do it again then

| 4 | C: but is that what you wanted |

A: no

B: ya

R1   (now have sort of a mill)   oh ya

A: come on let's just do it

R1   neow

B: it's neat... it's the same

A: I know

B: get back over here

A: ya .. FORWARD 20
   now..

FD 20

B: now R1
   go... oh yes

R1

A: neato.... we could do that not this

B: I like this one better I think
   clearscreen

CS

A: now do it

7   C: you can do this side

B: ya

7   C: Banje

B: just a minute

REPEAT

8   C: just wait a second please.. You can do that
        design..afterwards..but I would like to see
        you figure out how to do just the one
        triangle

A: just.. no repeats

5   C: and then

2[R1

B: he

8   C: try it
        and then we can work it in

B: Ali what did you do

A: what did I do I did it like this and like
   here

4   C: what happened here

B: I changed it like I REPEAT 2 R1 and it went
   like that

9   C: o.k... so remember that one but I do want
        you to go back to the original

CS

A: now editor.. E.D

131

ED

B: no not the other one

3   C: what did you tell it to do

A: I put I was putting editor ..then Basje
   returned

1   C: oh o.k.

A: ED

B: R1

A: shift

B: oh I know what to do I know what to do
(they are already in the editor)
CONTROL-C   ED wops no you don't.. watch this I won't
ED R (erases R)   mess this up
   °R1

A: I'm pressing it for you

B: no wait I want to write this down
(they are in the EDitor now)
ER   A: control-n .. now erases ER oh my god

B: erase. oo

10   C: look at the chart.. is there an ER on that
      one

A: nope... I think that I better BK that
(uses backarrow to erase ER)
3   C: o.k. what is it that you want to do

A: take away (both boys are laughing)

B: oh Ali

(erases 0)
9,5   C: Alright look at this line here
       do you know what you

A: ya D delete delete D CONTROL-D what am I
   saying

B: oh I want to delete the whole thing

4   C: I don't know do you

B: no oh o Ali what are you doing This ain't

132

working Al
(erasing REPEAT from the program in the EDITOR)
A: yes it is

B: woa I'm trying to write something
Hey where am I   oh

4   C: can you shorten that up a bit

A: CONTROL-K

B: no don't please

A: let's say I do CONTROL-D

D

B: oh god

A: what did I do....... what did I do
oh get back there

10   C: can you turn into that .. turn that into a
shorter line .. with a repeat is there
anything in there that is repeated that you
can turn that into

B: yes look , FD 50 ,

A: REPEAT

B: RT 90 FD 20 RT 90 FD 50 RT 90

8   C: o.k. so would you mind shortening that up
for me

A: me.. Basje . ya

B: he can do it

7   C: no no no you can do that cause your the one
that saw that

B: I don't know how

2   C: your still in the editor so your still fine

B: o.k. so what do I do again

A: what's erall

9,5   C: that's in the ahm... while Basje works on
CONTROL-K   that then I'll .... say you have umm....

133

where'd it go

                                        B: CONTROL-K I put

            8   C: alright write that in then .. write the um

                                        A: ya command if you know it

                                        B: I don't

            1   C: yes he does

    REPEAT   B: REPEAT repeat

            2   C: repeat

                                        A: repeat

                                        B: repeat

                                        A: repeat... 2 4
        2
                                        B: no

                                        A: k. 2 . k. now forward 50.. RT 90
        [FD 50 RT 90
                                        B: then you REPEAT.. how mu.. just a minute
                                           just a minute

                                        A: FOWARD 20 then

                                        B: no wait ..wait Ali no
        FD 20
                                        A: FD 20 RT 90

                                        B: no..... k. we did this

                                        A: oh boy.. sleep

                                        B: k. here's 1

                                        A: hey Janie, get to use the printer?

                                        B: no

            #   C: no

                                        J: Friday
    (B is typing procedure during this talk)
                                        A: hey let's look at a game when it's...

B: that's tomorrow Al

A: I know .. I wanna pick the games.. pick
   one before ..... what.   what are you doing
   Basje

(line reads)
REPEAT 2[FD 50 RT 90 FD 20 RT 90 REPEAT 2

B: now .. C

A: are you going crazy Basje

10   C: look it over before Basje

A: Basje.. look

B: what.. REPEAT 2 o.k.

9   C: o.k. follow the turtle

B: FD 50 like this o.k.

10   C: you tell me alright.. here

B: then I did REPEAT twice like you REPEAT
   this twice

8   C: do it on paper and let me see your

A: already repeated 2

1   C: o.k.

B: k. here's the turtle ...

2   C: alright he's there

B: k. we want to REPEAT

A: FD 50

B: k. FD 50 so we go up ..

A: then RT 90

B: RT 90 so facing this way

A: then forward 20

B: forward 20

135

A: and RT 90

B: RT 90

A: and then do the same thing again

B: then

A: do the same thing again like you went up here and like that so see .. so what's the use of putting REPEAT 2

1   C: ah..

B: to make it twice..oh no it is

A: it is

8   C: Ali you try it now.. wait a sec ..I want to see something before you change it.. you follow those instructions

B: hey look ..if I press CONTROL-P it'll go up there ..if I want to go down one step ...it goes

A: then REPEAT (he's working on the procedure) RT 90... it's facing this way now

5,8   C: alright... so is that a correct command.. try it

B: what
(erases END and spaces to end bracket of the repeat list)

A: what are you doing

END

B: CONTROL-C

R1 DEFINED

A: o.k.

B: oh.. uhn?

136

D2.E7.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

NOT ENOUGH INPUTS TO REPEAT:
JUST BEFORE LEAVING R1   B: then R1
R1   tada there we go
NOT ENOUGH INPUTS TO REPEAT:
JUST BEFORE LEAVING R1   3   C: how could you turn that into a procedure
                                   then

                               B: R1 R1

                               A: REPEAT 2 R1

                  5   C: si vous plait

                               A: we'll call it a

REPEAT
                               B: REPEAT.. REPEAT 2 R1

NOT ENOUGH INPUTS TO REPEAT:
JUST BEFORE LEAVING R1   A: Basje we're trying to make a procedure
                                  TO REC

TO R
                               B: TO REC

        EC   A: no

                               B: TO no no no no. Ali
                                  I have a better idea

                               A: (can't make out)

                  2   C: maybe he's trying to tell me something

                               B: at the end of this time ..we're gonna do
                                  this your gonna have a whole bunch of
                                  bruises on ya
REPEAT 2[R1
                  ‡   C: yes I think so I'm gonna have to start
                                  wearing boots

END   A+B: RETURN .. E N D

                               B: phooey

                               A: RETURN

REC DEFINED   B: REC DEFINED

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REC NOT ENOUGH INPUTS TO REPEAT: JUST BEFORE LEAVING R1	REC wait wait wait Ali we wanted to clear the screen
	A: o.k. clear it
CS	
	B: it's not gonna work .. look
REC	
	A: hey wait a second why don't we change..
NOT ENOUGH INPUTS TO REPEAT: JUST BEFORE LEAVING R1	R1
1	C: hmmm that makes sense
	A: ya we'll make a REPEAT 4 then so it'll make same kind design
8	C: o.k. try that
	A: Basje REPEAT 8 or 1
ED (erases ED) REPEAT (erases REPEAT)	oh ya clear screen
	B: o.k. o.k. sheesh
CS	
	A: now REPEAT 8
REPEAT 8[R1	R1 .. k just do it
NOT ENOUGH INPUTS TO REPEAT: JUST BEFORE LEAVING R1	B: why not
	A: what does it mean not enough inputs to repeat
9	C: let's take a look at it then
	A: hmmm
4	C: how are you gonna at what you made or what you did
	A: we said repeat 8 R1 so R1 will repeat 8
10	C: ya but if R1 isn't working...
	A: put REC
8,4	C: we have to look at R1 and see what we didn't do.. is that gonna give you what we
REPEAT	didn't do Basje

```
                                    B: no I'm just gonna watch for something
            B[ REC                     just in case
    NOT ENOUGH INPUTS TO REPEAT:
    JUST BEFORE LEAVING R1             it's so strange
    C8

    REPEAT 16
                        5           C: did we look at those then
            [REC
    NOT ENOUGH INPUTS TO REPEAT:
    JUST BEFORE LEAVING R1           B: huf.. forget it

                                    A: it doesn't work
    CS
    ED                  3,1         C: you tell me ..how are you gonna find out
                                       good Basje.... good start

                                    B: R1 or REC

                                    A: R1

                        3,10        C: what if you wanted to do look at both
            R1                         there's a way that you can look at both

                                    A: POPS

                        2,5,        C: no.. your in the editor ... can you go back
                                       Basje
    (erases R1)                        alright if you want to look at more than
                        6,8            just one program there is a routine that
                                       you do you see .. would you please take
                                                    away  the quote..  and put  a  bracket ..an  (erases ")
    open bracket now what do you want to see

            [
                                    A: R1 and REC1

                        8           C: o.k.  write in R1

                                    B: do I have to put that

                        2           C: no no not in this case
    (erases ")
            R1                      B: R1

                        5           C: o.k. and.. what's left

                                    B: n what
            REC
                                    A: close brackets
            ]
```

(erases])

6   C: no

B: press return

6   C: see.. now you learned something new about
         if you want to see some more than just one

B: alright this

1   C: o.k.

D2.E8.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

3   C: well how are you gonna figure out what's
               wrong

          A: do it again

2   C: alright you..I'll be the turtle then.. you
               and Basje tell me how to go

          A: REPEAT 2 FORWARD 50

          B: go ahead I'm just writing down

          A: FORWARD 50

          B: to ed more that one

2   C: I'm in here.. o.k.

          A: REPEAT 2 FORWARD 50

2   C: alright 50

          A: RT 90

2   C: RT 90

          A: and FORWARD 20 then RT 90
             ... wait a minute the bottom part REPEAT 2

5   C: Basje why did you put REPEAT 2

          B: well because like if we do this we're
             telling it to do that then REPEAT it'll
             REPEAT twice

10   C: he's already here he's here .. and then
             your telling him to REPEAT 2

          A: ya if Basje

3   C: where's he gonna go to if you tell it to
             REPEAT 2

          B: oh I don't know.. oh

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5   ~   C: do you think he knows

                    A: nope

                    B: no

                    A: Basje look .. the rays thing came through
                       here

        3   C: so how can we fix that then

                    A: take the REPEAT 2 off

        B   C: try it then
  CTRL-N
  CTRL-N
  CTRL-P   A: how do you move it to here

                    B: see I wrote down if more than one procedure
                       or whatever

        1   C: oh good
(Ali moves along line with CTRL-F to the error)
                    B: ED then bracket. one bracket of it..
                       then I put up here I put space space-an
                       whatever

        1,4   C: good o.k. so you'll remember that way
                       o.k. now how are you gonna delete that

                    A: with CONTROL D

        5   C: see what it does
(erases error with sucessive CTRL-D's)
                    B: hmmm

                    A: good now erase that.. dumg. what
(writes a D instead of a CTRL-D) ya back.. how'd you do that

                    B: how'd I do that I went .. that.. look I'll
                       do it look ..like that ...
(erases END with control moves)
        6   C: ya but we . we don't want that though

                    B: I know

                    A: keep in there
  E
                    B: No Ali
(erases E puts PP CONTROL-P) then.. how do you get there again

                              142

| | C: o.k. what do you have on here that could give you that |

B: F

3   C: where do you want to go

B: F.. forward.. I want to do it

A: oh no .. it makes space
(presses F instead of CTRL-F)   see
(erases F. does it again)   just do this Basje
(erases F. does CTRL-F   this makes it go see
(moves to end of line Deletes P and a blank line)
                                  A: oh ya

8   C: careful

A: now put end
(does CTRL-N)
B: yap
(CTRL-P then CTRL-F along the line to the end again)
                                  now what

5   C: well try what do you want it to do

B: I want to move the cursor there
(Ali helps out)   oh thanks

A: now you put the end bracket
   now CONTROL-C

B: is it o.k. now

4   C: I don't know is it

B: nope

A: ya..... oh END
END   now it's o.k. CONTROL-C
CONTROL-C
R1 DEFINED
REC DEFINED   B: R1
R1
A: doesn't look how I think it would

B: yaho

1   C: good

B: well it's pretty small

8

CS

REPE

at 4

[R1]

CS

1

REPEAT

4[R1

RT 90]

REPEAT

(erases REPEAT) CS
REPEAT 8[R1 RT 90]

REPEAT 8[R1 RT 90 RT 90]

CS

A: let's say REPEAT

C: now you can go ahead and do the design you want

A: alright Basje I'm gonna do C S return

B: o.k. o.k. I gotta do something

A: Basje.. REPEAT 4

B: ya I know I wrote it down there eh

A: no I'm doing something else ..look REPEAT look this is cool ..4

B: ya

A: now look watch this watch this ahm R1 watch

B: go....(repeats over itself) very good Al:

A: oh I know I know REPEAT 4 RT 90

C: o.k.

B: REPEAT

A: 4 .. R1 ..RT 90
   ya

B: I can do that in a sinch watch

A: let's tell him to do it here like one here and then another
   wait ..first he'll do the thing

B: oh ya ..change the angle

A: o.o hey Basje forward 20

B: hmm .. k. do what you want to do .. mine didn't work out

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D3.E1.83

A: = ALI
B: = BABJE
CT = CONNIE (teacher)

BT   B: o.k.

                9   C: notebooks   pencils......procedures

                            B: now let's try everything we did.. see how
                               it works........

                8   C: see if it works

                            B: see if we still got it... we can always fix
                               this

                            A: ya

                2,1   C: if you want to go back to that that's fine

                            B: I don't have all the stuff you do

                            A: I don't know

                            B: see if this

T1
I DON'T KNOW HOW TO T1   we didn't save T1.. the little thing like
                                that

                            A: yes we did

                            B: look .. T1

T1
I DON'T KNOW HOW TO-T1   5   C: why didn't it appear on the screen

                            A: cause we didn't load it

                            B: oh ya that's true

                            A: load shapes 5

LOAD   B: no the first one

     SHAPES   A: forgot the dots

(erases SHAPES) "SHAPES   B: Ali

POTS   A: oh ya
TO CAB

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```
TO PATTERN
TO HOUSE
TO S1
CS
LOAD "SHAPES 5
(erases 5)  5
POTS
TO HAIR
TO CURLS
TO CAB
TO PATTERN
TO HOUSE
TO S1


                              5


CATALOG
HELLO
SHAPES4
SHAPES3
SHAPES5
SHAPES2                       1


LOAD "SHAPES2
POTS
TO W.M
TO BODY
TO DOME
TO BLADES
TO X
TO TRI :S
TO DESIGN
TO PROVER :S
TO PROVER2 :S
TO HAIR
TO CURLS
TO CAB
TO PATTERN
TO HOUSE
TO S1
```

B: This one.. o.k.

A: no together

B: they're not all in there

C: how would you know what else is in there
   what's the other command .. to know what..

B: catalog

A: c?.alog
   l.o.g.

B: I know - —

C: see hem

B: shapes2

B: there see TRI :S1

A: there is no T1

B: there is so..T2 T3 remember that funny star
   we did

```
CS
```

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CAB

(CAB is still running)

CS

REPEAT 10 [FD 90

                    LT135

(erases and puts in space)

CS

REPEAT 10[

        FD 5

                    4

            LT 135]
                3

A: star? oh CAB

B: no ..look

A: the funny star

B: not that one

A: oh ya I .. it'll try that again   it's
   REPEAT 10

B: oh no clear screen   oh

A: what did you do CAB for

B: might as well not enjoy it

A: now REPEAT 4 no REPEAT 10

B: I know I have it here

A: FORWARD 90 LT 135

B: A1..

A: put your space

B: that star

A: let's do it smaller

B: o.k. CLEARSCREEN

A: FORWARD 10

B: no

A: 8.. try 10
   50!?

B: 5

A: oh

C: what are you doing

A: we're trying to do a small one

B: a real small one

C: what did you learn yesterday that you could

change that to larger or smaller

<table>
<tr><td>HT</td><td></td><td>A: S S.. ya we'll make a new procedure</td></tr>
<tr><td></td><td>4</td><td>C: o.k... could you change the one that you do
have</td></tr>
<tr><td></td><td></td><td>A: we don't have any for that</td></tr>
<tr><td></td><td>2</td><td>C: you don't have one for this   o.k.</td></tr>
<tr><td></td><td></td><td>B: no so we have to do TO...</td></tr>
<tr><td>TO</td><td></td><td>A: star</td></tr>
<tr><td>SGT (erases SGT)</td><td></td><td>B: ya o.k.
TO STA.. oh what am I doing</td></tr>
<tr><td>SA (erases A puts TAR\)
(erases \)</td><td></td><td>A: hey what I put .. this is what I took</td></tr>
<tr><td></td><td></td><td>B: TO STAR ... S</td></tr>
<tr><td>TO STAR :S
REPEAT 10 [FD :S LT 135]
END
STAR 40</td><td></td><td>A: REPEAT 10 FD :S LT 135 END
then STAR 20</td></tr>
<tr><td></td><td></td><td>B: that was 40</td></tr>
<tr><td></td><td></td><td>A: k that was what we made... k let me think</td></tr>
<tr><td></td><td></td><td>B: turtles not even there</td></tr>
<tr><td></td><td>3</td><td>C: what did you do</td></tr>
<tr><td></td><td></td><td>A: he hid the turtle
it's around there</td></tr>
<tr><td>CONTROL-T
CONTROL-S</td><td></td><td></td></tr>
<tr><td></td><td>4</td><td>C: k. to make it ahm</td></tr>
<tr><td></td><td></td><td>A: bigger?</td></tr>
<tr><td>CS</td><td></td><td>B: you just go</td></tr>
<tr><td></td><td>2</td><td>C: as large as the screen</td></tr>
<tr><td></td><td></td><td>A: no no don't clear screen...</td></tr>
<tr><td></td><td></td><td>B: to bad</td></tr>
<tr><td>STAR 40</td><td></td><td>A: make a little one then bigger then over
STAR 40</td></tr>
</table>

B: I want to make that box again

                            5   C: which box

                                        B: that funny one
STAR 20   \   all those little boxes   )

                            1   C: o.k.

                                        B: oh we could do that with circle too

                            1,6   C: yes you can..... ya.. I don't think we have
                                           a program for that though
CS

                                        A: hey ya and then we can make a cube and a
                                           square and show the lines inside of it

                            9   C: alright let's go

                                        B: k.

                                        A: what do we do first

                                        B: we have to do that box there

                                        A: ya

            —   B: is it loaded

                                        A: yup

                            1   C: yes
BOX

                                        A: BOX how much

                                        B: BOX

                                        A: 90
'90

                                        B: no it's too big
(erase 90 puts 60)

                                        A: we'll do a design
I DON'T KNOW HOW TO BOX   LOAD ....
LOAD "

                                        B: LOAD...

                                        A: wait just put POTS see if it's in there
                                           or not
(erases LOAD ")

                            1   C: good
POTS

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CONTROL-T   A: we don't have no BOX.... we don't have BOX
                      in our thing

C: aha

                   A: we have it in SHAPES something

3   C: would any of those be in it.. or else how
                      could you find out what else is in there

                   A: catalog

5   C: did you load everything from catalog

                   A: everythings put on SHAPES2

                   B: and SHAPES5

CATALOG
6   C: we don't have to go back to those um cause
                      we have repetitions and stuff

                   A: well SHAPES5 has them all...remember we did
                      it before..... LOAD "SHAPES5
LOAD "SHAPES5
POTS   no box

3   C: no what else is there

                   A: it can't be in SHAPES3

                   B: well we'll try

4   C: do you want to go through now and try to
                      fix up those ah mistakes

                   A: ya

                   B: ya ... first of all let's try them all

9   C: alright let's try them but can one of you
                      then ahm keep a list of what's in it and
                      then as we go along we can fix it up

                   B: you can do that Al

03.E2.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

4   C: so where do we start

     B: wait write them down now... write them all
        down

(making reference to the POTS listing)
TO STAR :S
TO W.M
TO BODY
TO DOME
TO BLADES
TO X
TO TRI :S
TO DESIGN
TO PROVER :S
TO PROVER2 :S
TO HAIR
TO CURLS
TO CAB
TO PATTERN
TO HOUSE
TO SI

5   C: which way you gonna start

     B: what about that one there

6   C: that's the one that he wants us to keep
        to ahm transfer everything we have for him

     A: for him

     B: where do you want me to put it

9,5 C: why don't we put it over on the printer
        or over here.. alright.. which one we gonna
        start with then

     B: ahm ... SHAPES2 A1

     A: no this is SHAPES5

     B: ya we'll do SHAPES5... we'll do ya we'll
        go by order from here

     A: k

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B: Lo Logo Logo Logo Logo Logo

5   C: you know why they have those
(making refernce to the LOGO on the catalog listing of LOGO files)

B: cause to know what the thing is

A: it's fun

CATALOG
DISK VOLUME 254   B: K. there
A 2 HELLO
T 2 SHAPES.LOGO
T 4 SHAPES4.LOGO
T 3 SHAPES3.LOGO
T 2 SHAPES5.LOGO
T 5 SHAPES2.LOGO   A: now do SHAPES

B: k. do SHAPES.. SHAPES2 no SHAPES
   k. LOAD ...
LOAD "   SHAPES
      SHAPES
A: POTS

B: SHAPES
POTS   k. there... hun?

1   C: alright that's o.k.

B: that was in SHAPES

2   C: well we're just gonna have to see

A: everyone has the same thing

2   C: well that's why we want to fix it up don't
   we

B: k. STAR

A: S

B: W M

A: W..M...go on

B: BODY

A: BLADES DONE

B: no DONE

A: then BLADES

B: ya

A: then X

B: TRI S.. TRI S

A: go ahead TRI S

B: TRI S   DESIGN PROVER S PROVER2.....S
   PROVER2 S it's already there

A: PROVER2 S

B: HAIR

A: HAIR CURLS

B: CAB PATTERN HOUSE and S1 that's it

C: o.k. usually we give it a name of all the
   ones that are similar like if ah..

A: like PATTERN and CAB

C: made up something else but uhm .. let's see
   how we do.. o.k.

B: k. now

A: we'll have to make a new BOX and then

B: k. we're gonna find out if these work
   then if they .. see what they look like

A: no they work they work

B: no to see what they look like

A: we tried everyone and we did STAR S right
   now
   write CONTROL-L

B: why

A: then we see it

B: once you press CONTROL-L it goes

A: draw it .. or check it out.. if it works

9   C: or describe it

       A: windmill

5   C: is this saved.... STARS S

       B: yup ..ya

       A: nope

5   C: was it saved

       A: ya it was it was saved

       B: we never saved it

       A: because .. it was on the thing

3   C: but does that mean it was saved

       B: no.. we'll save it at.the end

       A: o.k. we'll save it at the end

1   C: o.k.

CS

       B: _BODY

BODY

       A: what's a BODY.. oh ya

       B: there it is

       A: then a DONE

DONE

       B: oh yes

       A: he does one there

3   C: now why did that happen

       B: because the turtle was facing.that way
         .looks good that way

       A: ya looks like a .a.. ya looks like a looks
         like a can of drink or something apple
         behind it

4   C: what else does it look like

       A: well.. looks like ...

B: if you put it that way

A: a bark of a kind of tree or something
   sticking out like..

6   C: see how we all look at it differently cause
   when I looked at it .. I thought it was a
   mug you know with a handle

B: ya .. when I put it this way

1   C: ya

B: and it looks sort of like the white house
   you know with that big thing there but it
   should have been in the middle

1   C: oh ya

B: k. BLADE.. this is gona look ugly

BLADE

A: blah....from over here vyum vyum

B: k. that's it cause the angle was wrong

1   C: ya

B: X

A: oh yes X marks the spot......
   oh

X

B: try S... well we'll just put anything
   nyup

TRI (variable input)

A: nyup

B: nyup

A: nyup
   DESIGN I like it when it does DESIGN
   wait you gotta clear screen before you do
   DESIGN

B: oh ya

A: CLEARSCREEN

CS

B: zzzzup

A: now DESIGN

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DESING
I DON'T KNOW HOW TO DESING
CONTROL-S

DESIGN

CONTROL-L

3

4

3
(DESIGN is complete)

LCS
I DON'T KNOW HOW TO LCS
CS

PROVER 50

CS

Basje you know how to spell DESIGN

B: I know... I know how to spell DESIGN

A: no? o.k. tell me.. DESING

B: oh ya.... D.E.S.1.G.N

A: return gargle gargle gargle...
CONTROL-L....... CONTROL-L hurry up

B: there's one thing I don't like about this
that big thing in the middle

A: bah looks..

B: that

A: I'd rather have a little square

B: no no it's alright

C: how would you take it out

A: just zip it...

C: how

A: out from editor

B: ya but then the whole thing won't go

C: would it

B: very good

   I don't know how to
   k. now what

A: PROVER S.. how much you gonna do it

B: 12
PROVER

A: forgot what PROVER looks.. oh ya

B: put PROVER 50

A: PROVER2 S what's a PROVER2 S

B: I don't like it though

A: same thing I think

B: oh.. I know no I know what it is

10   C: there's something else we have to do

A: oh ya we have to..it does a butterfly thing
(PROVER or PROVER2 is being executed on screen)
          same thing

B: no cause we don't have that big thing there

A: oh ya
     how about a butterfly ..you didn't

CS

B: it cleared screen right away .. put
     CLEARSCREEN and return and it zzzzzt

5   C: when

B: when it was writing

1   C: oh... o.k.

A: to bad we didn't save our butterfly... we
     could do it again today

4   C: ya we can do that ..o.k. what's next·

A: HAIR

B: oh right watch this, watch this
     look all I do is.... find the R

HAIR CS   there and then I just do CLEARSCREEN
     press return ..

A: some hair

B: that was a little hair that little round
     thing

2   C: oh ya that was just a start of it

A: now CURL

B: CURLS

CURLS CS

A: du du du ..du du du ..du du dump dump dump
     wo wo wo nice hair line
     (can't make out.....)
     stop ..... stopped

CAB

B: k. CAB

A: oh we know what CAB does voom voom voom...

CONTROL-S
CONTROL-L
CS

B: see what it drew Al wait wait wait

A: he just didn't want to join that thing

B: (laughs)

A: now PATTERN patty pat pat pattern in the ..

PATTERN CS

6   C: Al I can't make that one out

A: I just went like that

B: hey I didn't see PATTERN..well PATTERN was
   just one of them

A: ya

B: PATTERN was just one of them

A: I know used it in the CAB

B: k. now we'll do HOUSE

A: without making anything

HOUSE
CS
S1

B: a lovely house.. see what HOUSE looks like

A: S1 is just like ..

CS

B&A: neow

A: we have to make a box...now we have to make
   a box

B: hey look they copied us... oh but theirs is
   better

4   C: what would be the difference between that
   one and what we did

CONTROL-S

B: ours has a line there

A: ya ours is smaller

4   C: alright and if you wanted to make it bigger

A: S (refering to using a variable :S)

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1,3 C: right o.k. .. can we group some of these
      together

      B: hey they got a they got a different one
      ya we can we can..
(unable to decode statement)

      A: hey I know how we can make a good design
      take X I mean BLADES then you repeat it
      around ten times .. each time RT 1
      something like that

      B: no look look look look we can make the
      windmill by just puting the body

      A: we already made the windmill

      B: no no BODY then DOME

      A: then TRI no just TRI S you can do then

      B: or TRI S it doesn't matter... and then the
      blade and then the end so we don't really
      need these this this this this

      A: yes we need BODY

      B: oh ya it's true we need it

      A: I (not clear) go back

1   C: o.k.

      B: I didn't know what I was thinkin about

5   C: do you want to keep the general name SHAPES
      then to include everything or do you want
      to start breaking it up a bit.

      A: keep it

1,5   C: keep it alright what about the other files
      then

      A: other files? they're all the same anyway

      B: well we'll try

4   C: do you need them

      A: ya

B: we'll try

A: ERASEFILE..we'll ERASEFILE all the way down
to except that one

B: you sure we..

POTS (same listing as above)
CONTROL-T
LOAD
　　　　　k. so.. LOAD... LOAD SHAPES2

A: why 2

B: cause we'll see if they're all the same
they probably are .. SHAPES4

"SHAPES4

A: we already did SHAPES2

B: k. then SHAPES4

A: same thing...... stopped

B: I know

A: it goes again.. what is this
(reffering to the red light on the disk drive)
I DON'T KNOW HOW TO POT
POTS
　　　　　stopped it's gonna go again watch

B: wooo

A: see same thing exact

B: STAR .. ya

A: ERASEFILE.. everyone except that one

2　　　C: which is the last one

A: SHAPES2

4　　　C: well are you sure

A: no way

9　　　C: o.k. check it out first

A: no no this is SHAPES this is SHAPES

2,4　　C: that's SHAPES and this is SHAPES4 do you
have everything in the same one before you
change anything

A: yup

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3   C: are you sure

        B: y

        A: no

        B: (laughs) no

3   C: how are you gonna check it

        A: check SHAPES3

9   C: wait a second before you do anything...
           you know

        B: check out all the shapes

4   C: you know what's in SHAPES how can you see
           if SHAPES4 has everything in SHAPES

        A: just look at em

9   C: k. why don't you both look at it and see if
           everything is in there

        A: k. read them out

        B: STAR S

        A: got it

        B: WM

        A: right here

        B: BODY

        A: yup

        B: DOME

        A: yup

        B: BLADES

        A: yup

        B: X

        A: yup

A&B: TRI S

A: DESIGN   PROVER S PROVER2 S HAIR CURLS CAB
   PATTERN HOUSE S1

C: ya alright so what are you gonna do to   — 4

A: ERASEFILE

B: erase SHAPES4

C: ahm   #

A: ERASEFILE .. points

C: right   1

B: Ali

ERASEFILE
NOT ENOUGH INPUTS TO ERASEFILE A: ERASEFILE........not enough inputs..
                                   he wanted to ersae the whole file or what

ERASEFILE *

C: if you wanted to erase the whole thing you   6
   have to be careful about that you say
   ERASEALL.. and that's dangerous so don'..
   unless you want everything gone

B: SHAPES4

SHAPES4

C: o.k.   1

A: and other ones too

B: no no

A: come on erase them

B: phooey on that

A: next time we do it on your disk

B: everythings on my disk

C: we'll change that   6

A: ya

B: now what

A: ERASEFILE SHAPES 3

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C: are you sure that everythings on SHAPES 3

                                    B: no

                                    A: yes

                                    B: no we're not .. look
LOAD "SHAPES   LOAD...

                                    A: if it's on SHAPES it should be on SHAPES 3
                                       cause SHAPES 3 we did afterward

POTS   C: ya but you'd feel bad if you lost something

                                    B: ALI
(same listing as above)
                                    A: see its same thing

                                    C: k. go ahead

                                    B: alright STAR S

                                    A: I got it o.k. MM

                                    B: ya

                                    A: BODY DOME BLADES X TRI S DESIGN PROVER S
                                       PROVER S 2 HAIR CURLS CAB PATTERN HOUSE S1
                                       LOGO

                                    B: AHM...... where are you Al
ERASEFILE *
                                    A: oh my god we have sixteen

                                    B: ERASEFILE ..

                                    A: SHAPES 3
SH(CONTROL-A)
                                    B: hey
(uses CONTROL-F to get back)
        APES   SHAPES 3?

                                    A: yup

                                    B: yup

                                    A: open it Basje

                                    B: no .. it's my disk

                                    A: see you stopped it you touched it

B: I didn't even touch it

A: erased all the shapes

B: no .. we want..

A: we saw SHAPES 2

1   C: ya but you ..well o.k. whatever you like

B: well which one do we wanna keep..SHAPES2 or
   SHAPES

A: we wanna keep SHAPES we wanna keep SHAPES
   it's better than the number next to it

1   C: alright

LOAD

B: LOAD

A: I'm gonna do the work
   oh ya goona do the work and that's the
   only one the one thing inside it.. then
   SHAPES will be sixteen

*SHAPES5

B: there's SHAPES 5 da da da da da da da da
POTS   STAR 5 and bl bl bl bl bl1l1 b

A: just erase it
   if it starts with STAR and ends with S1 we
ERASEFILE   know it's the one

B: ya....... ERASEFILE..
*SHAPES4 (erases 4) hu Al1 you just erased SHAPES

A: didn't you write 4

2   C: no

A: you didn't

B: you pressed return

7   C: you fellas are goona have to be careful
   about this

B: k. doesn't matter we'll keep SHAPES 5 then

A: no .. ya.. keep SHAPES 5

6   C: alright but that I think teaches us a

lesson

B: him a lesson

1,3   C: alright ...... o.k. that was a good idea
alright how can you see now what's on there

B: where...... on there

A : LOAD

B: LOAD

D3.E3.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

PU

B: o.k. you tell me what to write Al..
   PENUP.. cause we want it up here

A: PENDOWN

B: PENUP cause you want it up here

A: no make a line when you go up there

B: ya but then we can't put the face here

9   C: you try it yourself Basje and see

B: o.k. PENDOWN

8   C: you tell him what to write....

A: o.k.

8   C: then we'll reverse it... you tell him..

B: the other time when we were making
   something I had to tell him what to write

A: now .. FORWARD..

B: the pen's up..PENDOWN

A: PENDOWN
PD   PENUP

B: no we won't put PENUP

A: we won't put PENDOWN either

B: argh

A: k. now FORWARD...FORWARD 50
FD 50

B: zoom

A: RT 120
RT 120

B: today I might be able to stay until 12:30
   cause I'm walkin home

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A: TRI

B: from .. you know where I live ..
   by Good Shepard

A: ya.... TRI 40

B: I'm gonna walk.. TRI 40?

A: no TRI 50

TRIO (erases 0)

B: 50?

A: ya 50

50

B: TRI 50 nyup

A: that's hat ..wrong direction

B: lovely hat .. I love it... I love it

4 C: o.k. so can you use that

A: wrong direction nope

3 C: what would you do .. why

A: cause..um problem is we don't want it

3 C: ya but could you use the same command to
   do something

B: ya ... change the angle

A: oh ya .. RT but transfer to something

1 C: well

A: what are you doing now
   CLAN?

CC(erases C) LAN

I DON'T KNOW HOW TO CLAN

B: clan hu

CLEAN

A: CLEAR OR CLEAN....

B: nuyp

A: ok CLEAR too it works.. oh ya

4 C: k, what's the difference between CLEAN
   and the other one

167

A: nothing

HONE

1   C: um hum

A: well it didn't go HOME

1   C: o.k.

CLEAR
I DON'T KNOW HOW TO CLEAR   B: see.. I don't know how to clear

A: oh that's too bad

2   C: no no no between CS

A: oh

2   C: and CLEAN

CLEAN

A: k. now RT 90

B: we have to go up don't we

A: you'll see

B: RT 90?
nyup

FD (erases FD) RT 90

A: TRI 50
this is better

TRI 50

B: (laughs)

A: a little better

B: we can always make .. we can always change
the TV

+   C: ya but...

A: o.k. just erase

CS

5,2   C: wait a second .. what could you have done
in what direction was it.. it was this way
and to make it

B: I know we can just turn it here.facing that
way

1   C: right

A: ya.. oh ya right

LT 1890(erases 90) 0   no make it facing this way.. k. it's facing
                               this way

                  B: there

8   C: well try both ways and see

⊕   A: it's gonna face this way

8   C: well I'm not sure either so let's try

                  A: I'm sure
LT 90   what's he facing that way for

                  B: k. RT something

→————RT 180   A: hundred and 80
                      ya that's right... TRI 60

TRI   B: I know what's gonna happen
                      I know what's gonna happen
60

                  A: it's gonna be good right

                  B: nope

                  A: why not

‡   C: hmmm

                  A: now

                  B: cool .. right?

                  A: this one done ..nother direction

                  B: what?

                  A: this one nother direction

                  B: this on o --- ection (mumbles to copy Ali)
                      no first of all we have to it over here

                  A: FORWARD ..FORWARD 50
FD 50

                  B: quam fgjhgbcj (mimic)

                  A: now ... RT 90
RT 90

                  B: the wonderful wizard of OZ

BK 5

CURLS

PE
BK 5
PD
LT 90
FD 5◊

HT

A: BK 5

B: B .. the pen's up eh.. down I mean

A: ah a o.k. .. now

B: CURLS

A: you took the words right out of my mouth

B: (garble, sounds like private drinks)

A: 26?

B: (repeats garble)

A: keep it caps lock eh

B: ah not bad

A: should have kept it there

B: its good like that .. cause then it's like
   it has a rim there

C: um ha

A: hey ya.. excellent

B: stop

A: alright

B: now PENERASE this and put it

A: ya

B: on there

A: put it on there.... just PENERASE
   BK 5
   PENERASE ..BK 5
   then .. LT 90
   and FORWARD 5

B: (making squeaky noises)

C: nice

A: nice hat

B: now get over here and

A: now it looks good like a witch

B: no

A: just joking... k. put it back there

B: put it back where

A: where it was

B: SHOWTURTLE

A: right
   ah... disappearing trick

B: I'll try a disappearing trick

A: BK 10

B: I..hu?

A: BK 10

B: I have the hiccups.. hic

A: good .. now RT 180
   good.. now we go FORWARD for the thing right

B: the pens down

A: facing.. pen's down?

B: pen's down ya

A: put it up then

B: FORWARD how much

A: PENUP o.k. wait.. we want to make it like
   this right

B: ya ya.. ya ya ya

A: chin

B: so .. I don't know.. his tounge...
   I don't know

C: a square tounge?

ST

BK 10

RT 180

PU
FD

5

B: well it's a square guy... block in here

A: (mumbles something, not clear at all)

B: let me see my disk let me see my disk let
   me see my disk

A: oh ya make windows for the eyes

B: ha ha ..ya

5   C: whose disk is in there now

B: mine

2   C: oh that's your..

B: bankstreet

*   C: oh

A: we'll make it like this.. o.k.

B: Ali are you staying t. are you staying till
   12:30

A: 12:30? ya I'll ask

B: I am

A: no I doubt it

B: I'm gonna play with the joystick

A: oh you gonna play that game

B: frogger?

A: ya

B: ya frogger

A: maybe if Ken stays eh

B: Ken and Kirsten

A: eh?

B: Ken..come on let's work

A: k. now... k. FORWARD

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PD

PENDOWN DIDN'T OUTPUT TO FORWARD
PD

FD 5B

RT-9B

FD 3B

FD 2B
LT 9B

RT

9

3

9

B: pen is up eh

A: whauu PENDOWN

B: then why did you tell me to put the
pen down didn't output to forward

A: now .. FORWARD ..5B
nice face

B: doo

A: now.. RT 9B... to make the face .. the
chin coming up... remember we make the
last there

B: the ears...k. there's a good one

A: k. FORWARD..

B: ears can be BODY..... no BODY's gonna
be too big

A: ah who cares

B: should have been BODY S

A: FORWARD 3B

C: you could change it

B: yup

A: FORWARD 3B... now FORWARD .. 2B
making a square aren't we.. square head ha

C: what could you have used for the ahm head
instead of going all those directions

B: block something

C: ha so how about including that in your
written one so when you do it

B: oh no because then it'll go tch tch tch tch

A: ya

B: across right through there

C: well

173

B: dooa

A: oh it's going over there ya well
   too late

6 C: ya but when we redo it

180

A: if we redo it

A&B: (laugh)

6 C: well if you want to show your parents you
   will

B: we'll redo it we'll redo it

FD 50

A: FORWARD 50

HT

B: hey that looks pertty good

A: pertty good pertty pertty

B: we can aake this into a procedure

A: now we'll aake our BK

B: to clown brbrbrbrb

7 C: ya.that's what I'd like to have done by the
   end of the class

B: o.k... what tiae is it

A: BK

ST

2 C: it's only ten after nine

B: o.k.

A: BK 20

BK 20

B: now work fast Al cause I want to do it.
   soae one's got to print it out

another kid: do you know where the frogger is

B: no

A: Kenny has it

ak: are you sure it's frogger

174

A: of course.. and chop lifter too

ak: whose Ken anyway

B: Kenneth that guy over there

A: the blue shirt

B: the guy over there

A: which guy I don't see any hmm...LT 90
   lotta guys there

LT 90
FD 5

FORWARD 5

B: small ears hu

A: LT 90
LT 90
FD 10
RT 90
LT 180
FD 5

   FORWARD .. 10

   LT 90!
   now FORWARD 5
   there's our ear now RT 90 no PENUP PENUP
   PENUP
PU
FD 50
FD (erases FD)
PD
FD 5
RT 90
LT 180

   FORWARD 50

   now where were we
   we were there or what

   did you put the pen down

B: did you hear about that murderer
   that guy who killed at McDonalds

(not included in data)   C: isn't that awful

A: killed at McDonalds?

C: yup

A: what did he do

B: like there's

A: crazy psycho.. just shoots everyone that
   moves?

FD 10

B: ya

C: he shot how many people

B: 20 ..and injured some.. he killed 20 and

and ah took 5 5 policemen to shoot him

C: what I couldn't figure out was how come
it took them an hour and a half

B: an hour and a half?

C: to get him

B: well .. it was pretty hard to get down pf..
it would just hurt pf.. pf

C: no no no why did it take the police an hour
and a half

B: for.. to kill him?

C: um hm

B: well maybe.

C: to get to him

B: well maybe

C: that's a long time

A: ya

C: I mean you know if they knew he was in
there for an hour and a half

A: ya

C: oh well there must have been something
we don't know

A: they didn't miss their death

B: well no maybe they weren't there until..

A: hey where are we... FORWARD 5.. CONTROL-T
FORWARD 5 .. RT 90

B: wait can I borrow this for a minute

A: now LT 90

B: cold
I have another baseball game today

LT 90

FD 5

CONTROL-T

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A: I have another soccer game today

B: same place

A: ya

B: alright

A: tuesdays and thursdays

B: we're gonna win the game today..yesterday I
   was one for three for the line

C: what does one for three mean

B: like you went up three times to bat

C: um hm

B: and you only hit..you only got on base once
   was easy a yes. ah. I. yesterday I wasn't
   feeling well last game I wasn't feeling
   well

A: hey it doesn't do in baseball like they do
   really fast pitches it's not even fast at
   all eh?

B: our pitcher whips them ptew
   I got whiped right here once a long time
   ago pow auw..I got out of the game...
   cause I got hurt

A: we're at 10

B: we're at left 90

A: FORWARD 5.. then LT 90
   now

B: k. now what are we gonna do

A: our eyes.. PENUP

B: PENUP
   this is gonna go fast

A: ya it's fast

B: cause we know how to do things as
   procedures now

A: this is gonna be our shortest the ears gonna
   be as big as the eyes

B: no... your kidding

A: no .. FORWARD 20

FD

4   C: what kind of shape eyes they gonna be

B: window shaped
   oh Ali you said FORWARD 90

90

A: I said 5 so 20

B: FORWARD 90 and you wanted 20

FD

A: no .. to get back 70
(erase FD) BK 70
   voon
   (mumbles)

B: what?

A: ah-FORWARD

B: BACK

BK

3   C: how can you position the eyes

B: we want the eyes up there

2   C: one in the middle

B: no.. right there.. right there
   cyclops

A: we'll make them together ones gonna be
   small the ear then the other one

B: no

A: yes

2   C: oh... cross eyed

A: o.k.

all laugh

9   C: if you wanted to put them like you have in
              your diagram

178

A: k. wait.. divide it 50

1 C: right

A: it's 50 right

1 C: yes

B: very good

4 C: o.k. .. so then what that's

A: k. we'll make .. we'll make the distance
  between the eyes and the edge of the face 10'

1 C: right

B: and then there's and then

A: and then how much left ... 30

B: right

A: ooo 15 for each eye

8 C: alright try it

A: well 10 for each eye and 10 in the middle

B: ya 10 in the middle

1,0 C: that's a good way to figure it out..
  alright let's go

A: now.. BK 20
  BK 10
BK 10 BK 10

B: neow
  why don't we just go back to the ears

A: now FORWARD 10

B: you just..

A: PENDOWN FORWARD 10... happy
PD
FD 10 now.. RT 90
RT 90

B: yesterday I went to the depanneur I got
  a whole bag full of gum.. well I gave some

179

alot to my sister

                        A: REPEAT

                        B: finished it all though

                        A: REPEAT

                        C: why don't you buy apples or fruit orange
                           juice or milk

                        B: I do....
FD   FORWARD how much

(erases FD)   A: REPEAT 4
REPEAT

                        B: cause at Perette's they don't have fruits

                        A: FORWARD 10

                        C: well there's dominion.. not domiaion Provigo

                        A: Steinberg's.. REPEAT 4
        4[
                        C: I'm gonna open a store one day

                        B: what?

                        C: just for young people

                        B: ya

                        C: only fruit vegetables

                        A: vegies blah fruities ya

                        B: hm apple

                        A: FORWARD 10 RT 90
FD 10
                        B: FORWARD 10 RT 90
        RT 90   ha

                        C: .hm

                        A: now RT 90.. LT 90

        3   C: again what could you have used

                        B: ma BOX
LT 90

                                          186

```
PU                                    we'll use it for the other one

                                      A: ya LT 90    now PENUP

                                      B: hm.hm.. already did that

FD 10                                 A: FORWARD 10

                                      B: BOX

                                      A: BOX 10
BOX                                      da da da... no we don't have BOX

                                      B: ya we do

                                      A: no we don't

                                      B: we do

                                      A: remember

                                      B: oh ya it's true we didn't get it

(erases BOX)                          A: look just do it even
                                         now REPEAT

                                4     C: why didn't

                                      B: cause we didn't save it yesterday
REPEAT                                   we didn't save it... watch look
(erases REPEAT)
                                      A: no we did .. we saved it but remember
                                         you said when we were trying to cancel all
                                         those thing out... when Mr. Stenzel cancel
                                         my thing out no yesterday.. it said
                                         I DON'T KNOW HOW TO S the BOX thing
BOX 10
I DON'T KNOW HOW TO BOX
                                      B: I DON'T KNOW HOW TO BOX

                                9     C: o.k. let's remember we do have to do that
                                         then

                                      B: yup o.k.

                                      A: have to do same thing REPEAT 4...
REPEAT 4[ FD 10                          FORWARD 10... REPEAT 4 FORWARD 10
            RT 90]                       RT 90

                                      B: ah PENDOWN
```

```
PD
REPEAT 4 [FD 10 RT 90]

                              1


LT
NOT ENOUGH INPUTS TO LEFT
LT 90


                              1
```

A: right
   nice eye eh
   we'll call it blocker.. blockhead clown

C: good

B: that looks good

A: now..LT 90.. make a nose a square nose like
   no make a circle.. hey
   so now we'll have to make BOX S and CIRCLE S

B: circles.. CIRCLE S

C: that's right

D3.E4.83

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

B: make a nose for the clown

A: circle.. first you have to go PENDOWN ..PENUP
PENUP

PU

pow?

B: pow wow.... pow wow pow wow.. forward

FD 5

A: now we'll make our nose., REPEAT

REPEAT

B: 360

A: no

B: it's a circle isn't it

A: 360 you want to join on to go to,.

B: no wait 360 divided by blblblbl

A: REPEAT 72 55 wouldn't that bring it in

B: no

8   C: let me see it we'll see if it'll work

A: look we did use REPEAT.this has to be right
it has to be a good one or it's gonna make
a line and we can't erase it

C: oh o.k. so

A: it's gonna be...

4   C: what is your idea

A: well it's REPEAT

9   C: o.k. put it down so you can maybe look at
it both of you and see

A: 72... FORWARD 1 RT 55

4   C: is that gonna work out do you think

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B: no

A: ya

B: wanna try

4   C: remember.. ahm what was the important thing
about ..

A: they have to make 360

4   C: and do they

B: 72 and 55

A: ya I think so wait...oh no that was 5 eh..
I remember ..that's 5

4   C: amen

A: not 55

8   C: check it again

72[FD   A: 72 times 5 .... yes

B: FORWARD what ..18?

A: 1..... RT 5

1 RT 5]   B: good it was wrong

A: good ..isn't PENDOWN ..(not clear)
I have to make it smaller now

B: we'll do a box

8   C: no let's continue

B: triangle nose

5   C: well..

A: I know REPEAT

8   C: it's really good to ah..continue with this
one

A: REPEAT 36

3   C: Basje how would you do that

```
                                            A: REPEAT 36 um RT 18
           REPEAT

                                            B: I don't know

                        8   —               C: well you can try

                                            B: REPEAT
                36
                                            A: wait 36 ya FORWARD 1
              [FD 1                             LT 18 .
                   LT 18    _                    yup

                                            B: nope .. right over the nose

                                            A: that's this part and that doesn't make
                                               anything.. try .. it was good.. anyway
                                               PENDOWN
        PD
        REPEAT 36 [                             REPEAT.. how much   36?

                                            B: ya that's what you told me to do

                                            A: FORWARD 1   LT 18
            FDS 1(erases S 1)
                 1 LT 18                        do do do do... nice nose

                                            B: oh yes

                   1,9                      C: alright.. o.k.  Basje I want you to just
                                               look at this for a second

                                            B: umhm

                   2                        C: if you wanted to have a smaller nose ..
                                               even than that

                                            A: smaller than that

                   2                        C: smaller than that.. wait a second

                                            B: do the door knob

                   3                        C: how would you do that what would you have.

                                            A: it's easy

                   9                        C: just wait for a second.....I want you to
                                               think about that one

                                            B: well first of all it has to equal 360
```

3   C: o.k. so what would you do

B: this would be lower

1   C: alright

B: like.. lower and this would be higher

5   C: o,k. and then

B: this would stay the same

1   C: o.k.

A: like this...................

2   C: ya that is an option but

A: REPEAT

2   C: your right you do have to be careful about
those 2 figures alright

B: not those two

2   C: no no those 2 yes

A: now for the for the a pupil in the eye
we'll make a little door knob like we did

1   C: o.k. great

A: that was REPEAT 4.. FORWARD ..

B: well first of all Ali we have to

A: no FORWARD 2 is better

PU

B: PENUP .... wait a minute here ..

1   C: good idea Basje I was just about to suggest
that to you

A: ha ha... meow.... cut here.........now..

B: PENUP

A: ya .. now BK..

BK   B: 12

3 (erases 3) 5

RT 90

2

10

4

4

4

2,4

10

2

1

A: 5

B: bawk bawk bawk

A: now RT 90

B: wait a minute what was that command..
   to find what the angle was

C: oh ya ... to see if it was in the right
   direction

B: ya

A: that was ... uhm .... forgot

C: print....

B: angle....

C: what do you say when your going in one
   direction

A: print ...ah...

C: which way are you .....

A: straight

C: which way am I ...

B: facing

C: facing .. what's another word for facing

A: facing

C: which you might ask somebody ahm.. in which
   way should I...

A: look

C: in order to get some place

B: which way do I go

A: walk

B: head

C: head

187

B: head

A: head

6   C: (laughs).. o.k. .. heading

B: heading

A: oh ya heading

5   C: why do you want to use this one

B: which one

5   C: why do you want to use it

B: oh no I just wanted to write it down

A: no .. we don't want to see it

4   C: what would be the use of it

A: nothing

B: I don't know

A: well he already knows RT°90

4   C: no but what if you didn't know

A: then we know where we are

1   C: o.k.

D3.E5.63

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

A: now

B: what is it

A: something crazy

B: to block in the

REPEAT 4[FD 2 RT 90]
HT

A: clown... REPEAT 4 FORWARD 2 RT 90 return
   HIDETURTLE I want to see his pupil

B: how could you if the pen was up

ST
PD
REPEAT 4

A: aw .. PENDOWN then aw just when it was
   something good
   now watch ..gonna make a pupil with one
   REPEAT 4

B: I know

[FD2 RT
(erases 2 RT) 2 RT 90]

HT

A: 4... 2
   wait .. eh eh eh Basje your space
   now 2 RT 90.. now watch this da da da da
   we got it

B: nyup..oh yes now we'll do another one there
   like

A: ya we'll do REPEAT .. 3 now ..no REPEAT

B: no the same size same size

A: forward 3

B: same size

A: no.. want bigger.. can hardly see um

B: it's good like that... eh

A: na

B: ya

A: what do you say

B: I don't see what's wrong with it

A: what do you suggest

2,6,8   C: what do I suggest .either one would be fine
         try both

A: ya .. try both

B   C: and if you don't like them go back

B: what's wrong with it like that

A: come on let's make it bigger

B: leave it like this leave it like this

A: bigger.. can hardly see it

ST

↓

B: I can see it

A: now REPEAT 4........REPEAT 4

REPEAT 4   FORWARD 3
    [FD 3 RT 90]

HT

B: is that better you majesty

A: yes it's better.. it is isn't it

1   C: both are fine

03.E6.63

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

A: now we'll get it back there.. SHOWTURTLE

ST

3   C: what's the procedure that keeps repeating
      itself that we really should be doing

PU

A: box

·18   C: box.....

A: S

9   C: yes ....o.k. let's try to get this going so
      we can get it into our procedures

A: PENUP now BK

BK

B: BACK..

A: 20

20

B: oh they're printing that today (other group)

A: good now we'll do repeat... 4
    bla bla bla bla

]REPEAT 4[FD

B: we put the brackets there

(erases line)
REPEAT 4   A: REPEAT .. 4 ya .. forward 3 RT
    [FD 3 RT 90]

B: haaaaaaa

A: PENDOWN,

PD

B: Kevin aren't you doing something
(Kevin is from another group come to watch)

K: ya but as Kashif's on the computer
    he needs trouble.. he needs help

A: needs trouble hee

REPEAT 4 [FD 3 RT 90]
     9   C: how about you helping his

K: me?

C: ya

                                    K: he.. he's um doing the editor
HT
                                    A: so go and help him with the editor
                                       .. hey what happened

                    3   C: what did happen

                                    B: cause this one we did two of them

                                    A: well let's do it again then
STY (erases Y)   3 4 FD 2 then 3 again

                                    B: we know.. (into mic) will I record

                    +   C: shhh

                                    A: o.k. now REPEAT
REPEAT
                                    B: REPEAT 4
        4FD 2 RT
                                    A: no brackets Basje
(erases FD 2 RT) [FD 3   4 2
(erases 3)   2   RT 90
                  RT 90   ya spin it.. hideturtle
HT
                                    K: satisfied?

                                    A: yup

                                    B: there that was better

                    1   C: ya that's nice

                                    B: now the mouth

D3.E7.63

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

B: now the mouth

A: right

A:+B: bllll

A: it should be square

B: rectangle

A: ya

B: BODY

A: don't be crazy........legs legs legs legs

B: v.v.v.v.v.v.v.v   no

A: legs legs

B: no we have to make it smaller

3   C: but what do we have to do with the original
     legs

A: shorten it

3   C: what does that require·

A: S

1   C: ya

A: hey let's make every figure S
   we could make him a little bigger

B: at the end at the end

A: we could make the windmill even bigger

1,8   C: that's right...o.k. let's finish this, make
       it into procedures and then try it o.k.

A: ya ..we can make our patterns so small then

2   C: you can make several ahm windmills ya o.k.

03.E8.63

A: = ALI
B: = BASJE
C: = CONNIE (teacher)

PU

B: K now work...... PENUP
   column 4

A: satisfied... k. now LT 90
   we'll sake them up... FORWARD 20

LT 90
FD 20

B: nyup

A: RT 90

RT

B: oh did I hit.. oh no hit ...

90

C: no it's o.k. to hit him..(laugh)

1

A: auw

B: aw gee I'm sorry

A: I'm sorry I didn't do it on purpose

B: PENDOWN

A: yup

PD

B: (comment not clear)

A: FORWARD ..

B: FORWARD 5

A: no

B: FORWARD 30
   pen's not dow.. oh yes.....mmm grouch

FD 30

A: I have a better idea.. RT 90
   no up ya
   now FORWARD .. 1

RT 90

FD 1

B: K.

A: FORWARD...

B: no no ..look

HT

195

```
                          A: FORWARD 2 forward 3 forward 3 forward 3
        FD 3
                          B: we'll do it without the turtle

                          A: o.k. ... forward 1 more... then we put 5
        FD 1                 I'd like to do it again

                          B: 5 is not even

                          A: no but like in the 5 numbers and all those

                          B: ya look 1 2 .. ya it's 5

                          A: k. RT 90

                          B: see those little things there tsch tsch
                             that's each a step
        RT 0
                          A: what are you doing now....how'd you get the
                             9 out
        ST                   RT 0
        RT 90                how'd he get the 9 out
                             FORWARD 30
        FD 30
                          B: sure you don't want 5

                          A: ya .. RT 90
        RT 90                FORWARD 5
        FD 5                 da da da da da da .. a clown.... HIDETURTLE
        HT
                          B: ta da

                          C: now that's nice

                          B: na .. oh we're missing something

              , 2         C: the pom pom

                          A: aw... let's leave it.. PENUP
        ST
        PU                   LT 180
        LT 180               FORWARD....... it ..is
        70                   90

                          B: that was 70

                          A: 20 now
        FD 20                k. this is fifth... 10
        FD 10                100 I was close

                          B: I was closer..... would be neat if we could


                          196
```

just go zt zt zt⁻

A: ahm we could make the same size circle

B: no A: we'll do there

A: yes

B: cause we still have a procedure for..huuuuu

A: that's too small

B: I think I just wrote HAIR here...
   it's the same size

A: no we want a big one we want a big one

B: k. now

3   C: ya but could we do one that would be for
        everyone

A: ya

B: ya .. ah

1,9 C: alright we'll make it .. we'll have

A: LT 90

6   C: not made it o.k.

B: LT 90

LT 90
FD
   10
FD 4(erases 4), 5   A: FORWARRRRRD 10
                        from zero if it works.... k. put 5
                        works.. right?
                        of course it does... see what I mean
FD 5   FORWARD 5
                        RT 90 .. RT 90

B: what time is it

2   C: twentyfive to ten

A: not on my watch

5   C: what do you have

A: I have twenty two

	5	C: twenty to or twenty two to
		A: twenty two to
RT 90		
	2	C: twenty two to .. o.k.
		B: heee twenty two to.. twenty to twenty two to
		A: still PENUP eh? ... BK ... ahem
		B: I'm just I'm just trying to figure that out twenty two to
BK		
	7	C: o.k. what's that mean ..... twenty.. break it up
		A: twenty two
		B: no. wait this. twenty two minutes to two
	1	C: right
5		
		A: to two o'clock?
	1	C: ya you could have that
		B: well to eleven.. twenty two to
		A: RT 90
RT 90		
		B: nyup
		A: k. now
		B: HAIR
		A: FORWARD 5
FD 5		
		B: HAIR
		A: LT 90
LT 90		
		B: HAIR.. HAIR....
		A: REPEAT
		B: no HAIR's better
		A: REPEAT 36

B: HAIR because this is what this is

A: no I want it that small

4   C: do you

B: ya we do

3   C: cause what was the string.. of several of
     them what did we call that

A: CURLS

3   C: so each individual one was

B: HAIR

A: HAIR... aw.. it's o.k.
   HAIR HAIR HAIR HAIR

HAIR

B: see it was big like this .we need a perfect
   angle

A: now do it here

B: hu?   here.. PENDOWN

A: right... PENDOWN

PD
HAIUR   B: what is that
(erases UR) AIR

A: it's a haiur... HAI-UR

B: oh... now we'll do another one zzz

A: don't be crazy

B: that looks good look

HT   A: I want .. no no
I DON'T KNOW HOW TO 'HT   hideturtle
HT   see it's better we don't want another one

B: that's good like that

9   C: alright we only have twentyfive minutes to
     do all the procedures

A: we'll go like zoom

B: we'll just call it something

2 C: but it's it's not anything yet

  B: I know

  A: well we can't make a procedure we can't

  B: we could

  A: we can't.. I'm not gonna copy all this down
    on it

2 C: but you don't have to

  A: we don't

6 C: cause what can you do

  A: just make squares and things

9 C: o.k.... alright let's move fast on that
    because ah

  A: I'm not workin on it

7 C: Ali ..

  A: ya

8 C: come on let's go

  A: o.k. o.k. o.k.

8 C: you can do it.. Basje help him out
    do you have one for that

  B:&A: ya

  B: that's what we used .. TRI

5 C: o.k. what about here do you have one
    for the FACE

  B: not yet

  A: o.k. let's just forget it

8 C: let's do that please

  A: ..it's BOX 50 first we'll first we'll get
    procedure BOX then CIRCLE

C: good .. o.k.

APPENDIX B

The following pages are a sequence of
"Turtle Talks" that were developed in part by
Professor Frank Greene of McGill University for use in
teaching the "240 level, Introduction to Logo" course's
at the university.

TURTLE TALK ZERO

This is TT ZERO because it has nothing to do with
learning LOGO: It has to do with completing a course
(432-240) for which credit weighting is allocated and
for which a grade must be entered. This is a formal
course (sad, since it is contrary to LOGO philosophy
of investigative learning). However, it is also an
experience (great) during which each of us gets to
share the results of our learning explorations. In
order to maximize your opportunity to explore and to
share, the following minimum course requirements have
been set.

1) Complete and submit a LOGO project -- often a
picture, but it might be a turtle-geometry activity or
even an interactive game or lesson. Submit your disk
as well as a hard copy of all the procedures used.
Your master procedure should call out other procedures
as needed. Put SETPOS and INPUT commands in the master
procedure not in the individual procedures, so that
you can move them around easily. Since your project is
both a piece of art and proof that thee hast mastered
the commands and operations of LOGO, the commands and
operations you use should be as varied and as flexible
as is compatible with your project.

2) Learn your way comfortably around the Bank
Street Writer. Use BSW to write and print out your
software evaluations.

3) Evaluate two commercial software programs
which might be considered suitable for use at your
level of teaching (preschool, elementary, HS, etc.)
and/or in your teaching area(s) (math, science,
special ed. etc.). The evaluations should take into
consideration all of the ususal teaching and
curriculum concerns of any potential instructional
materials and in addition should evaluate as
competently as you are able the adequacy of the
documentation (printed manual material accompanying
the program) and the program itself -- ease of use,
clarity of directions, readability level, bells &
whistles, ability to restart an ongoing lesson, etc.

Once the minimum requirements are under control,
you may learn more by: increasing the interest,
quality and quantity of any of the course components;
and/or, doing anything else that is appropriate for a
course titled "Introduction to microcomputers in
education." Check with me before you start any

project to make sure that it is appropriate for this course.

Remember this is an introductory course. Entry into the course requires no prior experience with computers. Successful exiting from the course is easily done. The most important consideration is the development of a reasonable level of mastery over the machine. You should be able to get the computer:

to draw what you want to see
to print what you want to say
to help instruct what you want to teach

Please think about thinking (which is what computer exploring is all about): the computer is a tool -- how should we use it.

-- Have fun.

TURTLE TALK 1

A few general comments on computers:

1. There is WORKSPACE (RAM) in the computer that you will be using when the computer is on. The workspace is erased when the computer is turned off!

2. There is PERMANENT MEMORY (ROM) in the computer. This memory stays even when the computer is off.

3. There is memory on the DISK. Information can be saved to or read from a disk. This information stays (usually) until you erase it.

4. To BOOT means to load a program from a disk to the workspace.

[] [] [] []

How to boot LOGO:

1. Get a LOGO disk.

2. Insert the LOGO disk into the disk drive. (#1 if there are two)

3. The disk goes in with the label facing up and the slot going in   first. Hold the disk gently.

4. Turn on the monitor.

5. Reach around to the back of the APPLE on the left side. Find the switch and turn it on. There will be a beep and a light will come on at the lower left of the keyboard.

6. There will be a whirring and a red light from the disk drive.

7. Soon the screen will say:

                    PRESS THE RETURN KEY TO BEGIN

                    IF YOU HAVE YOUR OWN FILE DISKETT
        INSERT IT NOW, THEN PRESS RETURN

8. Press the RETURN key.

9. Soon the screen will say: WELCOME TO LOGO

10. Take out the disk and put it away carefully.

11. You are ready to start teaching your turtle.

[] [] [] []

A few more bits of information;

The RETURN key tells the computer to do what you just
typed.

The left arrow erases' The right arrow moves without
erasing.

●The CTRL key changes the message the computer gets.
(More later.)

Note that the 1 (one) key is not the same as the l
(el) key.

Note that the 0 (zero) key is not the same as the O
(oh) key.

[] [] [] []

Get a 3-ring notebook, put your notes and your Turtle
Talks in it.

Keep it with thee and use it: Remember GIGO!

TURTLE TALK 2

Here are some things the turtle knows how to do. See
if you can make the turtle do all of them for you.

[] [] [] []

ST   <S<how <T<urtle - the turtle is on the screen

HT   <H<ide <T<urtle - no turtle on the screen, but
it's still there

FD n   <F<orwar<D< - moves forward n turtle steps
(for example: FD 40)

BK n   <B<ac<K< - moves back n turtle steps (for
example: BK 25)

(Note about moving: if the turtle goes too far, it
usually goes off the screen! Then it wraps around and
comes back on the other side of the screen' Try it.
Make the turtle go a lot of turtle steps.)

RT d   <R<ight <T<urn -- turns right d degrees (for
example: RT 90)

LT d   .L<eft <T<urn - turns left d degrees (for
example: LT 45)

CS   <C<lear <S<creen - puts the turtle in the centre
of a clean screen

PD   <P<en <D<own - the turtle draws a line when it
moves

PU   <P<en <U<p - the turtle moves without leaving a
trail

[] [] [] []

What can you make the turtle draw?

A small box. A big box. A box to the right. A box to
the left. A diamond. A diamond inside a box.

A triangle, base down. A triangle, base up. A
triangle, base left.

A pine tree. Three pine trees of different sizes --
with no lines between the trees.

Can you get the turtle to print your first name in
block letters?

What else can you make the turtle draw? Use your
imagination. Show the rest of us the things you get
the turtle to draw.

[] [] [] []

Note: Keep a record of interesting patterns you can
get your turtle to make. Use the back of this sheet so
you have lots of room.

Remember SERENDIPITY PAYS!

TURTLE TALK 3

Here are the things both you and the turtle know how
to do:

FD n   ForwarD   (example FD 50)
BK n   BacK (example BK 35)
RT d   Right Turn   (example RT 120)
LT d   Left Turn   (example LT 144)
ST   Show Turtle (you can see the turtle)
HT   Hide Turtle (the turtle is there, but you
cannot see it)
CS   Clear Screen   (puts the turtle in the centre of
a clean screen)
PD   Pen Down (lets the turtle draw when it moves)
PU   Pen Up (the turtle moves without drawing)

[] [] [] []

Here are some more things you can teach the turtle to
do.

PE <P<en <E<rase - the turtle erases any lines it
goes over.

CLEAN . - erases the screen, but leaves the turtle
alone.

HOME - sends the turtle back to the centre starting
point.

REPEAT n [   ] - the turtle repeats whatever is inside
  . the brackets   n times. For example: REPEAT 4 [FD
     40 RT 90] will make a square. (The [is made by
     SHIFT-N. The] is made by SHIFT-M.)

CTRL G This is a special command that stops whatever
        is going on.   To make it, you hold down the CTRL
        key and then press the G key.

CTRL W This command halts whatever is going on (so
        that you can look at it). Pressing any key resumes
        the stopped activity.

CTRL L Reserves the whole screen for graphics. Called
        FULLSCREEN.

CTRL T Reserves the whole screen for text. Called
        TEXTSCREEN. _

CTRL S   Reserves four lines at the bottom of the
    screen for text, the rest of the screen is for
    graphics. This is the default setting, and called
    SPLITSCREEN.

[] [] [] []

Now what can you teach the turtle to make?

A pentagon? An octagon? A house? A five-pointed star?

Can you nest a REPEAT inside a REPEAT? What designs
    can you get the turtle to draw? (A square of
    boxes??)

What else can you make the turtle draw? Use your
imagnation. Let the rest of us look at your drawings.

[] [] [] []

Note: Keep a record of the procedures you can teach
the turtle to make. Use the back of this sheet so you
have lots of room.

TURTLE TALK 4

Here are some of the things both you and the turtle
know how to do:

REPEAT n [   ]   Repeats n times whatever is inside
the brackets.
CTRL G   (stops whatever is going on)
CTRL W   (temporarily halts whatever is going on. Any
key resumes)
CTRL L   (the whole screen is reserved for graphics)
CTRL T   (the whole screen is reserved for text)
CTRL S   (saves four lines for text, the rest for
graphics)
PE   (the turtle erases any line(s) it goes over)
CLEAN   (cleans the screen, leaves the turtle alone)
HOME   (sends turtle back to centre starting point,
no cleaning)

[] [] [] []

Now YOU GET TO TEACH the turtle new things!

TO name   - this will teach the turtle a procedure
called <name<

        for example: ? TO BOXL
                      ` REPEAT 4 [FD 60 LT 90]
                      > END

       Will teach the turtle to BOXL, that is to make a
square 60 turtle steps on a side while turning left.
Try it.

       Note that when you say TO, the ? changes to >.
When you finish your new procedure with the word END.
LOGO will tell you that your new procedure has been
learned by telling you

                      BOXL DEFINED.

[] [] [] []

Now what can you teach the turtle to make?

      A box to the right? (You might call it BOXR) A
diamond? (DIA)
      A triangle to the left? (TRIL) To the right?
(TRIR)

Try using repeat and the shapes you have taught
the turtle.
    Turn the turtle between the drawings and see what
you can get.
    (This is like the REPEAT nested in a REPEAT of
TT3.)
    What would you get if you wrote: REPEAT 12
[BOXL LT 30]

What else can you teach the turtle? Use your
imagination. Share with the rest of us the patterns
you get the turtle to make.
[] [] [] []

Note: Keep a record of the procedures you can teach
the turtle to make. Use the back of this sheet so you
have lots of room.

TURTLE TALK 5

Here are some of the things you know how to do:

REPEAT n [   ]   repeats n times the commands in the
brackets
TO NAME   teaches the turtle a new procedure called
NAME

[] [] [] []

Now you get to EDIT things you have taught the turtle.

ED "NAME -- lets you edit the procedure called NAME.
Note that the " in front of the name tells LOGO that
you want to work on the file rather than to have the
turtle do it.

        For example to change the size of the sides in
BOXL type in
                ED "BOXL
and you will see (if you defined BOXL as in TURTLE
TALK #4)

                TO BOXL
                REPEAT 4 [FD 60 LT 90]
                END
with the cursor on top of the T in TO.

Move the cursor down and over so that it is on top of
the 6. Type in 35 and then use CTRL D to get rid of
the 6 and the 0. Use CTRL C to exit. Now run BOXL
again and see the difference.

Here are some computer commands to move you around in
the edit file:

CTRL N   - moves the cursor down (Next) one line
CTRL P   - moves cursor uP one line
CTRL B   - moves cursor Back one space
CTRL F   - moves cursor Forward one space
CTRL D   - erases (Deletes) character under cursor
CTRL K   - erases to the end of the line (puts into a
              Kill buffer)
CTRL Y   - inserts copy of Kill buffer at cursor (This
              is a neat to move lines. Outside the editor,
              copies last line typed.)
CTRL O   - Opens a new line for you to type in
CTRL C   - quits the editor and saves the edited
              procedure

```
CTRL G   - quits the editor without saving the edited
           procedure  (Outside the editor, aborts
           whatever is going on.  See TT3.)
CTRL A   - moves cursor to start of the line
CTRL E   - moves the cursor to end of the line
CTRL V   - moves down one screenful (also called
           scrolling down)
ESC V    - moves up one screenful (also called scrolling
           up)
ESC >    - moves the cursor to the end of the edit file
ESC <    - moves the cursor to the begining of the edit
           file
RIGHT ARROW  - moves cursor one space right  (does not
           erase)
LEFT ARROW  - moves cursor one space left and erases
           as it moves
```

[] [] [] []

Can you edit your other files? Teach the turtle a new
procedure and then edit the file and change the
procedure. What can you make and change? Use your
imagination. Share your procedures with all of us.

[] [] [] []

Remember to keep a record of your interesting
procedures.

TURTLE TALK 6

Here are some of the things you know how to do:

TO NAME   teaches the turtle a new procedure called
NAME
ED "NAME   lets you edit the file called NAME
CTRL keys to let you move around in the edit file and
outside too

[] [] [] []

Now you get to teach the turtle procedures with
INPUTS. (You have used procedures with inputs already,
such as FD 30 or RT 45. You can tell the procedure
what variable to use when you run the procedure.)

BOXL (TT4 & TT5) always made a box with sides of
whatever length you had written or edited in the
procedure. However, instead of making a different
procedure for every size, you can make a more general
procedure which includes an input. Then you specify
what you want the input to be each time you tell the
turtle to run the procedure.

For example:
  ?   TO BOXL :SIDE   (:SIDE is the input)
  >   REPEAT 4 [FD :SIDE LT 90]   (:SIDE goes here too)
  >   END

Then when you wanted a box going to the left, you
would decide how big a box to make and type in BOXL
and a number where the number is the size you wanted
each side to be. Such as BOXL 35. Try it. How about
BOXL 50? Or BOXL 2?

[] [] [] []

Here are some commands to help you in the workspace.

POTS   - <P<rints <O<ut <T<itle<S< of all the
procedures in the workspace.

POPS   - <P<rints <O<ut <P<rocedure<S< in the
workspace.

ER "name   - <ER<ases the file called name from the
workspace. (Not
            from the disk.)

[] [] [] []

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Use your edit skills to edit TRIR and change the
procedure to accept a variable length for the sides.

Can you make a procedure that will draw a rectangle
(not a square)?   (Hint, use two inputs.)

Can you get the turtle to draw a circle? Hint, think
like a turtle.   What pattern would you need to walk to
make a circle path?

[] [] [] []

Note: Keep a record of your files. So you can share
them and so you can remember them.

TURTLE TALK 7

Here are some of the things you know how to do:

TO NAME   teaches the turtle a new procedure called
NAME
Use inputs   so that you can modify a procedure each
time you run it.
ED "NAME   lets you edit the file called NAME
CTRL keys   to move you around the editor and the
screen too
POTS   prints out titles of procedures in the
workspace
POPS   prints out procedures in the workspace
ER "name   erases the file called NAME

[] [] [] []

The turtle knows how to make circles and arcs .

CIRCLER r - draws a circle to the right with a radius
of r. For example: CIRCLER 25

CIRCLEL r - draws a circle to the left with a radius
of r. For example: CIRCLEL 10

ARCR r d - draws an arc to the right with a radius of
r and covering d degrees. For example: ARCR 30 180

ARCL r d - draws an arc to the left with a radius of
r and covering d degrees. For example: ARCL 50 90

[] [] [] []

Now you can get the turtle to make lots of pictures.

Can you make a pattern with four circles one inside
the other. Do the circles touch? Can you make the four
circle inside each other like a bulls-eye? With no
lines showing between them?

Can you make a flower? On a stem? Can you make a
garden path with at least five flowers along the path?
With the nearer flowers larger and the farther away
flowers smaller?

Can you make an apple tree. With a trunk and a little
apple? And a little puppy sitting under the tree?

Can you make a heart inside a valentine?

Can you make a moving van type truck? Being followed
by a little car?

Can you make a sun up in the sky? The sun could be
filled in solidly to show brightness. Or with rays for
brightness.

What else can you make? Show the rest of us what you
can do.

[] [] [] []

Notes: I hope that you have been keeping a record of
all your neat patterns. Especially since soon we will
learn how to save files to the disk. And how to reload
them from the disk back to the computer. Then you will
have long term memory!

TURTLE TALK 8

In order to have long term memory, you need your own
file diskette. You will not save on the LOGO disk. So
get an initialized disk. Insert and boot the LOGO disk
as always. When it says:

WELCOME TO LOGO

remove the LOGO disk, insert your file disk and type

SAVE "STARTUP "AIDS

Now you have your own file disk with a startup file.

.Note: you only need to make your file diskette once.
In the future whenever you boot the LOGO disk and it
says,

IF YOU HAVE YOUR OWN FILE DISKETTE,
INSERT IT NOW, THEN PRESS RETURN

take the LOGO disk out and put your disk in. Then type
RETURN.

[] [] [] []

Here is how you SAVE and LOAD your own files.

SAVE "NAME -- will save everything in the workspace
to the disk in a file called NAME. Remember, use one
" so that LOGO will treat NAME as a file instead of
trying to run it. <Everytime< you SAVE, <everything<
in the workspace is saved!

LOAD "NAME -- will load a file called NAME from the
disk to the ' computer workspace. (A file usually
has multiple procedures in it.)

[] [] [] []

Here are a few more tools to aid your saving and
loading activities:

CATALOG -- shows the names of all the files on the
disk.

ERASEFILE "NAME -- erases the file called NAME from
the disk.

(Note: There can only be one file on the disk with the
same name. So either use ERASEFILE to get rid of a
file whose name you want to use again, or just save
your next file with a different name: such as JUNK and
then JUNK2, etc.)

ERALL -- empties out <everything< in the workspace.
This is like ER "name (see TT6), but it cleans out
everything! Be careful, save what you want first!
(ERALL is used to clear out the workspace when you
want to load another file or to start fresh.)

[] [] [] []

Make the procedures which you have found interesting
and/or useful. (See, all those notes you have been
making are now going to pay off!) Save them on your
floppy disk. Turn off the computer. Now comes your
real power. Restart the computer, load your file back
into the workspace. Run your procedures without having
to retype. PURE BLISS!

Getting the turtle to print (rather than draw) for you:

PRINT [TEXT]   - Prints the TEXT on the text screen.

PR   (Prints its inputs followed by a RETURN)
     PR "C   prints the indicated character
     PR [TEXT]   prints all the bracketed text
     PR :X   prints the contents of "X
     (PR "ADD :N1 [AND 5 AND 7]) prints all inside
parentheses
     PR []   prints a blank line

     TYPE   same as PRINT but no RETURN.

(Note that you could also make a set of procedures to draw letters on the screen. Or save the file ALPHA on your own disk. Get ALPHA from someone who has it already.)

[] [] [] []

CTRL Q = \ = literal command: use when you want exact printing. As in REPEAT :N [TYPE [\ ]] (one way of getting spaces)

     You need to use the literal command before the special LOGO characters so that they will print as characters rather than behave as LOGO predicates, arithmetic operators, or delimiters.
     These special characters are:

<   >   =   +   -   *   /   ( )   [   ]   \ (itself),and space.

[] [] [] []

Some clever procedures to play with.

```
TO POLY :SIDE :ANGLE
FD :SIDE  RT :ANGLE
POLY :SIDE :ANGLE
END

TO SPI :SIDE :ANGLE :INC
FD :SIDE  RT :ANGLE
SPI :SIDE + :INC :ANGLE :INC
END
```

(Note that both POLY and SPI need CTRL G to
stop them)

Save POLY and SPI in your SHAPES file? It is trickier
to add something to an existing file than you might
wish! Can you do it?

[] [] [] []

Play with these procedures, they can do really neat
things.

With POLY, can you make a box? A pentagon? An
octogon? A star?

With SPI, can you make a star that gets bigger
and bigger?

TURTLE TALK 10

A very useful skill is to be able to use
<absolute headings< and <absolute placements< in
getting the turtle pointed in any direction you wish
and sitting anywhere you want on the screen. Up to now
all the turtle's movements have been <relative< to its
present heading and position. But we can use absolute
degrees and positions on the screen also.

When using absolute degrees, the screen is like a
map or a compass rose with the top (or North) = 0 (or
360), the bottom (or South) = 180, the right centre
(or East) = 90, and the left centre (or West) = 270.
There are 360 degrees running clockwise from the top.

When using absolute positions, the screen has
four quadrants with HOME in the centre of the screen
and the centre of the quadrants. All distances are
determined from HOME which is considered [0 0]. Left
and below HOME is a minus number. Right and above HOME
is a positive number. For example: any location in the
upper left quadrant would have a negative number
horizontally and a positive number vertically.

[] [] [] []

SETH d - Sets the head of the turtle to the absolute
degrees d. For example: SETH 225 would point the
turtle's head towards the lower left. Remember: the
degrees used for RT and LT are relative to the
turtle's head, but SETH points the turtle's head to a
specific direction. SETH 0 and SETH 360 both point
straight up.

SETPOS [n n] - Places the turtle at the position
indicated by [n n]. For example: SETPOS [90 -50] would
place the turtle in the lower right corner of the
screen. The first n is the horizontal position. The
second n is the vertical position. Remember that HOME
is [0 0]

(Note: If you want to know what the turtle's present
settings are -- PR HEADING will output the turtle's
heading, and PR POS will output the turtle's
coordinates.)

[] [] [] []

Can you determine the coordinates of the four corners
of the screen? Are the top and bottom numbers the same

(not considering the - sign? Do these numbers change
if you are in FULLSCREEN (TT3)?

[] [] [] []

You can now make a wonderful, complicated picture to
fill the whole screen.

Use one master procedure to draw the picture by
calling in other procedures to make each of the
components which you have placed using SETPOS, SETH,
PU, and PD as needed.

Use PR to title and ALPHA to sign your picture.

Save the procedures in a disk file.

Surprise and charm the rest of us by running your
master procedure.

TURTLE TALK 11

A RECURSIVE procedure is one that calls itself into
the process so that it keeps going (see TURTLE TALK 9
for two examples). You can get the procedure to stop
itself by using IF statements and MAKE statements. An
IF statement is one that will test for the conditions
that you specify and if they are true will do what you
have indicated. A MAKE statement puts into the memory
box indicated the amount specified.

    IF :SIDE > 60 [STOP]   (Stops the procedure if
side is greater than 60 turtle steps)

    MAKE "SIDE 4   (Puts the quantity 4 into the
memory space SIDE)

Thus we could use an IF statement to modify the
procedure SPI so that it stopped when it had reached
some particular size like this:

```
        TO SPI :SIDE :ANGLE :INC :N
        IF :SIDE > :N [STOP]
        FD :SIDE RT :ANGLE
        SPI (:SIDE + :INC) :ANGLE :INC :N
        END
```

We could use both a MAKE statement and an IF statment
to modify POLY to stop itself after it had turned a
specified number of degrees by:

```
        TO POLY :SIDE :ANGLE :TOTAL
        MAKE "TOTAL :TOTAL - :ANGLE
        IF :TOTAL < 0 [STOP]
        FD :SIDE RT :ANGLE
        POLY :SIDE :ANGLE :TOTAL
        END
```

[] [] [] []

By using MAKE to read the turtles position, you can get
the turtle to remember where it was. Here is a
procedure that lets you make a triangle of any angles
and any sides, becuase it remembers where it began
drawing from.

```
        TO ANYTRI :S1 :A :S2
        MAKE "BEGIN POS
        FD :S1 RT :A FD :S2
        SETPOS :BEGIN
        END
```

[] [] [] []

Play with these procedures, they can do wild and crazy
things.

   With SPI, can you make a five-pointed star that will
stop when its
        longest side is 48 turtle steps long?

   With POLY, can you make a five pointed star that
will stop when it
        has drawn itself just once?

   With ANYTRI, can you make a tall, skinny isosceles
triangle?