A REPORT ON THE DEVELOPMENT OF AN INSTRUCTIONAL UNIT ENTITLED "DATA BASE AND SPREADSHEET APPLICATIONS"

WILFRED J. BARTLETT

A REPORT ON THE DEVELOPMENT OF AN INSTRUCTIONAL UNIT ENTITLED "DATA BASE AND SPREADSHEET APPLICATIONS"

by

Wilfred John Bartlett, B.Sc., B.Ed.

A Project Report submitted
in partial fulfillment of the
requirements for the degree of
Master of Education

Division of Learning Resources
Memorial University of Newfoundland

August 1986

St. John's Newfoundland

ISBN 0-315-33646-3

ABSTRACT

The purpose of this project is to develop supplementary materials on spreadsheet and data base applications for use in high school computer studies classes. Spreadsheet applications were drawn from budget, workshop and kitchen uses; data base applications chosen were a medical data base, police motor vehical system, and a library search system. They were chosen for their familiarity and variety.

A combination of computer simulation and print student and teacher guides was chosen as the medium of delivery. This was dictated in part by the nature of the topic.

A process of continual evaluation was followed in the project. As part of this evaluation, consideration was given in the development to the necessity of the project, the nature of the learner, and the choice of media. Following the production stage, evaluation was conducted to assess the appropriateness of content, instructional methodology, potential classroom use and quality of the development procedures.

The classroom phase of the formative and summative evaluations were conducted with two half classes and two full classes of high school computer studies students. This evaluation showed that the intended level of learning had

taken place. The programs and related material were enthusiastically received by the students and teachers concerned.

ACKNOWLEDGEMENTS

I wish to thank my advisor Dr. Mary Kennedy for her assistance and patience in this project.

I would also like to thank Dr. Garfield Fizzard, Dr. R.T. Braffet, Mr. William Rose and Mr. William Walsh for their kind assistance in reviewing my material. In addition I wish to thank Ms. Fiona Rochester for her assistance in the classroom testing of the project.

Finally, I owe a special thank you to my wife Sylvia for her patience and help in proof-reading the manuscript and to my son Michael for his patience while the project was being completed.

TABLE OF CONTENTS

LIST OF FIGURES

Chapter I

Background

> I am convinced that educators can ignore them only at their peril. Computers have the potential to individualize instruction, improve school productivity and assist in the management and administration of elementary schools. (Bevan, 1981, p. 2)

As will be evident, computers have become part of our lives in general and are becoming part of our school lives in particular.

General School Use

Taylor (1980) divides school uses into three catagories - tutor (instructional aid), tool (administration and similar uses), and tutee (having the student teach, program, the computer). Others have made modifications to Taylor's classification.

Merrill et al. (1986) list six applications of computers to schools:

1) drill and practice,

2) simulations,

3) games,

4) tool applications, and

5) programming and problem solving. (pp. 8-11)

Simmons (1983) assigns priority to the implementation of these computer applications in a school. He claims that the introduction should be done in the sequence of:

a) computer literacy,

b) computer awareness,

c) office use (attendance, grading, scheduling),

d) computer assisted instruction in business education and remedial reading,

e) maximize utilization in the above areas, and

f) develop computer assisted instruction in other areas. (pp. 75-76)

Computer studies in Newfoundland schools also emphasises literacy and awareness. The Computer Studies 2206 Course Description (1982) states:

> The overall aim of the course is to establish a degree of computer literacy which will appeal and relate to the education of all students, rather than specialize in one area alone, e.g., computer programming. (p. 3)

The stress on awareness and literacy is supported by Berkley (1983). In addition to listing twelve traditional characteristics of an 'educated' man, he adds:

In 1983 it is appropriate to assert that a man may be classified as educated only if:

1) he has some knowledge of computers,
2) he considers that he can know and understand computers to some extent. (p. 6)

What is literacy? In a survey of computer educators, Cheng and Stevens (1985) found that literacy topics, in order of perceived importance, were:

1) running a computer and using software,
2) computer terminology,
3) language syntax,
4) development of positive attitudes,
5) understanding the social impact,
6) writing programs,
7) the parts of a computer,
8) planning and writing algorithms,
9) having basic mathematical concepts, and
10) history of computers. (pp. 9-13)

Computer Assisted Instruction

Ragsdale (1982) summarizes what he feels must be the priority of school use as:

Schools are using computers in an increasingly larger variety of ways, and for a number of

reasons. The primary reason should be, and often is, to improve the educational experience for the students. (p. 191)

Computer assisted learning has a number of forms. Hudsonn (1984) state that it is "about the breakdown of information and skills into small pieces. It gives the opportunity to the student to work at the learning task in simple, achievable stages" (p.3). According to Tolman and Allred (1984), "In computer assisted instruction (CAI), students interact with computers, with information and/or stimulus material presented on monitors" (p. 9).

Computers were first used as an instructional aid in the late 1950's (Ross,1986). As shown, their use has spread both in variety and volume to a degree where Yellin (1982) predicts that, by 1987, 50% of all U.S. schools will be using computer assisted instruction.

Tolman and Allred (1984) report on a survey conducted in January, 1983 by the Center for Social Organization of Schools (CSOS) at Johns Hopkins University. CSOS found that 63% of U.S. schools had at least one microcomputer for instructional purposes. Forty percent had five or more computers. Eighty-five percent of secondary schools used their computers for literacy. Other uses included programmed instruction (76%), drill and practice (31%) recreation and games (19%), administration (14%), and wordprocessing (7%).

It would appear that Yellin was somewhat conservative in his predictions.

Pantiel and Peterson (1986) divide computer assisted instruction into drill and practice, tutorial and simulation. Kalopanis (1983) characterizes tutorial as "making heavy use of text and questions." He goes on to describe this mode of use as helping "to introduce and teach new concepts, rules and/or discriminations. It is assumed that the student already knows the skills involved" (p. 26).

Drill and practice, is described by Merrill et. al. (1986) as used to "help the student memorize the appropriate response to some stimulus. ... In a sense the computer serves as a sophisticated flash-card presenter" (p. 9).

"Without computer simulations we would be without one of our most powerful and versatile methods for problem solving" (Bronson, 1984, p. 95). He goes on to describe this third mode of computer assisted instruction as "the process of designing a model of a real system and conducting experiments with this model for the purpose either of understanding the behavior of the system or of evaluating strategies for the operation of the system" (p. 95). As Maidment (1973) states "All simulations are based on models. A model is a simplified but accurate representation of the real world" (p. 1). Chandler (1984) describes simulations as "user as teacher" and "user as role player" (p. 8).

More specifically, in terms of the educational uses, Reiser (1980) lists four characteristics of instructional simulations:

> A simulation game can be defined as an instructional strategy which
>
> 1) involves active learner participation,
> 2) provides a set of precise rules,
> 3) specifies precise goals, and
> 4) represents some aspect of the real world (p. 1).

Gredler (1986) gives additional characteristics of instructional simulations:

> A simulation used in instruction:
>
> 1) is a realistic setting in which a student is presented with a problem,
> 2) the student executes a sequence of inquiries, decisions and actions,
> 3) receives information about the ways the situation evolves and changes in response to his or her actions (p. 7).

Taylor and Walford (1972) summarize by saying "Whether the simulation has structure or not, interrelationships between a large number of factors can be displayed, visibly manipulated and adjusted " (p. 17).

A number of advantages of simulations as an

instructional technique can be identified. "All of us, not just children, learn more effectively when we are at our most 'playful': when we are actively participating in an enjoyable experience, or when we engage with ideas in a way which involves the exercise of our creativity" (Chandler, 1984, p.9).

Maidment and Bronstein (1973) give three advantages of simulations:

1) a new and non-authoritarian role for the teacher;
2) a more realistic and relevant presentation of the learning experience, and
3) an increase in student motivation and interest. (p. 20)

Chandler (1984) stresses the computer's role in simulations:

> Just as playing games on a computer can, for particular purposes, have certain advantages over doing so without, so simulations which allow us to explore the effects of particular actions (either through imaginative role-play or the manipulation of mathematical probability) can acquire new dimensions when a computer is used. (p. 19)

Tolman and Allred (1984) make a more general statement on the advantages of computers in education, "most studies

reveal positive effects on the factors considered and conclude that a traditional program supplemented with CAI is frequently more effective than programs that use traditional methods alone" (p. 9). In a study of the performance of handicapped children, Harper and Ewing (1986) found that "for all but one of the nine students, the microcomputer was the most effective treatment in terms of productivity (number of comprehension questions answered correctly)" (p. 41).

Hallworth & Brebuer (1980) found similar results:

> When CAI has been introduced as a supplement to other methods of instruction, achievement levels have frequently increased substantially. Students have expressed positive attitudes to this new means of learning and there is evidence attention span has increased (p.6).

Implementation of CAI

Hallworth and Brebuer (1980) give a general guideline for implementation of computers for instruction. "In selecting projects, priority should be given to those students and those subject areas most likely to benefit from the introduction of CAI" (p.8). Chorover (1984) offers a rather pessimistic view of the implemetation of computers. "Too many schools still follow an established recipe for

disaster: first, policy makers choose the hardware, then decide on the software" (p. 226).

Maidment and Bronstein (1973) also offer a word of caution. "Before deciding upon a simulation game approach, the teacher should carefully examine the advantages of the simulation game as a total learning experience" (p. 29).

The recurring idea of the computer as a supplement to traditional methods is reinforced by Reiser (1980) who describes computers and simulations as integrated into the instructional process, not as an adjunct activity. He stresses the importance of systematic design of activities.

The planning and design is emphasised by Gentleman (1976). He says that the use of computers is most appropriate where:

1) the presentation of course material can benefit by use of a computer, and
2) adequate software has been prepared (p. 6)

Ragsdale (1982) suggests two rules for computer implementation:

1) propose new applications of computers only when they will result in an improvement in the existing procedures;
2) implement a computerized solution only when there are sufficient resources to make its success a likely event. (p. 195)

Problems With Computers in Schools

In describing software as the 'Achillies Heel' of educational computing, Wilton (1984) suggests that software is the most important resource. "Without appropriate software, the full potential of computer use will not be realized" (p. 1). Rosen (1982) expresses the concern that this is the most difficult resource to obtain: "We found that it is difficult for teachers and schools to locate suitable high quality educational software for their microcomputers" (p. (i)).

A number of cautions are expressed in the generally enthusiastic acceptance of computers in education. Kincheloe (1986) believes that "the use of computers must go beyond the transmission of facts. It must be more creatively approached" (p. 27). He goes on to identify LOGO as a positive step. LOGO is a language designed specifically for education by Seymour Papert.

Papert (1980) summarizes his view of computers in education by stating:

> It is not true to say that the image of a child's relationship with a computer I shall develop here goes far beyond what is common in today's schools. My image does not go beyond: it goes in the

opposite direction. (p. 5)

Chorover (1984) issues a caution with respect to computers in education. His concern is with questions of student-teacher relationships in a computer environment. Beven (1981) has a similar concern: "In other words, we can speculate about but cannot be sure of the effects of computers on the culture of the classroom" (p. 1).

Weizenbaum (1984) expresses one of the most radical views on computers in the schools:

> I'm trying to argue that the introduction of computers into primary and secondary schools is basically a mistake based on very false assumptions. (p.225)

He argues that computers are attacking the symptoms of a failing school system and leaving untouched the root causes for the problems.

Database and Spreadsheet Applications

Databases and spreadsheets represent two of the central computer applications. In defining computer literacy, Grierson (1985) includes spreadsheets and databases as necessary units. Wilton (1984) also lists databases and spreadsheets with LOGO and wordprocessors as 'learning tools'. "With these programs, students at all grade levels

and in any subject area can learn how to use computers" (p. 6).

Daines (1984) defines a database as "simply a collection of data" (p. 10). Pantiel and Peterson (1986) refers to a database as a "computerized index card file" (p. 70).

A wide variety of applications of databases are possible. Daines (1984) describes the use of databases to teach classification and Venn Diagrams. Sopp (1985) describes children's database applications. Dillon and Hunter (1982) give an application to identifying folk music based on classification of various filed characteristics. The universal appeal of database applications is indicated in a statement by Cercone and Goebel (1983): "In the design or selection of a computing system for literary and linguistic applications, an important consideration is the database management methodology" (p. 121).

Pantiel and Peterson (1986) define spreadsheets as "a very powerful calculator" (p. 70). They go on to describe traditional mathematics/science applications. Marshman (1983) presents rather non-traditional applications in the home workshop to estimating the cost of projects.

Conclusion

In conclusion, then, computers have become an important

factor, not only in our lives in general, but in education in particular. Though some cautions are in order, educators need to incorporate computers into their methodology. Databases and spreadsheets represent two of the central general applicatons of computers.

Chapter II

Front-end Analysis

Introduction

The present high-school curriculum includes a computer literacy course, Computer Studies 2206. The general aims of this course as stated in the course description are:

1. to learn the principles of operation, the capabilities, the history, and the applications of computers
2. to acquire elementary programming skills using BASIC
3. to be aware of careers in computer technology
4. to appreciate the computer's role and influence in our society. (p. 3)

With respect to the applications of computers, two areas deserve special attention because of their wide use. Data bases and spreadsheets are among the most popular of all computer software. Sanders (1983) states that Visicalc, the first of the electronic spreadsheets, outsold all other computer software, including arcade games.

Olle (1983) describes a database as a "thoroughly cross-referenced set of files" (p. 441). The applications of databases are quite diversified, ranging from filing record collections to internationally linked library bibliographic systems. It is this universal application that give databases their importance.

Spreadsheets are described by Capron and Williams (1984) as a financial analysis program allowing numeric answers to 'What if...?' types of questions. Spreadsheet applications have considerable scope not restricted to financial applications.

In a reader survey, Byte magazine (1984) found that 29% of the non-business users surveyed use their computers for spreadsheet applications and 38% for database applications. Fifty-four percent of business users use spreadsheets. Despite this, the current computer studies text (The World of Computers) contains very little on data bases and has no information at all on spreadsheets. Texts of a similar level make either cursory reference or no reference whatsoever to these applications.

In assessing the need for this development project, a number of factors were considered.

First of all there is a general need for some form of instruction in the areas of data bases and spreadsheets. As discussed in the introduction, this is seen as necessary

because of the power and popularity of these applications. If, as the course description suggests, Computer Studies 2206 is to be concerned with making students familiar with applications, it is essential that two of the most popular uses of computers be addressed.

Having established that there is a need for instructional materials, the availability of existing materials must be examined.

Data base and spreadsheet programs are available at two levels - professional/business level and student level. Typical of the professional level are dBase III and Lotus 1-2-3. Student versions of these types of programs (Data Manager and Calc-Master) are produced by Merlan Scientific. Several problems are inherent in the use of either of these levels of software.

First of all, most commercial programs require full computer systems for each student station (computer, monitor and disk drive). This is beyond the scope of many schools.

A second problem related to cost is the initial purchase cost of the commercial software and the use restrictions placed on many of them. A commercial data base or spreadsheet would cost from $50 to $900 and normally have copyright restrictions placed on the making of multiple copies. Many will present serious technical problems with the use of a networked computer system.

A third more serious problem arises with the aims of the existing programs. The existing student-oriented packages have as their aim the teaching of how to use data bases and spreadsheets. This is beyond the scope of the Computer Studies 2206 course. What is needed is an illustration of the applications of data bases and spreadsheets.

It would be possible to build examples from commercial packages, but some form of instructional guide would still be necessary. As well, the problem of equipment and cost previously mentioned would still be present.

What is needed, then, are materials to assist in presenting databases and spreadsheets. It is the author's intention to develop an instructional package for high school students on spreadsheet and database applications. Though designed specifically for Computer Studies 2206, it can have applications to the business education courses now offered in high school.

The development procedure used has the following steps:

1. determination of the need for instructional materials;
2. assessment of existing materials and alternatives;
3. description of the intended learners;
4. a task analysis consisting of:
   a) the entry level and background of the students.
   b) a detailed breakdown of the tasks involved in the lessons.

c) specification of the objectives to be achieved.

5. determination of the appropriate media to be used;

6. development of the lessons;

7. formal evaluation of the program.

8. revision and conclusions.

Figure 1. (page 19) represents this development procedure. In the steps outlined above, formal evaluation occurs towards the end of the process, but in fact a continual evaluation was carried out. The evaluation procedures used will be discussed in detail in Chapter VI.

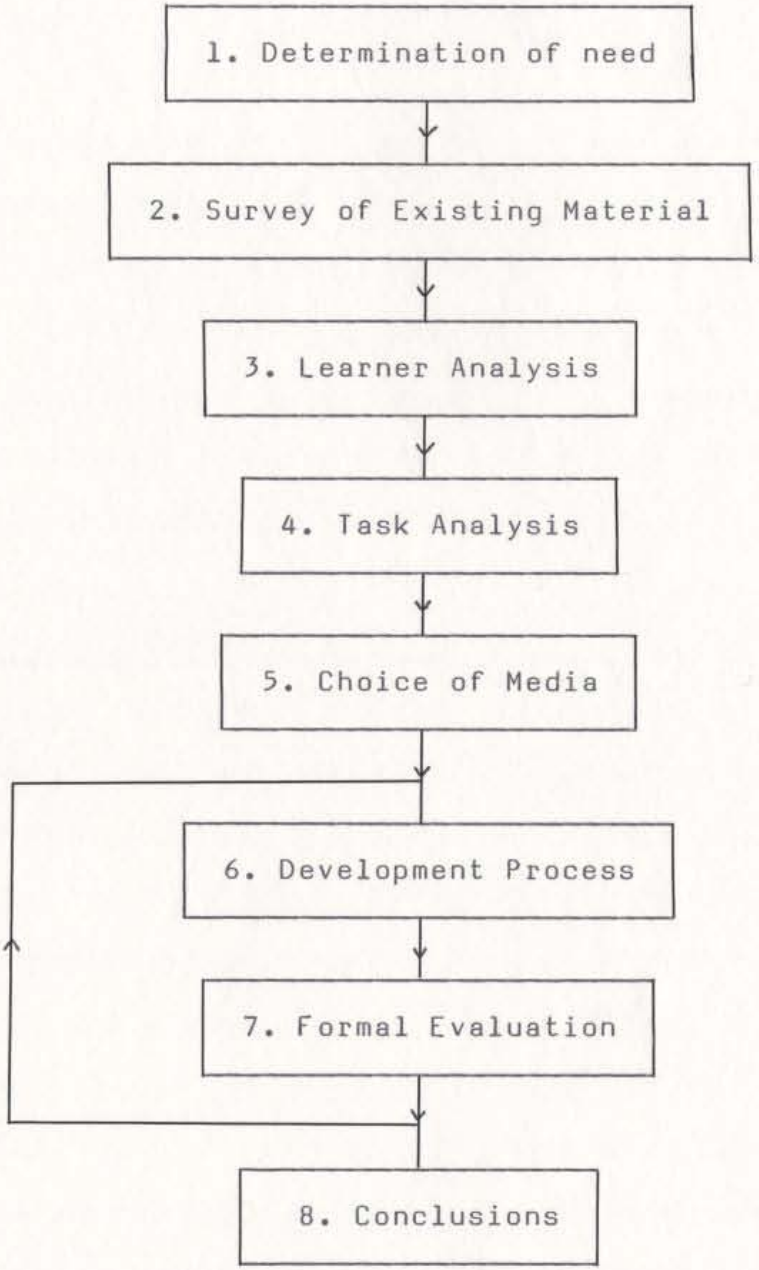

Figure 1. Instructional Design Model

or cultural background. They can be enrolled in any year of high school and have the greatest possible range of academic preparation.

Age/Grade Level

Since Computer Studies 2206 is normally available to any grade level in high school, students could range in ages from 15 to 18. The pilot and summative test groups were not typical of all intended groups since the particular school used for testing did impose restrictions on the grade level. All but one student in the pilot group were in their second or third year of high school. None of the summative evaluation group were in their first year. This, of course, was also reflected in the age levels. The youngest student was sixteen while the oldest was eighteen.

Academic Ability

There is no academic prerequsite for Computer Studies 2206, so the course is open to students of all academic levels. Though, as stated earlier, some schools have placed restrictions, in general it must be assumed that students enter the course with the broadest range of academic abilities.

The pilot groups had students of all academic levels. There were students enrolled in a strong science/advanced mathematics program and those in the basic mathematics/low academic program. The test groups could best be described as 'average', with an average midyear computer studies exam grade of 64% . The lowest exam grade of students in the pilot groups was 30% while the maximum grade was 97%.

Subject Matter Competency

Some subject matter competence is assumed. As discussed more fully in the task analysis, it is assumed that all students will have general computer literacy. Placing the programs in the second term (as would be appropriate for the topics of computer applications) would assure that this prerequsite is met.

Reading/Writing Language Skills

Students are assumed to be reading and writing at a junior high school level. The test groups ranged from second year students enrolled in the basic English Language course to students with a very high level of reading/writing competency. This would be typical of any school. It is interesting to note that there were a total of four students

whose native language was Chinese. Their experience with English as a primary language ranged from ten years to only six months. All four, however, were among the highest achievers in all groups.

Social Background

Computer Studies 2206 is now offered in almost all areas of the province. Students enrolled in the course can come from any social, economic or cultural background. This has implications for the development of the program. To use a large department store application as an example of a database or to use a fisheries application to illustrate spreadsheets would be to place an unnecessary social/cultural bias on the package. A social/cultural bias could be detrimental to the instructional goals of the program.

The test groups were somewhat more restricted in background with the most rural being from communities immediately outside St. John's. In fact, the test group contained students who had lived in many different areas both within the province and world wide.

Tool Skills

All students had all prerequisite keyboard skills and

level of computer literacy related to disk operations. This would be true in all cases of applications of this program as recommended.

Chapter IV

Task Analysis

A task analysis seeks to establish the present level of the learner (entry behavior), to identify the desired educational outcome (learning objectives) and to trace the proposed path toward this outcome (the hierarchical diagram).

Entry Behavior

The topics of databases and spreadsheets most directly apply to computer applications and, to some extent, to the social impact of computers. Computer applications are normally introduced in the Computer Studies 2206 course at or slightly after mid-year. Social impact of computers is usually among the last areas covered in the course.

By the time students would be exposed to these simulations, they would have had considerable experience with computer hardware and terminology. More specifically, it is assumed that the students, on beginning this simulation are familiar with loading and running a program stored on a mass storage device (tape or disk). In addition, they will have had some discussion of the general applications of computers.

Because of the choice of examples, it is assumed that

students are familiar with the function of call numbers in a library cataloging system. Since, at the earliest, the simulation would be encountered in the middle of the students' first year, this was felt to be a reasonable assumption.

Figures 2 and 3 (see pages 27 and 28) contain an analysis, in diagram form, of the tasks contained in the instructional program. The term field is used in the data processing sense to describe a specific piece of information within a data record. For example, in a file of names and addresses, the name would represent one field while the address would represent another.

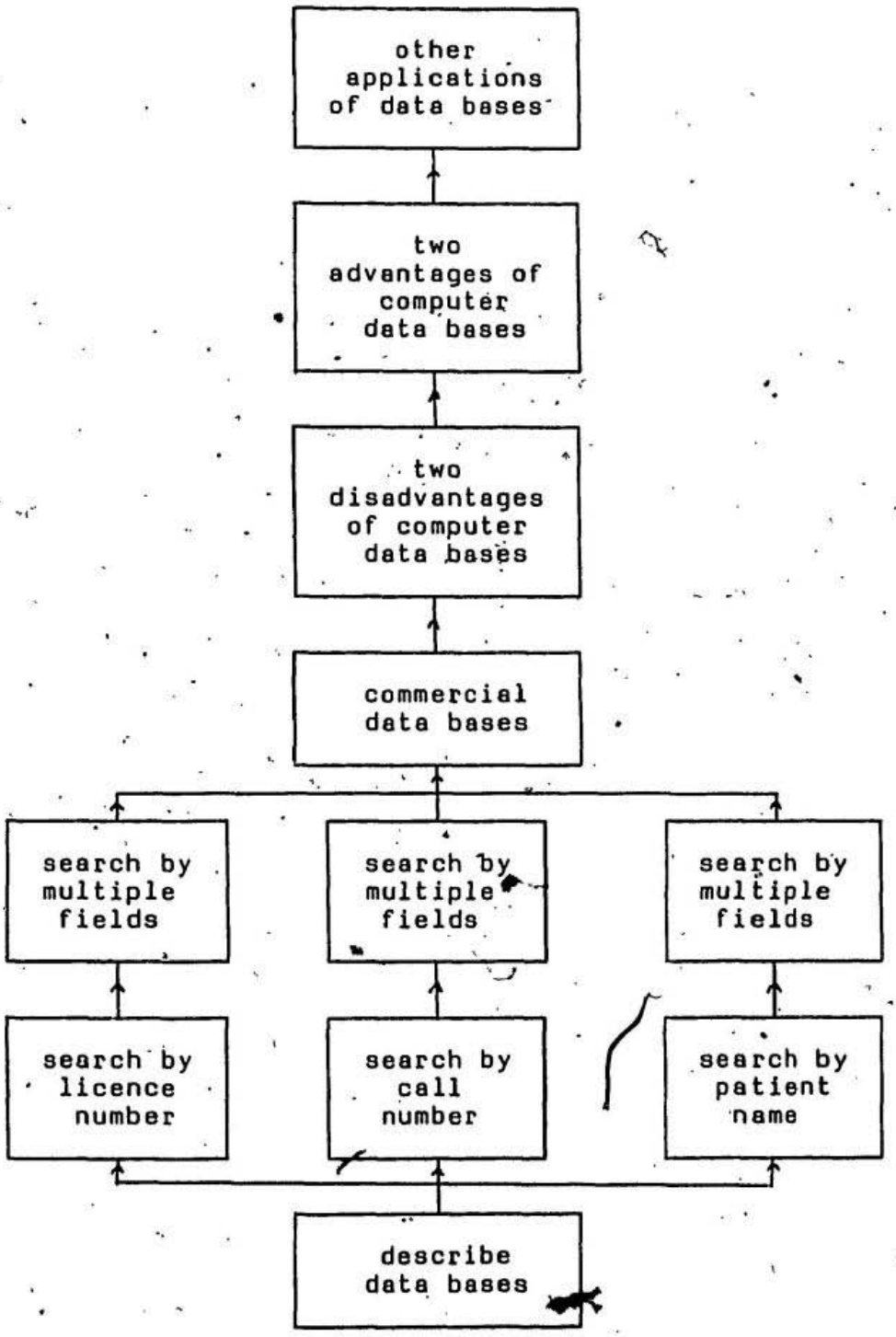

Figure 2. Task Analysis (Data Base)

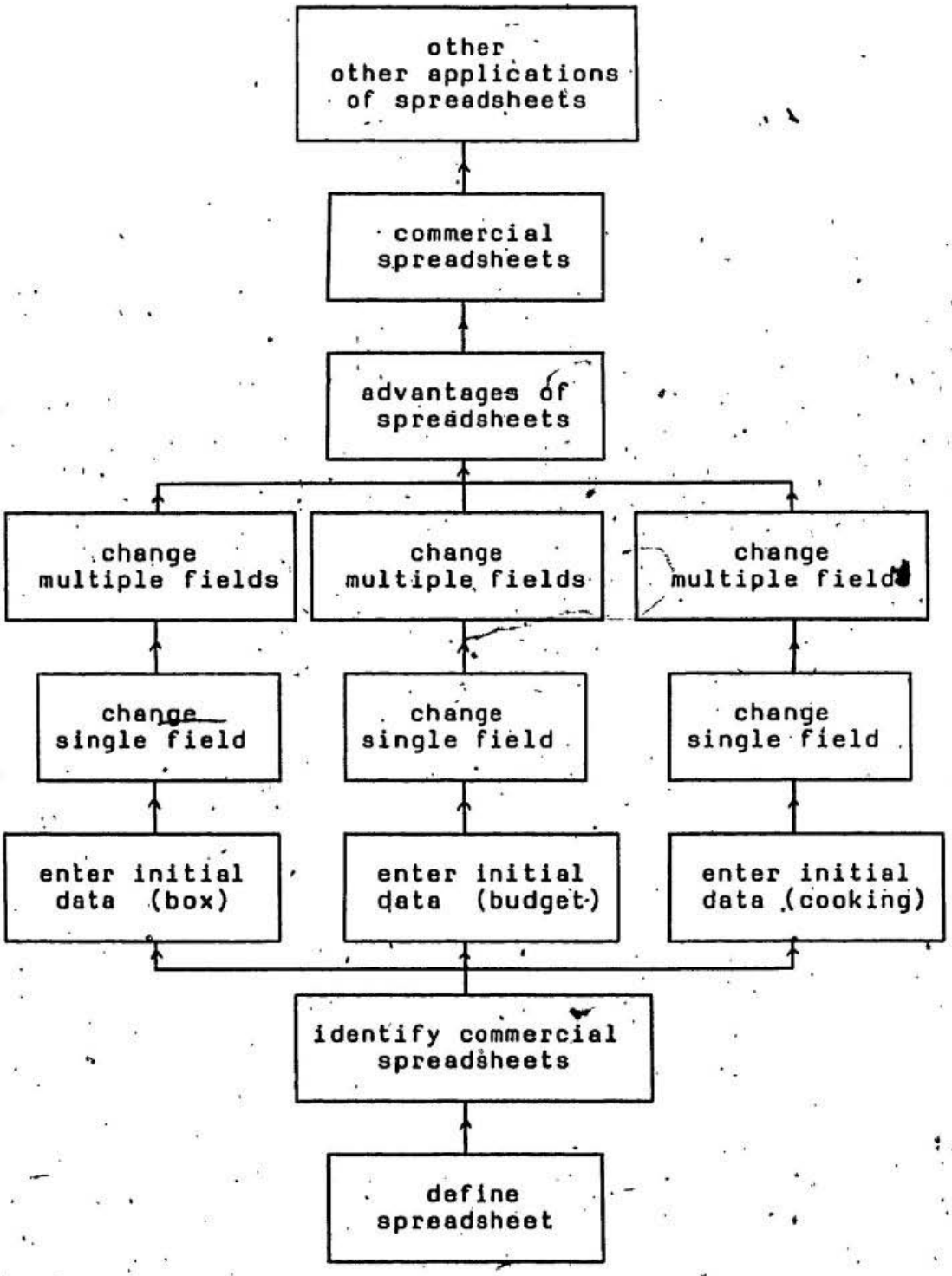

Figure 3. Task Analysis (Spreadsheet)

Chapter V

Choice of Media

A variety of media can be applied to the delivery of instruction. The choice of computers as the medium for this learning package is dictated in part by the general instructional aim. Since the intent of the lessons is to expose students to applications of computers, it would seem most reasonable to use computers as the means of delivery of the instruction. Other factors contributed to this decision.

The availability of the hardware is assured for a computer based simulation. The demands on computer equipment for this package are the same as that for the other components of Computer Studies 2206. Other media may not be as readily available.

Stolovitch (1978) gives a number of attributes of common media available in schools. A modified form of this table is presented in Figure 4 (page 30). Modifications were necessary because a computer studies course setting is atypical in a number of attributes. Those identified by "+" in Fig. 4 were originally reported by Stolovitch as not applicable to the medium. Now they must be stated as 'usually associated with the medium'.

The students' familiarity with the hardware also

	Media*								
Media attributes	A	B	C	D	E	F	G	H	I
audio	x					x	/	x	+
visual		x	x	x	x	x	x	x	x
motion			/			x	x	x	+
color		x	x	x	x	x	x	/	+
3-dimension			x						
response acceptance	x	x							x
feedback	x	x		x	/	/	/	/	x
self-pacing	/	x	x	x					x
random access		x	x	x	/				x
self contained	x	x	x	x		x	x	x	x
easy-to-use	x	x	x	x	x		x	/	x
inexpensive	x	x		x	x				+
quick to set up	x	x	/	x	x		x	/	+
no special environment	x	x	x	/			x	x	+
grouping flexibility	x	x	x	x			/	x	+
easy handling/storage	x	x		x	x	x	x	x	+
generally available	x	x		x	x	/			+

* A - audio tape
B - print
C - relia
D - slides/filmstrip
E - overhead transparency
F - 16mm film
G - super-8 film
H - videotape
I - CAI terminal

\+ or x = is usually associated with the medium
/ = can be obtained

Figure 4. Choice of media (adapted from Stolovitch, 1978)

influenced the decision. At the recommended time of use of the programs, the students will have become thoroughly familiar with procedures for loading and running programs and will have acquired all required keyboard skills.

Though some instructions can be given on the screen, it was felt that to make the simulations entirely computer delivered would not be desirable. The computer programs will be supplemented by print materials consisting of a Student Guide and Teacher Guide.

Chapter VI

Production Procedures

A total of six computer programs were written, three for the data base and three for the spreadsheet simulations.

The general style conventions followed was that of Heckel (Byte, Dec. 1983). The programming style both in the visible running of the program and in the technical listing is considered to be important both for the programming itself and as an example to students. A number of guidelines applied to this project. The relevent points included:

1. keep the amount of screen text to a minimum,
2. use familiar ideas,
3. keep the user informed when the computer is 'doing something',
4. make the displays as interesting as possible.

Though a disk-based data base would have allowed for more storage and would have more closely resembled the operation of 'real' data bases, this would have made a separate disk drive for each computer a necessity. To use a networked system would have been too slow with the disk-intensive operations required. A tape based data base would have been impossible because of the speed consideration. The programs as designed can be used on a

tape or disk computer system.

BASIC was chosen as the programming language because of its universal availability and because it is the language of the programming component of the Computer Studies 2206 course.

Modular programming as a form of so-called structured programming is described by Ross (1986) as "The technique of dividing different parts of a program into separate modules. Each module is then programmed independently." (p. 172). He goes on to identify the advantages as ease of writing, clear organization, and easier error detection. Capron and Williams (1984) list the characteristics of good modular programming as weak coupling (the modules are as independent as possible), inner cohesion (a module should have only one function as far as possible), and modules of manageable size (a one page maximum is recommended).

This approach has been used throughout the programming phase of production. Each module, as identified in the program listings (Appendix E) was planned, written, tested and saved on disk separately and later appended to form the complete program.

To facilitate transfer of programs to other Commodore computers (or even to other brands of computers), all necessary references to computer memory addresses were done using a relative base address. That is, the starting address

was assigned its value at clearly identified points in the program and all subsequent references to other memory addresses were made relative to this assigned value. To adapt to another machine would involve a minimal number of statement changes. The original programs were written on a Commodore 64 computer. It was found that the transfer from Commodore 64 to Commodore PET was accomplished with little difficulty.

The screen editing procedures were designed to approximate commercial programs and to provide a reasonably 'student proof' program. No attempt was made to protect programs against listing or modification since it is desirable to have the user adapt the programs.

It was found that one of the critical elements in designing the package in general was the balance between computer and print presentation. This was an issue at several stages. For example, in the pilot run of the package (see page 36) the instructions for the data base were found to be inadequate. The decision had to be made to either increase the screen presentation or rewrite the printed instructions.

Chapter VII

Evaluation

Procedure

Evaluation forms the basis for the entire development of a project. Alkin and Fitz-Gibbon (1975) divides evaluation into three phases - preformative, formative and summative. This report will describe the evaluation process in these terms. The pre-formative stage includes the needs assessment, learner analysis, assessment of the status quo and determination of the objectives as well as the initial design of the concept. Formative evaluation would include evaluations done during the actual production of the package including the pilot trials. Summative evaluation, in the terminology of Alkin and Fitz-Gibbon, will assume a stabilized program and is intended to make a final measure or determination of the program's effectiveness.

Both quantitative and qualitative procedures have been used at the various stages in the evaluation. Qualitative procedures include observation (both structured and informal) and interviews. Details of the quantative procedures used will be described in the discussion of results.

At the pre-formative stage informal observations and

interviews formed the main basis of evaluation. This phase of evaluation is described elsewhere as needs assessment, learner analysis and task analysis.

Following completion of the first draft of the package, an informal run-through was conducted to identify general weaknesses. Revisions from this stage resulted in a product that could be evaluated in the formative phase.

The first stage of the formative evaluation was that of expert appraisal of the project. Four experts were identified and an appropriate evaluation form designed for each. These were chosen for their expertise in:

1) content - one who is familiar with the concepts taught and their context in the school curriculum.
2) instructional development - one who can assess the value of the package as it relates to appropriate instructional development procedures.
3) methods - one who is familiar with the chosen method of delivery (in this case, computers) and can assess the effectiveness of the package from this point of view.
4) potential user - one who is representative of the classroom teacher who will potentially put the package to practical use.

The next formative evaluation procedure was a pilot run in a classroom setting. This run followed the pre-test, instruction and post-test sequence. The pre-test and

post-test were used to determine whether or not the instructional objectives had been met. During the running of the programs, teacher observations were used to evaluate any delivery problems.

The final stage was the summative evaluation. This evaluation was to determine the effectivness of the final product. It was similar in form to the previous evaluation phase, utilizing a pre-test and post-test format.

Evaluation Results

Expert Appraisal

As described previously, four expert appraisers were chosen in the areas of content, instructional development, computers as a delivery medium, and potential user. Each evaluator was given a package consisting of a copy of the Teacher Guide, Student Guide, a disk containing the programs (formatted for a Commodore 1541 disk drive), an evaluation form and a brief letter of introduction (see Appendix C).

The evaluation form was based on the Microsift Evaluator's Guide for Microcomputer-Based Instructional Packages (1981). Checklists were arranged to provide a set of items relevant to each of the areas of evaluation. There was some necessary overlap in the evaluations.

All four appraisals were generally positive, however a number of problems were identified. Two of the appraisers suggested more explicit loading instructions in two of the simulations (the BUDGET and PANCAKES programs). These suggestions were implemented. Also a number of minor typographical errors were identified. These were corrected. One rather bothersome error was caused by the use of Commodore 64 computers, some with monochrome displays and some with color video monitors. The setting of background

screen color was necessary on the monochrome display, otherwise the screen was impossible to read. This 'correction', however, made the color display very difficult to see. It was decided to encorporate instructions in the initial screen displays to allow the user to select whether he was using a color or monochrome display.

The response in the checklist for three of the four appraisers was positive throughout (either "strongly agree" of "agree"). One of the appraisers chose not to use the checklist form, but rather to use written comments only.

Pilot Run

The pilot run of the packages was conducted on one Computer Studies 2206 class at Booth Memorial High School, St. John's. Half the class was used for the data base and the other half for the spreadsheet simulation. They were conducted simultaneously, in part to assess the logistic difficulties associated with using computer based instructional packages with a full class. Students worked in pairs on the computers. This represents a realistic student/computer arrangement.

The most significant observations with the use of the programs was the inadequacy of the instructions for the database simulations. Students were unsure of how to enter

data or initiate a search during the first part of the simulation. More explicit instructions were added to the Student Guide to correct this. The question "Another run?" displayed on the screen at the end of a search was difficult to see on a screen filled with data. Also students confused the use of the left arrow with the left cursor control. These inadequacies were also corrected by including more explicit student instructions in the Student Guide. After the instructions were clarified, no problems were encountered. Students using the spreadsheet simulations encountered no significant problems.

Interest level was very high. Students of all levels approached the programs with enthusiasm. As anticipated, a number of students listed the programs to 'see how they worked'.

Analysis of Results

Figure 5 (page 41) matches the objectives with the test items for the pre-test and post-test. Figures 6 (page 42) presents the results of the pre-test for the database and spreadsheet simulations.

Several problems were revealed in the administration of the pre-test. Question 3 of the Data Base test ("List five areas where a data base could be used.") gave a very high

Databases	
OBJECTIVE	ITEM
1	1
2	2
3	6
4	8
5	7
6	9
7	3
8	4
9	5

Spreadsheet	
OBJECTIVE	ITEM
1	1
2	2
3	3
4	3
5	3
6	3
7	4
8	5

Figure 5. Objectives Matched with Test Items

Data Bases

	mark		percent	
Question	pre	post	pre	post
1	1.00	1.6	50.0	80.0
2	0.80	1.0	80.0	100.0
3	4.80	5.0	96.0	100.0
4	0.90	1.8	45.0	90.0
5	1.10	1.5	55.0	75.0
6	0.00	1.0	0.0	50.0
7	1.50	3.0	50.0	100.0
8	2.00	3.0	67.0	100.0
9	1.90	3.0	63.0	100.0
total	14.00	20.7	61.0	90.0

Spreadsheets

	mark		percent	
Question	pre	post	pre	post
1	0.25	1.8	12.5	90.0
2	0.13	0.5	13.0	50.0
3	3.40	5.0	68.0	100.0
4	0.13	2.0	6.5	100.0
5	0.13	1.5	6.5	75.0
6	0.00	2.0	0.0	100.0
7	0.00	0.8	0.0	80.0
8	0.00	1.8	0.0	90.0
total	4.00	15.3	29.0	90.0

Figure 6. Summary of Pre-test/Post-test Scores

score for all students on the pretest. Part of the problem was in the universality of the data base application. Any areas (businesses, organizations, occupations, etc.) would almost certainly have data base applications. The question, as stated, would not test the students knowlege of data bases. An examination of the objective from which this question was derived showed a similar need for revision. The objective was restated from:

"list five areas in which data bases could be used." to

"briefly describe how data bases could be used in five areas."

A similar problem arose in the spreadsheet test. Students were asked to list five areas in which spreadsheets could be used, but three were dealt with in subsequent questions.

It was decided in both cases to combine some of the specific questions on the simulations with the more general questions on applications. The final form of the tests is given in Appendix D.

Summative Evaluation

The summative evaluation was conducted on two Computer Studies 2206 classes at Booth Memorial High School. Both simulations were run with no administrative problems.

Problems of unclear instructions encountered in the piloting stage had been corrected. As with the pilot stage, students reacted very favorably to the simulations.

The Spreadsheet simulation was used with a class of 19 students. Pre-test scores had a mean of 20.6%, while the post-test mean was 85.0%.

Figure 7 (p. 46) gives a line graph of the final results for the spreadsheet simulation. A number of features should be noted. Though the stated objective for the package has been achieved in terms of the average class performance, several students failed to achieve this level. The most notable of these was subject 6. This subject did, though, improve from 0% to 53%. Subject 19 also represents an anomaly with a pretest score of 76%. The student is a computer hobbyist so his entry level is atypical. Significant learning gains were still observed.

The Database simulation was run with a class of 21 students with a pre-test mean of 44.6% and a post-test mean of 86.0%.

Figure 8 (p. 47) gives a line graph of the database summative results. As with the spreadsheet simulation, not all students achieved the objective level. Again, though, gains were observed. The students' prior knowledge of databases observed in the pilot run (p. 43) was evidenced in the summative evaluation. A comparison of Figures 7 and 8

will make this evident.

Conclusions and Recommendations

The stated objective of the simulations was a performance level of 80% for the lessons. This level was achieved.

Because of the relatively high pre-test scores on the database program, it could be profitably placed earlier in the academic year, possibly at the point of first introducing computer applications (the beginning of term two in the school year).

In general, the learning packages proved to be effective. Future investigations could explore their utility in related courses like Business Education in high school.

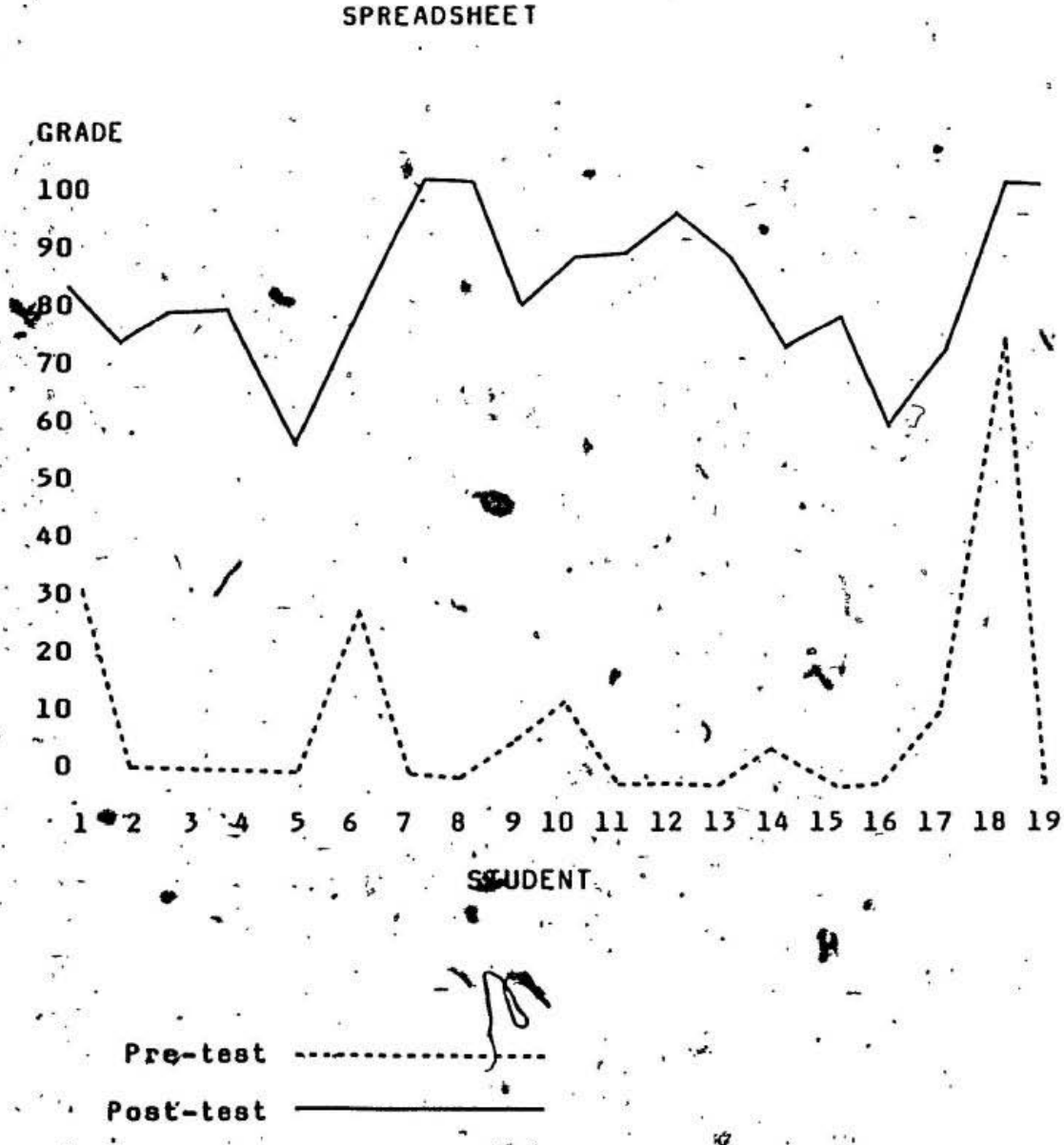

Figure 7. Student Scores (Summative)

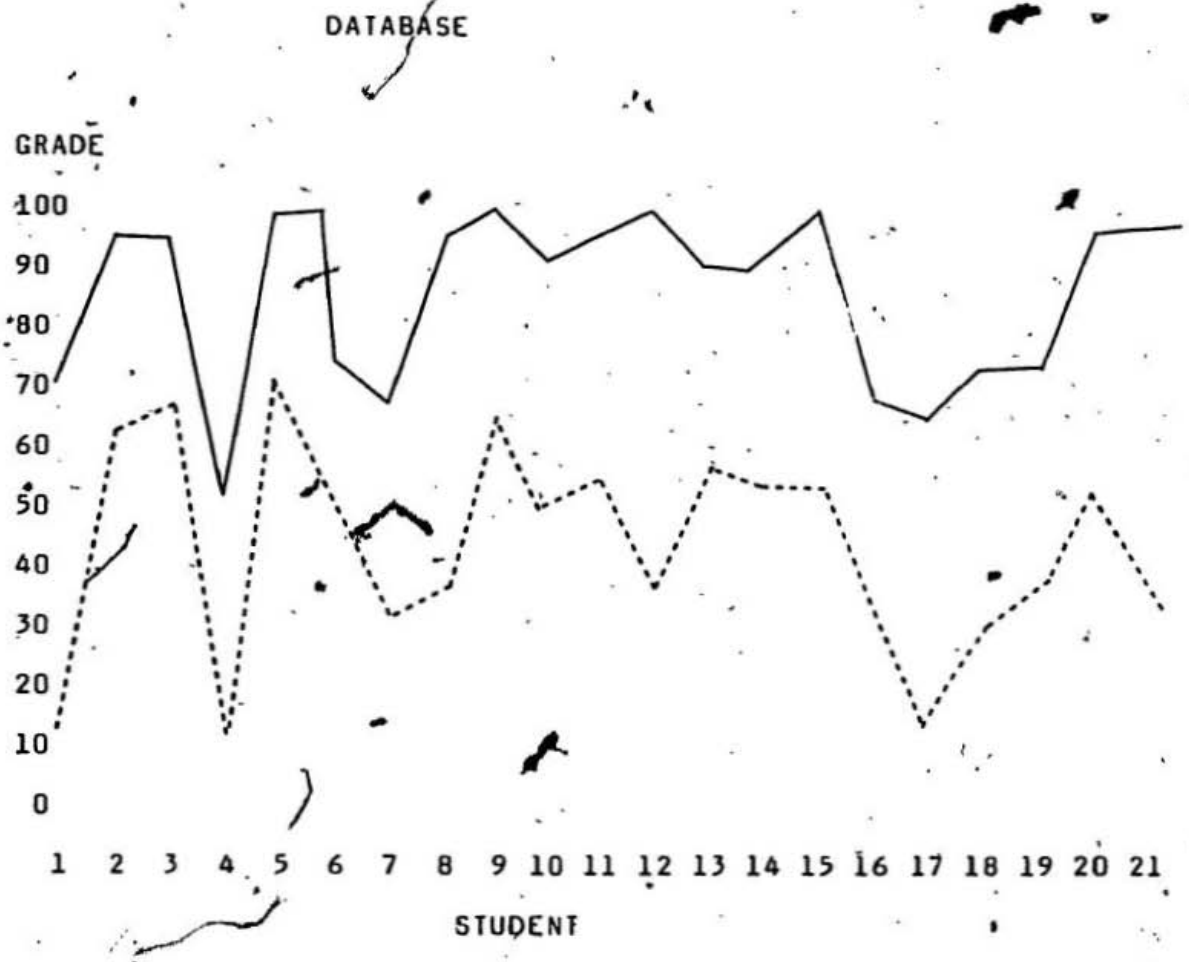

Figure 8. Student Scores (Summative)

References

Alkin, M. C. & Fitz-Gibbon, C. T. Methods and theories of evaluating programs. Journal of Research and Development in Education, 1975, 8(3), 5-15.

Banathy, B.H. & Lange, D.L. A Design for foreign language curriculum. Lexington, Massachusetts: D.C. Heath and Company, 1972.

Berkley, E. C. Computers and an educated man. Computers and People, January-February 1983, p. 6.

Beven, G. H. Computers in schools: some social implications. Unpublished manuscript, Alberta Education, 1981.

Bronson, R. Computer simulation: what it is and how it's done. Byte, March 1984, pp. 95-102.

Capron, H.L., & Williams, B.K. Computers and data processing. Don Mills, Ontario: Addison-Wesley Publishers Ltd, 1984.

Carcone, N. & Goebel, R. Databases and knowledge representation for literary and linguistic studies. Computers and the Humanities, 1983, 17(3), p. 121.

Chandler, D. Young learners and the microcomputer. Milton Keynes: Open University Press, 1984.

Cheng, T. T. & Stevens, D. J. Prioritizing computer literacy topics. Computers and Education, 1985, 9(1), 9-13.

Chorover, S. L. Cautions on computers in education. Byte, June 1984, pp. 223-226.

Daines, D. Databases in the classroom. Turnbridge Wells, Kent: Castle House Publications Ltd., 1984.

Dillon, M. & Hunter, M. Automated identification of melodic variants. Computers and the Humanities, 1982, 16(2), 107-117.

Gentleman, J. F. Interactive graphics in a terminal-equipped classroom. In Conference on innovative uses of computers in education. Waterloo, Ontario: University of Waterloo, 1976.

Gredler, M. B. A taxonomy of computer simulations. Educational Technology, April 1986, pp. 7-12.

Grierson, R. Mission: define computer literacy. The Computing Teacher, 1985, 13(3), 10-16.

Hallworth, H. J., & Brebuer, A. Computer assisted instruction in schools: achivements, present developments and projections for the future. Calgary, Alta.: Alberta Education, 1980.

Harper, J. A. & Ewing, N. J. A comparison of the effectiveness of microcomputer and workbook instruction on reading comprehension performance of high incidence handicapped children. Eduactional Technology, May 1986, pp. 40-45.

Heckel, P. Walt Disney and user-oriented software. Byte, December 1983, pp. 143-154.

Hudson, K. Introducing CAL: a practical guide to writing computer assisted learning programs. New York, N. Y.: Chapman and Hall, 1984.

Kalopanis, G. Elementary math and the microcomputer. In P. Barrette (Ed.), Microcomputers in K-12 education: second annual proceedings. Rockville, Maryland: Computer Science Press, 1983.

Kincheloe, J. L. The future of the computer in social studies. International Journal of Instructional Media, 1986, 13(1), 27-33.

Maidment, R., & Brostein, R. H. Simulation games design and implementation. Columbus, Ohio: Charles E. Merrill Publishing Company, 1973.

Marshman, P. Computers in the workshop: finding the software. Canadian Workshop, November, 1983, pp. 40-44.

Merrill, P. F., Tolman, M. N., Christensen, L., Hammons, K., Vincent, B. R., & Reynolds, P. L. Computers in education. Englewood Cliffs, N. J.: Prentice-Hall Inc., 1986.

Olle, T.W., Database management. In A. Ralston & E. Reilly, Jr. (Eds.), Encyclopedia of computer science and engineering. New York: Van Nostrand Reinhold Company, 1983.

Pantiel, M., & Peterson, B. The senior high computer connection. Englewood Cliffs, New Jersey: Prentice-Hall, 1986.

Papert, S. Mindstorms: children, computers, and powerful ideas. New York: Basic Books Inc., 1980.

Ragsdale, R. G. Computers in education: why use micros? Toronto, Ont.: Ontario Institute for Studies in Education, 1982.

Reiser, R. Increasing the instructional efectiveness of simulation games. Simgames. July,1980, pp. 1-3.

Rosen, T. Educational software for microcomputers: an overview of information sources, evaluators and distributors. Unpublished manuscript, TVOntario, 1982.

Ross, S.H. BASIC programming for educators. Englewood Cliffs, New Jersey: Prentice-Hall, 1986. p.171

Sanders, D. H. Computers Today. New York: McGraw-Hill, 1983.

Simmons, J. D. Microcomputers: the first year. In P. Barrette (Ed.), Microcomputers in K-12 education: second annual proceedings. Rockville, Maryland: Computer Science Press, 1983.

Sopp, W. P. Do you realy need a children's database? The computing teacher, 1985, 13(3), 43-45.

Stolovitch, H. Audiovisual training modules. Englewood Cliffs, New Jersey: Educational Technology Publications, 1978.

Taylor, J. L., & Walford, R. Simulation in the classroom. Middlesex, England: Penguin Books, 1972.

Taylor, R. P. The computer in the school: tutor, tool, tutee. New York: Teachers College Press, 1980.

Tolman, M. & Allred, R. A. The computer and education. Washington, D. C.: National Education Association, 1984.

Weizenbaum, J. Another view from MIT. Byte, June 1984, p. 225.

Wilton, J. A. Software: the Achilles heel of educational computing. Unpublished manuscript, 1984.

Yellin, C. Microcoputers in computer assisted instruction. Computers and People, September-October 1982, p. 27.

Appendix A: Teacher Guide

DATA BASE

TEACHER GUIDE

Data bases are organized collections of information. The best example of a data base is the filing cabinet, but a computerised data base offers the advantages of speed and flexibility.

These simulations are meant to illustrate the flexibility of application of data bases. The similarity of the data input screens is deliberate - the message being, a great number of seemingly different computer uses are really the same use.

It should be stressed that the purpose of these simulations is not to teach <u>how</u> to use data bases, but rather to illustrate how they can be used. Specific objectives are listed on the following page.

Objectives (Data Bases)

On completing the data base computer simulation, the student should be able to:

1. describe data base.
2. state one non-computer form of data base.
3. list five areas in which data bases could be used.
4. describe three specific procedures possible with a police data base.
5. describe three specific procedures possible with a library data base.
6. describe three specific procedures possible with a medical office data base.
7. state two advantages of a computer data base.
8. state two disadvantages of a computer data base.
9. state two features present in commercial data bases beyond those in the simulation.

ANSWERS TO QUESTIONS

EXERCISE #1 POLICE DATA SYSTEM

1. This car is suspected as having been used in a robbery.

2. 1981 Ford Granadas: S8A 387
   WWR 353

3. The car will show up as stolen. Constable Smith will probably arrest Joe Jones for car theft. This type of incident has, in fact, happened.

EXERCISE #2 MEDICAL RECORDS SYSTEM

1. Bob Jones is taking tetracycline.

2. Frank Samuels, Bill Jones, and Sam Jones are being treated for diabetes.

3. Jill Day and Carol Lake are on anoxocane.

4. Harry Harris is being treated for alcohol and drug addiction.

EXERCISE #3 LIBRARY RECORDS SYSTEM

1. The Third Wave: by Alvin Toffler (303 .4 TOF)

2. Books by Hemingway: The Old Man and the Sea
   For Whom the Bell Tolls
   A Farewell to Arms

3. Books on World War II: D-Day the Normandy Invasion
   Across the Rhine
   The Diary of a Young Girl

SPREADSHEETS

TEACHER GUIDE

One of the most popular of all computer applications is the spreadsheet. Originally done on paper, they are the format for a "what if?" analysis. What if we increased the area of the family room? What if we invest in ACME stocks? What if we need to serve 500 people rather than six? An electronic spreadsheet uses the computer to perform calculations on a matrix of interrelated cells.

The applications in these exercises were chosen for their variety. The home budget is a very traditional use of spreadsheets. The woodworking and cooking examples show the potential scope of spreadsheet use.

It should be stressed that the purpose of these exercises is not to teach students how to use a spreadsheet. Rather, it is intended to teach what a spreadsheet is and the range of uses possible. The following page contains the specific objectives of the lesson.

Objectives (Spreadsheets)

On completing the spreadsheet computer simulation, the student should be able to:

1. describe spreadsheets.
2. state where spreadsheets were first used.
3. list five areas where spreadsheets could be used.
4. describe how spreadsheets could be used by a woodworking shop.
5. describe how spreadsheets could be used in budget preparation.
6. describe how spreadsheets could be used in cooking.
7. state one commercial brand of computer spreadsheet.
8. state two features present in commercial spreadsheets beyond those in the simulation.

ANSWERS TO QUESTIONS

EXERCISE #1 THE BOX

Q1

COST/SHEET	DIMENSIONS	COST
18	2 X 4 X 6	506.88
28	3 X 7 X 1	555.52
28	3 X 4 X 6	967.68
20	3 X 4 X 2	332.80

EXERCISE #2 HOUSEHOLD BUDGET

Q1 SAVINGS: $1650.

Q2 SAVINGS: $2200.

Q3 SAVINGS: $3400.

Q4 No, you will not have enough saved (savings are only $1700).

EXERCISE #3 PANCAKES

Q1 Flour for 4 pancakes: 156 ml..

Q2 For 20 pancakes: 2 eggs and 76 ml. oil.

CONCLUSION

Q1. a) Carpet dealers can use a spreadsheet to estimate the cost of carpeting. Cells would include cost per square meter of carpet and underlay, dimensions of the room, cost of other materials (tape, edging, etc.) and cost of labor.

b) Car dealers could use it to estimate the cash or trade value of a used car (with cells containing the year, options, conditions, number of kilometers, etc.) as well as the price of a new car based on type and options packages.

c) Building contractors could input the dimensions and specifications (type of floor covering, etc.) of the rooms. Output could include estimates of amount and cost of materials required.

d) A teacher could use a spreadsheet for grade calculation. Input would be the scores in each catagory (labs, tests, etc.). Output would be the grade.

Appendix B: Student Guide

DATA BASE

STUDENT GUIDE

Introduction

Data bases are collections of information arranged in an organized fashion. The most common in paper technology is the filing cabinet. Data base programs are used to:

a) enter information into the base,

b) alter information, and

c) search for information.

These simulations of data bases will deal with only the last of these - the retrieval of information already contained in the system. This will be in a police automobile records system, a library system, and a medical records system.

Before beginning the first simulation, complete the questions on the following page:

Q1. Give <u>one</u> example of a non-computer data base.

Q2. What are the <u>three</u> operations possible in a commercial data base?

Police Data System

This program is a simulation of a police data base for automobile records. Load and run the program "POLICE".

To do a search, enter the search data in the correct area on the screen. The RETURN key will move you to the next data area. When you are ready to do a search, press the -- on the keyboard (NOTE: this is not the left cursor key). When the search is completed, you will be asked whether you want to run again. Type in Y or N.

1. While on patrol, Constable Smith spots a car parked in a no-parking zone. He wishes to run a check on it. Its licence number is ABC 476. What will he find out ?

2. A hit-and-run is reported. The car involved is a 1981 Ford Granada. (The make is Ford and the model Granada.) Find out all possible licence numbers for such cars.

3. Joe Jones had his car (licence number RRT 454) stolen two weeks ago. Yesterday it was returned to him and he made a report to the police. Constable Smith spots the car today and runs a routine check. Run the check on the system. What do you think Constable Smith's action will be?

This last example shows one important problem with any data base; that of keeping accurate, complete and up-to-date information.

Before continuing with the next simulation, complete the following questions:

Q1. Describe <u>three</u> specific operations possible with a police data base.

Q2. What is one problem with a data base?

Medical Records System

Load and run the program called "MEDICAL".

1. Bob Jones visits the doctor. Obtain his records. What medication is he currently taking?

2. Is the doctor treating anyone suffering from diabetes? If so, what are their names?

3. A drug company announces a problem of side effects with a drug called amoxocane. Are any patients taking this drug?

4. Trevor Smith, a computer studies student, is successful in dialing into the medical records system. 'Just for fun', he decides to look up the records of his neighbour Harry Harris. What does he find out?

This last example illustrates a second problem with computer data bases, that of <u>data security</u>. Since many computer data bases can be accessed over a phone line, security is much more an issue than with paper technology.

Before continuing with the next simulation, answer the following questions:

Q1. List three ways a doctor can use a data base:

Q2. What problem is identified with the medical data base?

Library Records System

Load and run the program called "LIBRARY".

1. Look up the author and call number of "The Third Wave".

2. What books are on file by Hemingway?

3. You are researching World War II. Obtain a list of all books on this topic.

These simulations show the main reasons for the power of a computer data base. One is its speed. A search can be accomplished in a matter of seconds. Another is the great amount of flexibility. You have seen how a data base can be applied to a police system, a medical system and a library system. A data base has applications wherever information must be stored and retrieved.

Before continuing, complete the following questions:

Q1. Give <u>three</u> operations possible with a library data base:

Q2. Give <u>two</u> reasons for the power of a computer data base:

Q3. List <u>three</u> other areas where you think a data base could be used:

SPREADSHEETS

STUDENT GUIDE

INTRODUCTION

Spreadsheets are a means of planning - of testing to see 'What if?'. Data is entered in a spreadsheet in an area called a cell.

Spreadsheets were used originally for financial projections and were done by hand on paper. The first electronic spreadsheet (called VisiCalc) made it possible for many areas to use this tool.

Spreadsheets are sold under a variety of brand names (VisiCalc, EasyCalc, Multiplan, Lotus 1-2-3 and many others). Most computers have a number of spreadsheets available.

You will be working with three simulations of spreadsheets. These simulations are intended to give you some idea of the range of areas that can use a spreadsheet and some types of operations possible. Follow the instructions carefully. If you complete the exercises before the end of the time your teacher has allowed, then use any extra time to explore some other 'What ifs?' with your spreadsheets.

Before proceeding with the first simulation, complete the questions on the following page.

1. For what purpose were spreadsheets first used?

2. List the names of <u>three</u> commercial spreadsheets.

APPLICATION 1: BUILDING A BOX

•Load and RUN the program called BOX.

Imagine you are in a woodworking shop and you have to estimate the cost of building a box with a cover. You want to be able to find the cost for any size box and for any type of wood.

The first cell should contain a light-colored bar. Type 24.00 (for wood that costs $24.00 per sheet) and press the space bar. The light-colored bar should now have moved to the second cell. Continue pressing the space bar until the bar is in the cell marked LENGTH. Enter a length of 3, a width of 2 and a depth of 1 in the correct cells.

Press <RETURN> to do the calculation. After a few seconds a total amount should appear in the last cell. This is the cost of the box you have specified.

Change the first cell to 32.00. Now you will get the cost of the same box made from a more expensive wood. Press <RETURN> and watch the last cell.

Complete the following table:

COST/SHEET	DIMENSIONS	COST
18	2X4X6	____
28	3X7X1	____
28	3X4X6	____
20	3X4X2	____

Before proceeding to the next simulation, complete the following questions:

Q1. Describe how a woodworking shop might use a spreadsheet.

Q2. Suggest how a carpet layer could use a spreadsheet.

APPLICATION 2: HOUSEHOLD BUDGET

Load and RUN the program called BUDGET.

In this exercise, you will use a spreadsheet to examine a household budget.

IMPORTANT NOTE:

The cell marked MONTHS refers to the time period in months for which the calculation is to be made. All entries are based on a per-month cost. SAVINGS are the accumulated savings for the number of months given.

For the initial calculation, try the following:

INCOME: 1200	HYDRO: 200	PHONE: 25
FOOD: 300	GAS: 100	MISL.: 200
LOANS: 100	MONTHS: 6	

Q1. What were the SAVINGS? _____

Q2. What will the SAVINGS be in 8 months? _____

Q3. You are given a raise making your income $1350. How much will you save in 8 months? _____

Q4. You want to take a vacation in 4 months. It will cost $2000. Will you have enough saved for it? _____

Commercial spreadsheets are more powerful than this simulation in several ways:

i) they contain more cells (one commercial spreadsheet has almost two million cells)
ii) they can produce a variety of reports often in graphical form
iii) they allow the user to change formulas used in calculating cell values.

Before proceeding with the next simulation, complete the questions below.

Q1. How can spreadsheets be used in budget preparation?

Q2. List three ways that a commercial spreadsheet is more powerful than the simulatiom.

APPLICATION 3: **PANCAKES**

Load and RUN the program called PANCAKES.

The third example of uses of spreadsheets involves a recipe for pancakes. A common problem is that a recipe is given for a number of people and must be adjusted for a different number. The recipe given was originally given for 8 large pancakes. All amounts are in ml. (except the eggs). (NOTE: The recipe is a good one!)

The cells represent number of pancakes (NUMBER), flour, baking powder (BK PWD), sugar, salt, eggs, milk, and salad oil (OIL).

Q1. How much flour would you need to make 4 pancakes? _____

Q2. You need 20 pancakes. How many eggs are required? ____
How much cooking oil?_____

Appendix C: Evaluation Forms

Introduction

The present high school curriculum includes a general computer literacy course, Computer Studies 2206. One of the aims of this course as stated in the course description is to learn the principles of operation, the capabilities, the history, and the applications of computers.

With respect to the applications of computers, two areas deserve special attention because of their wide use. Data bases and spreadsheets are among the most popular of all computer software. Visicalc, the first of the electronic spreadsheets has outsold all other computer software, including arcade games.

In a reader survey, Byte magazine (November, 1984) found that 29% of the non-business users surveyed use their computers for spreadsheet applications and 38% for database applications. Fifty-four percent of business users use spreadsheets. Despite this, very little is included in the current computer studies text (The World of Computers by R. Kelley) on data bases, and nothing at all on spreadsheets. Similar level texts make either cursory reference or no reference to these applications.

What is needed, then, are materials to assist in presenting databases and spreadsheets.

The simulations included are not intended to teach how to use spreadsheets and databases, but rather to give

students some idea of what these applications look like and how they can be used. The actual set-up and manipulation of a data base or spreadsheet is well outside the scope of the Computer Studies 2206 course.

The objectives on the following pages more explicitly give the intent of the package.

The only entry level skills assumed are a knowledge of the keyboard of the computer and how to load and run a program. The simulation would be used at about mid-year or later.

Objectives (Databases):

On completing the data base computer simulation, the student will be able to:

1. describe data base.
2. state one non-computer form of data base.
3. describe three specific procedures possible with a police data base.
4. describe three specific procedures possible with a library data base.
5. describe three specific procedures possible with a medical office data base.
6. briefly describe how data bases could be used in any two other areas
7. state two advantages of a computer data base.
8. state two disadvantages of a computer data base.
9. state two features present in commercial data bases beyond those presented in the simulation.

Objectives (Spreadsheets):

On completing the spreadsheet computer simulation, the student will be able to:

1. describe spreadsheets.
2. state where spreadsheets were first used.
3. describe how spreadsheets could be used by a woodworking shop.
4. describe how spreadsheets could be used in budget preparation.
5. describe how spreadsheets could be used in cooking.
6. briefly describe how spreadsheets could be used in two additional areas.
7. identify one commercial brand of computer spreadsheet.
8. state two features present in commercial spreadsheets beyond those in the simulation.

Evaluation Form (Content)

Please circle the abbreviation which best reflects your judgement. Use the space below for comments.

SA - strongly agree
A - agree
D - disagree
SD - strongly disagree

1. The general purpose is well defined. SA A D SD
2. The objectives are clearly stated. SA A D SD
3. The objectives are appropriate for Computer Studies 2206. SA A D SD
4. Lessons are free of ethnic, sex and other stereotypes. SA A D SD
5. The lessons have educational value. SA A D SD

COMMENTS:

Evaluation Form (Potential User)

Please circle the abbreviation which best reflects your judgement. Use the space below for comments.

SA - strongly agree

A - agree

D - disagree

SD - strongly disagree

1. Entry level is accurate.	SA A D SD
2. The general purpose is well defined.	SA A D SD
3. The objectives are clearly stated.	SA A D SD
4. The objectives are appropriate for Computer Studies 2206.	SA A D SD
5. Objectives are adequately addressed in the lesson.	SA A D SD
6. Test is appropriate for objectives and lesson.	SA A D SD
7. Student directions are clear.	SA A D SD
8. The reading level is appropriate.	SA A D SD
9. Lessons are free of ethnic, sex and other stereotypes.	SA A D SD
10. Activities are well paced.	SA A D SD
11. Lessons are interesting.	SA A D SD
12. The lessons have educational value.	SA A D SD

13. Teacher Guide is well organized. SA A D SD

14. Teacher Guide is adequate. SA A D SD

15. Package is easy to administer. SA A D SD

16. The programs are reliable and error-free in normal use. SA A D SD

COMMENTS:

Evaluation Form (Instructional Developer)

Please circle the abbreviation which best reflects your judgement. Use the space below for comments.

SA - strongly agree
A - agree
D - disagree
SD - strongly disagree

1. Entry level is clearly specified.	SA A D SD
2. The general purpose is well defined.	SA A D SD
3. The objectives are clearly stated.	SA A D SD
4. Objectives are adequately addressed in the lesson.	SA A D SD
5. Test is appropriate for objectives and lesson.	SA A D SD
6. Student directions are clear.	SA A D SD
7. Lessons are interesting.	SA A D SD
8. The lessons have educational value.	SA A D SD
9. Teacher Guide is well organized.	SA A D SD
10. Teacher Guide is adequate.	SA A D SD
11. Package is easy to administer.	SA A D SD
12. The programs are reliable and error-free in normal use.	SA A D SD

COMMENTS:

Evaluation Form (Methods)

Please circle the abbreviation which best reflects your judgement. Use the space below for comments.

SA - strongly agree

A - agree

D - disagree

SD - strongly disagree

1. The general purpose is well defined.	SA A D SD
2. The objectives are clearly stated.	SA A D SD
3. Objectives are adequately addressed	SA A D SD
4. Test is appropriate for objectives and lesson.	SA A D SD
5. The reading level is appropriate.	SA A D SD
6. Student directions are clear.	SA A D SD
7. Activities are well paced.	SA A D SD
8. Lessons are interesting.	SA A D SD
9. The lessons have educational value.	SA A D SD
10. Teacher Guide is well organized.	SA A D SD
11. Teacher Guide is adequate.	SA A D SD
12. Package is easy to administer.	SA A D SD
13. The programs are reliable and error-free in normal use.	SA A D SD
14. Effective use is made of computer capabilities	SA A D SD

COMMENTS:

Appendix D: Tests

Data Bases Quiz

NAME:_____

1. Describe what is meant by the term data base.

2. Give <u>one</u> example of a non-computer data base.

3. Give <u>two</u> advantages of computer data bases.

i)

ii)

4. Give <u>two</u> problems with computer data bases.

i)

ii)

5. Give <u>three</u> functions present in a commercial data base.

i)

ii)

iii)

6. Briefly describe <u>three</u> specific operations possible with a police motor vehicle data base.

i)

ii)

iii)

7. Briefly describe <u>three</u> specific operations possible with a medical data base.

i)

ii)

iii)

8. Briefly describe <u>three</u> specific operations possible with a library data base.

i)

ii)

iii)

9. <u>Briefly</u> describe how a data base could be used in <u>two</u> other areas .

i)

ii)

Spreadsheet Quiz Name _____

1. Describe what is meant by the term spreadsheet.

2. Where were spreadsheets first used?

3. Briefly describe how a spreadsheet can be used in:

i) woodworking shop

ii) a bakery

iii) preparing a home budget

any two other areas:

iv)

v)

4. Which of the following is a commercial spreadsheet?

i) DataTech

ii) Lotus 1-2-3

iii) EasyScript

iv) Pilot

5. Give <u>three</u> operations possible with a commercial spreadsheet.

i)

ii)

iii)

Appendix E: Computer Programs

```
100 REM ********************************
110 REM   MAIN PROGRAM   (POLICE)
120 REM ********************************
130 CLR
140 V=1024
150 DIM A$(10,10),B$(2,10,10),F(10),V(10),S$(10),I(10),M(10)
160 GOSUB 290: REM *** INTRODUCTION ***
170 II=0
180 GOSUB 450: REM *** DATA SCREEN  ***
190 GOSUB 660: REM *** SEARCH DATA  ***
200 GOSUB 1190: REM *** SEARCH       ***
210 GOSUB 1360: REM *** REPORT       ***
220 REM *** ANOTHER RUN? ***
230 PRINT "          ANOTHER RUN?"
240 GET A$
250 IF A$="Y" THEN 100
260 IF A$<>"N" AND A$=<>"Y" THEN 240
270 PRINT "s"
280 END
290 REM ********************
300 REM     INTRODUCTION
310 REM ********************
320 V=1024
330 PRINT "s"
340 PRINT "QQQQQQQQQQ]]]]]]]]]]MOTOR VEHICLE DATA"
```

```
350 FOR I=0 TO 39
360 POKE V+I,230
370 POKE (V+960+I),230
380 NEXT I
390 FOR I=0 TO 960 STEP 40
400 POKE (V+I+40),230
410 POKE (V+I+39),230
420 NEXT I
430 GOSUB 1550
440 RETURN
450 REM **********************
460 REM    DATA SCREEN
470 REM **********************
480 PRINT "s"
490 PRINT:PRINT
500 PRINT TAB(10);"LICENCE NO.R      r"
510 PRINT:PRINT
520 PRINT TAB(2);"COLOR R          r"; TAB(22);"MAKE R
   r"
530 PRINT:PRINT
540 PRINT TAB(2);"MODEL R          r";
550 PRINT TAB(22);"YEAR R    r"
560 PRINT:PRINT
570 PRINT TAB(2);"OWNER R                    r"
580 PRINT:PRINT
```

```
590 PRINT "ADDRESS R                                    r"
600 PRINT:PRINT
610 PRINT TAB(18);"STATUS"
620 PRINT TAB(1);"R                                     r"
630 PRINT:PRINT:PRINT:PRINT
640 PRINT " R<RETURN>:FORWARD r  R‡:BACK r   R_:SEARCH r";
650 RETURN
660 REM *****************
670 REM  SEARCH DATA
680 REM *****************
690 FOR I=1 TO 8
700 IF I<1 THEN I=1
710 FOR J=1 TO F(I)
720 M=V(I)+J
730 XM=PEEK(M)
740 POKE M,230
750 GET C$
760 IF C$=CHR$(13) THEN POKEM,XM: GOTO 920
770 IF C$=CHR$(20) THEN C=160 :J=J-2: GOTO 890
780 IF C$=CHR$(95) THEN GOTO 950
790 IF C$>"Z" AND C$<>" " AND C$<>"‡" THEN GOTO 750
800 IF C$<CHR$(32) AND C$<>CHR$(20)THEN GOTO 750
810 REM:IF C$=CHR$(145) THEN 3030
820 REM:IF C$=CHR$(157) THEN 3030
830 IF C$=CHR$(94) THEN I=I-1: POKE M,XM:GOTO 700
```

```
840 IF C$="" THEN 750
850 C=VAL(C$)+176
860 IF C$<"0" OR C$>"9" THEN C=ASC(C$)+64
870 IF C>255 THEN 750
880 IF C$=" " OR C$=" " THEN C=160
890 IF J<0 THEN J=0
900 POKE M,C
910 NEXT J
920 NEXT I
930 I=1
940 GOTO 690
950 REM *** READ SCREEN ***
960 PRINT"qqq                R SEARCHING r"
970 FOR I=1 TO 8
980 FOR J=1 TO F(I)
990 VM=PEEK(V(I)+J)
1000 IF VM=160 OR VM=230 OR VM=32 THEN D$=" ": GOTO 1030
1010 D$=CHR$(PEEK(V(I)+J)-64)
1020 IF PEEK(V(I)+J)>175 THEN D$=CHR$(PEEK(V(I)+J)-128)
1030 S$(I)=S$(I)+D$
1040 NEXT J
1050 NEXT I
1060 FOR I=1 TO 8
1070 FOR J=F(I) TO 1 STEP-1
1080 IF MID$(S$(I),J,1)<>" " THEN 1110
```

```
1090 NEXT J
1100 J=1
1110 S$(I)=LEFT$(S$(I),J)
1120 FOR J=1 TO LEN(S$(I))
1130 IF MID$(S$(I),J,1)<>" " THEN 1160
1140 NEXT J
1150 J=LEN(S$(I))
1160 S$(I)=RIGHT$(S$(I),(LEN(S$(I))-(J-1)))
1170 NEXT I
1180 RETURN
1190 REM **********************
1200 REM    SEARCH
1210 REM **********************
1220 FOR I=1 TO 10
1230 FOR J=1 TO 8
1240 IF S$(J)=" " THEN 1310
1250 M=LEN(S$(J))
1260 N=LEN(A$(J,I))-M+1
1270 FOR L=1 TO N
1280 IF MID$(A$(J,I),L,M)=S$(J) THEN 1310
1290 NEXT L
1300 GOTO 1340
1310 NEXT J
1320 II=II+1
1330 M(II)=I
```

```
1340 NEXT I
1350 RETURN
1360 REM ********************
1370 REM     REPORT
1380 REM ********************
1390 IF  II=0 THEN PRINT"sQQQQQQQQQQ]]]]]     RECORD NOT
FOUND":RETURN
1400 FOR I=1 TO II
1410 GOSUB 450
1420 FOR J=1 TO 8
1430 FOR L=1 TO LEN(A$(J,M(I)))
1440 M=V(J)+L
1450 C$=MID$(A$(J,M(I)),L,1)
1460 C=ASC(C$)+64
1470 IF  ASC(C$)<64 THEN C=C+64
1480 POKE M,C
1490 NEXT L
1500 NEXT J
1510 PRINT "qqqq         PRESS ANY KEY TO CONTINUE"
1520 GET A$:IFA$="" THEN 1520
1530 NEXT I
1540 RETURN
1550 REM ********************
1560 REM   READ DATA
1570 REM ********************
```

```
1580 FOR I=1 TO 10
1590 FOR J=1 TO 8
1600 READ A$(J,I)
1610 NEXT J
1620 NEXT I
1630 FOR I=1 TO 8
1640 READ V(I)
1650 V(I)=V+V(I)
1660 NEXT I
1670 FOR I=1 TO 8
1680 READ F(I)
1690 NEXT I
1700 RESTORE
1710 RETURN
1720 REM ****************
1730 REM   DATA FOR FILE
1740 REM ****************
1750 DATA ABC 476,YELLOW,FORD,PINTO ,1979,PHIL SMITH,33 PINE
ST,ROBBERY SUSPECT
1760 DATA SBA 387,BLACK,FORD,GRANADA,1981,BOB DOE,4 ASH
PL,DRUG TRAFFIC
1770 DATA ERA 777,GREEN,CHEV,CITATION,1982,SAM JONES,44
SECOND AVE,RECOVERED
1780 DATA SDF 654,RED,DODKE,ARIES,1983,JOE JONES,37 BARBER
ST,HIT AND RUN
```

```
1790 DATA UJY 678,BLUE,MAZDA,626,1984,TOD SMITH,4 DOE
PL,ROBBERY SUSPECT
1800 DATA WED 234,RED,MAZDA,GLC,1983,SAM ALLEN,22 SECOND
PL,HIT AND RUN
1810 DATA WDF 457,ORANGE,NISSAN,STANZA,1981,SARA OBRIEN,37
ALLEN ST,RECOVERED
1820 DATA WWR 353,BLACK,FORD,GRANADA,1981,SALLY SMITH,78
EMPIRE ST,STOLEN
1830 DATA THT 688,BLACK,DODGE,TRUCK,1984,BILL TILLER,2 GRANT
ST,RECOVERED
1840 DATA RRT 454,SILVER,MERCEDES,450,1984,JOE JONES,45 HILL
RD,STOLEN
1850 REM *** RELATIVE SCREEN LOCATIONS
1860 DATA 140,247,266,367,386,487,607,760
1870 REM *** FIELD LENGTHS
1880 DATA 7,10,10,10,4,30,30,38
1890 END
```

```
100 REM ********************************
110 REM    MAIN PROGRAM    (LIBRARY)
120 REM ********************************
130 CLR
140 V=1024
150 DIM A$(10,10),B$(2,10,10),F(10),V(10),S$(10),I(10),M(10)
160 GOSUB 290: REM *** INTRODUCTION ***
170 II=0
180 GOSUB 450: REM *** DATA SCREEN  ***
190 GOSUB 670: REM *** SEARCH DATA  ***
200 GOSUB 1200: REM *** SEARCH      ***
210 GOSUB 1370: REM *** REPORT      ***
220 REM *** ANOTHER RUN? ***
230 PRINT "          ANOTHER RUN ?"
240 GET A$: IF A$="" THEN 240
250 IF A$<>"Y" AND A$<>"N" THEN 240
260 IF LEFT$(A$,1)="Y" THEN 100
270 PRINT "s"
280 END
290 REM *********************
300 REM     INTRODUCTION
310 REM *********************
320 V=1024
330 PRINT "s"
340 PRINT "QQQQQQQQQQ]]]]]]]]]]LIBRARY SEARCH"
```

```
350 FOR I=0 TO 39
360 POKE V+I,230
370 POKE (V+960+I),230
380 NEXT I
390 FOR I=0 TO 960 STEP 40
400 POKE (V+I+40),230
410 POKE (V+I+39),230
420 NEXT I
430 GOSUB 1560
440 RETURN
450 REM **********************
460 REM    DATA SCREEN
470 REM **********************
480 PRINT "s"
490 PRINT
500 PRINT TAB(2);"CATALOG NO. ";
510 PRINT TAB(15);"R          r"
520 PRINT TAB(15);"R          r"
530 PRINT TAB(15);"R          r"
540 PRINT:PRINT
550 PRINT TAB(2);" TITLE R                              r"
560 PRINT:PRINT
570 PRINT TAB(2);"AUTHOR R                              r"
580 PRINT:PRINT
590 PRINT TAB(4);"DATE R          r"
```

```
600 PRINT:PRINT
610 PRINT TAB(15);"DESCRIPTION"
620 PRINT "R                                                    r";
630 PRINT "R                                                    r"
640 PRINT:PRINT:PRINT:PRINT
650 PRINT " R<RETURN>:FORWARD r  R↑:BACK r   R_:SEARCH r";
660 RETURN
670 REM *****************
680 REM  SEARCH DATA
690 REM *****************
700 FOR I=1 TO 7
710 IF I<1 THEN I=1
720 FOR J=1 TO F(I)
730 M=V(I)+J
740 XM=PEEK(M)
750 POKE M,230
760 GET C$
770 IF C$=CHR$(13) THEN POKEM,XM: GOTO 930
780 IF C$=CHR$(20) THEN C=160 :J=J-2: GOTO 900
790 IF C$=CHR$(95) THEN GOTO 960
800 IF C$>"Z" AND C$<>" " AND C$<>"↑" THEN GOTO 760
810 IF C$<CHR$(32) AND C$<>CHR$(20)THEN GOTO 760
820 REM:IF C$=CHR$(145) THEN 3030
830 REM:IF C$=CHR$(157) THEN 3030
840 IF C$=CHR$(94) THEN I=I-1: POKE M,XM:GOTO 710
```

```
850 IF C$="" THEN 760
860 C=VAL(C$)+176
870 IF C$<"0" OR C$>"9" THEN C=ASC(C$)+64
880 IF C>255 THEN 760
890 IF C$=" " OR C$=" " THEN C=160
900 IF J<0 THEN J=0
910 POKE M,C
920 NEXT J
930 NEXT I
940 I=1
950 GOTO 700
960 REM *** READ SCREEN ***
970 PRINT"qqq                R SEARCHING r"
980 FOR I=1 TO 7
990 FOR J=1 TO F(I)
1000 VM=PEEK(V(I)+J)
1010 IF VM=160 OR VM=230 OR VM=32 THEN D$=" ": GOTO 1040
1020 D$=CHR$(PEEK(V(I)+J)-64)
1030 IF PEEK(V(I)+J)>175 THEN D$=CHR$(PEEK(V(I)+J)-128)
1040 S$(I)=S$(I)+D$
1050 NEXT J
1060 NEXT I
1070 FOR I=1 TO 7
1080 FOR J=F(I) TO 1 STEP-1
1090 IF MID$(S$(I),J,1)<>" " THEN 1120
```

```
1100 NEXT J
1110 J=1
1120 S$(I)=LEFT$(S$(I),J)
1130 FOR J=1 TO LEN(S$(I))
1140 IF MID$(S$(I),J,1)<>" " THEN 1170
1150 NEXT J
1160 J=LEN(S$(I))
1170 S$(I)=RIGHT$(S$(I),(LEN(S$(I))-(J-1)))
1180 NEXT I
1190 RETURN
1200 REM ***********************
1210 REM    SEARCH
1220 REM ***********************
1230 FOR I=1 TO 10
1240 FOR J=1 TO 7
1250 IF S$(J)=" " THEN 1320
1260 M=LEN(S$(J))
1270 N=LEN(A$(J,I))-M+1
1280 FOR L=1 TO N
1290 IF MID$(A$(J,I),L,M)=S$(J) THEN 1320
1300 NEXT L
1310 GOTO 1350
1320 NEXT J
1330 II=II+1
1340 M(II)=I
```

```
1350 NEXT I
1360 RETURN
1370 REM ********************
1380 REM      REPORT
1390 REM ********************
1400 IF II=0 THEN PRINT"sQQQQQQQQQ]]]]]      RECORD NOT
FOUND":RETURN
1410 FOR I=1 TO .II
1420 GOSUB 450
1430 FOR J=1 TO 7
1440 FOR L=1 TO LEN(A$(J,M(I)))
1450 M=V(J)+L
1460 C$=MID$(A$(J,M(I)),L,1)
1470 C=ASC(C$)+64
1480 IF ASC(C$)<64 THEN C=C+64
1490 POKE M,C
1500 NEXT L
1510 NEXT J
1520 PRINT "qqq          PRESS ANY KEY TO CONTINUE"
1530 GET A$:IFA$="" THEN 1530
1540 NEXT I
1550 RETURN
1560 REM ******************
1570 REM    READ DATA
1580 REM ******************
```

```
1590 FOR I=1 TO 10
1600 FOR J=1 TO 7
1610 READ A$(J,I)
1620 NEXT J
1630 NEXT I
1640 FOR I=1 TO 7
1650 READ V(I)
1660 V(I)=V+V(I)
1670 NEXT I
1680 FOR I=1 TO 7
1690 READ F(I)
1700 NEXT I
1710 RESTORE
1720 RETURN
1730 REM ***************
1740 REM   DATA FOR FILE
1750 REM ***************
1760 DATA F,HEM," ",THE OLD MAN AND THE SEA,E.
HEMMINGWAY,1968,FICTION
1770 DATA F,HEM," ",FOR WHOM THE BELL
TOLL,E.HEMMINGWAY,1963,FICTION
1780 DATA FIC,HEM," ",A FAREWELL TO
ARMS,E.HEMMINGWAY,1957,FICTION
1790 DATA 940,.54,SKI,D-DAY THE NORMANDY
INVASION,G.C.SKIPPER,1967,WORLD WAR II
```

```
1800 DATA 940,.52,D29,ACROSS THE RHINE,F.M.DAVIS,1973,WORLD
WAR II
1810 DATA 940,.53,F85,THE DIARY OF A YOUNG GIRL,ANN
FRANK,1949,WORLD WAR II
1820 DATA 305,.4,RAY,TOWARDS WOMENS.RIGHTS,J.RAY,1980,WOMENS
RIGHTS (SOCIAL)
1830 DATA 303,.4,TOF,THE THIRD WAVE,ALVIN TOFFLER,1980,FUTURE
STUDIES
1840 DATA 973,.924,B45,ALL THE PRESIDENTS
MEN,C.BERNSTEINI,1979,NIXON YEARS
1850 DATA 595,.78,MOR,BUTTERFLIES AND
MOTHS,D.MORRIS,1967,BUTTERFLIES & MOTHS
1860 REM *** RELATIVE SCREEN LOCATIONS
1870 DATA 94,134,174,288,408,528,679
1880 REM *** FIELD LENGTHS
1890 DATA 10,10,10,30,30,10,80
1900 END
```

```
100 REM ********************************
110 REM  MAIN PROGRAM   (MEDICAL)
120 REM ********************************
130 CLR
140 V=1024
150 DIM A$(10,10),B$(2,10,10),F(10),V(10),S$(10),I(10),M(10)
160 GOSUB 290: REM *** INTRODUCTION ***
170 II=0
180 GOSUB 450: REM *** DATA SCREEN  ***
190 GOSUB 660: REM *** SEARCH DATA  ***
200 GOSUB 1190: REM *** SEARCH      ***
210 GOSUB 1360: REM *** REPORT      ***
220 REM *** ANOTHER RUN? ***
230 PRINT "           ANOTHER RUN?"
240 GET A$
250 IF A$<>"Y" AND A$<>"N" THEN 240
260 IF A$="Y" THEN 100
270 PRINT "s"
280 END
290 REM ********************
300 REM     INTRODUCTION
310 REM ********************
320 V=1024
330 PRINT "s"
340 PRINT "QQQQQQQQQQ]]]]]]]]]]MEDICAL RECORDS"
```

```
350 FOR I=0 TO 39
360 POKE V+I,230
370 POKE (V+960+I),230
380 NEXT I
390 FOR I=0 TO 960 STEP 40
400 POKE (V+I+40),230
410 POKE (V+1+39),230
420 NEXT I
430 GOSUB 1560
440 RETURN
450 REM **********************
460 REM    DATA SCREEN
470 REM **********************
480 PRINT "s"
490 PRINT:PRINT
500 PRINT TAB(4);"NAME R                              r"
510 PRINT:PRINT
520 PRINT TAB(1);"ADDRESS R                              r"
530 PRINT:PRINT
540 PRINT TAB(3);"MCP NO. R                r"
550 PRINT:PRINT
560 PRINT "LAST VISIT R                r"
570 PRINT:PRINT
580 PRINT TAB(10);"GENERAL HISTORY"
590 PRINT" R                                        r"
```

```
600 PRINT:PRINT
610 PRINT TAB(10);"MEDICATION"
620 PRINT " R                                          r"
630 PRINT:PRINT:PRINT
640 PRINT " R<RETURN>:FORWARD r  R‡:BACK r   R_:SEARCH r";
650 RETURN
660 REM *****************
670 REM  SEARCH DATA
680 REM *****************
690 FOR I=1 TO 6
700 IF I<1 THEN I=1
710 FOR J=1 TO F(I)
720 M=V(I)+J
730 XM=PEEK(M)
740 POKE M,230
750 GET C$
760 IF C$=CHR$(13) THEN POKEM,XM: GOTO 920
770 IF C$=CHR$(20) THEN C=160 :J=J-2: GOTO 890
780 IF C$=CHR$(95) THEN GOTO 950
790 IF C$>"Z" AND C$<>" " AND C$<>"‡" THEN GOTO 750
800 IF C$<CHR$(32) AND C$<>CHR$(20)THEN GOTO 750
810 REM:IF C$=CHR$(145) THEN 3030
820 REM:IF C$=CHR$(157) THEN 3030
830 IF C$=CHR$(94) THEN I=I-1: POKE M,XM:GOTO 700
840 IF C$="" THEN 750
```

```
850 C=VAL(C$)+176
860 IF C$<"0" OR C$>"9" THEN C=ASC(C$)+64
870 IF C>255 THEN 750
880 IF C$=" " OR C$=" " THEN C=160
890 IF J<0 THEN J=0
900 POKE M,C
910 NEXT J
920 NEXT I
930 I=1
940 GOTO 690
950 REM *** READ SCREEN ***
960 PRINT"qqq                R SEARCHING r"
970 FOR I=1 TO 6
980 FOR J=1 TO F(I)
990 VM=PEEK(V(I)+J)
1000 IF VM=160 OR VM=230 OR VM=32 THEN D$=" ": GOTO 1030
1010 D$=CHR$(PEEK(V(I)+J)-64)
1020 IF PEEK(V(I)+J)>175 THEN D$=CHR$(PEEK(V(I)+J)-128)
1030 S$(I)=S$(I)+D$
1040 NEXT J
1050 NEXT I
1060 FOR I=1 TO 6
1070 FOR J=F(I) TO 1 STEP-1
1080 IF MID$(S$(I),J,1)<>" " THEN 1110
1090 NEXT J
```

```
1100 J=1
1110 S$(I)=LEFT$(S$(I),J)
1120 FOR J=1 TO LEN(S$(I))
1130 IF MID$(S$(I),J,1)<>" " THEN 1160
1140 NEXT J
1150 J=LEN(S$(I))
1160 S$(I)=RIGHT$(S$(I),(LEN(S$(I))-(J-1)))
1170 NEXT I
1180 RETURN
1190 REM **********************
1200 REM    SEARCH
1210 REM **********************
1220 FOR I=1 TO 10
1230 FOR J=1 TO 6
1240 IF S$(J)=" " THEN 1310
1250 M=LEN(S$(J))
1260 N=LEN(A$(J,I))-M+1
1270 FOR L=1 TO N
1280 IF MID$(A$(J,I),L,M)=S$(J) THEN 1310
1290 NEXT L
1300 GOTO 1340
1310 NEXT J
1320 II=II+1
1330 M(II)=I
1340 NEXT I
```

```
1350 RETURN
1360 REM ********************
1370 REM     REPORT
1380 REM ********************
1390 IF II=0 THEN PRINT"sQQQQQQQQQQ]]]]]     RECORD NOT
FOUND":RETURN
1400 FOR I=1 TO II
1410 GOSUB 450
1420 FOR J=1 TO 6
1430 FOR L=1 TO LEN(A$(J,M(I)))
1440 M=V(J)+L
1450 C$=MID$(A$(J,M(I)),L,1)
1460 IF C$="" THEN C$="   "
1470 C=ASC(C$)+64
1480 IF ASC(C$)<64 THEN C=C+64
1490 POKE M,C
1500 NEXT L
1510 NEXT J
1520 PRINT "qqq         PRESS ANY KEY TO CONTINUE"
1530 GET A$:IFA$="" THEN 1530
1540 NEXT I
1550 RETURN
1560 REM ********************
1570 REM   READ DATA
1580 REM ********************
```

```
1590 FOR I=1 TO 10
1600 FOR J=1 TO 6
1610 READ A$(J,I)
1620 NEXT J
1630 NEXT I
1640 FOR I=1 TO 6
1650 READ V(I)
1660 V(I)=V+V(I)
1670 NEXT I
1680 FOR I=1 TO 6
1690 READ F(I)
1700 NEXT I
1710 RESTORE
1720 RETURN
1730 REM ****************
1740 REM   DATA FOR FILE
1750 REM ****************
1760 DATA BOB JONES,245 THIRD ST,127485286349,JAN
82,ACNE,TETRACYCLINE
1770 DATA FRANK SAMUELS,245 EMPIRE ST,187648837369,MAR
84,DIABETES,INSULIN
1780 DATA BILL JONES,245 THIRD ST,132435176849,JAN
80,DIABETES,INSULIN
1790 DATA JILL DAY,187 TRENT ST,176283542728,OCT 84,
,AMOXOCANE
```

```
1800 DATA CAROL LAKE,5 THIRD PL,287649872839,DEC 84,
,AMOXOCANE
1810 DATA HARRY HARRIS,24 THIRD ST,345622234549,OCT
85,ALCOHOL/DRUG ADDICTION,
1820 DATA SAM JONES,245 THIRD ST,132435176849,JAN
80,DIABETES,INSULIN
1830 DATA SIMON SHAW ,364 JACKMAN ST,762893682000,NOV
83,INSOMNIA,
1840 DATA SAM JANES,245 THIRD ST,132435176849,JAN 80,,
1850 DATA HELEN JULIAN,200 FIRST AVE,983652763672,SEPT 83,,
1860 REM *** RELATIVE SCREEN LOCATIONS
1870 DATA 128,248,369,490,640,800
1880 REM *** FIELD LENGTHS
1890 DATA 30,30,12,10,38,38
1900 END
```

```
10 POKE53281,1
20 GOSUB 11000
90 GOSUB 10000: REM INTRODUCTORY SCREEN  (BOX)
92 PRINT:PRINT:PRINT:PRINT:PRINT
93 PRINT:PRINT:PRINT
95 PRINT TAB(8);"R PRESS ANY KEY TO BEGIN r";
96 GET ZZ$:IF ZZ$="" THEN 96
100 GOSUB 1000: REM SET SCREEN LOCATIONS
110 GOSUB 3000: REM PRINT BORDERS
120 GOSUB 3175: REM PRINT LABELS
125 IF V$="N" THEN POKE 53281,11
130 GOSUB 1300: REM ENTER NEW VALUES
140 GOSUB 1050: REM REVERSE VIDEO
150 GOSUB 7000: REM GET TABLE VALUES
160 GOSUB 8072: REM CALCULATE
170 GOSUB 7100: REM INPUT VALUES
180 GOTO 130
1000 REM ********************
1001 REM SET SCREEN LOCATIONS
1002 REM ********************
1005 V1=1275
1010 M1(1)=V1
1011 M1(2)=V1+10
1012 M1(3)=V1+20
1013 M1(4)=V1+200
```

```
1014 M1(5)=V1+210
1015 M1(6)=V1+220
1016 M1(7)=V1+400
1017 M1(8)=V1+410
1018 M1(9)=V1+420
1020 RETURN
1045 REM ********************
1046 REM    REVERSE VIDEO
1050 REM ********************
1060 FOR K=0 TO 5
1065 V=M1(J)+K
1067 Z=PEEK(V)-128
1069 IF Z<0 THEN Z=Z+128
1070 POKE V,Z
1080 NEXT K
1090 RETURN
1300 REM ************************
1301 REM ENTER NEW TABLE VALUES
1302 REM ************************
1303 FOR J=1 TO 9
1304 FOR K=0 TO 5
1305 V=M1(J)+K
1306 Z=PEEK(V)+128
1307 IF Z>255 THEN Z=Z-128
1308 POKE V,Z
```

```
1309 NEXT K
1318 FOR L=0 TO 5
1320 V=M1(J)+L
1321 REM:POKE V,102
1322 GET K$
1325 IF K$="Q" THEN PRINT"s":END
1326 IF K$=CHR$(13) THEN GOTO 1360
1327 IF K$=CHR$(32) THEN GOTO 1352
1328 IF K$=CHR$(20) THEN GOSUB 9000:GOTO1320
1330 IF (K$<"0" OR K$>"9") AND K$<>"." THEN 1322
1341 Z=ASC(K$)
1342 REM:V=V+1
1343 POKE V,Z
1350 NEXT L
1352 GOSUB 1050: REM  REVERSE VIDEO
1355 NEXT J
1357 GOTO 1303
1360 RETURN
1390 IF L<0 THEN L=0
3000 REM ***************
3001 REM   PRINT  TABLE
3002 REM ***************
3004 PRINT "s"
3050 P1=1233
3060 FOR I=1 TO 29
```

```
3070 POKE P1+I,99
3080 POKE P1+160+I,68
3090 POKE P1+360+I,70
3100 POKE P1+560+I,100
3110 NEXT I
3120 FOR I=0 TO 560 STEP 40
3130 POKE P1+I,93
3140 POKE P1+10+I,93
3150 POKE P1+20+I,93
3160 POKE P1+30+I,93
3165 NEXT I
3170 RETURN
3172 REM ******************
3173 REM PRINT TABLE LABELS
3174 REM ******************
3175 V1=1995
3180 FOR I=1 TO 26
3190 READ M
3200 POKE V1+I,(M+128)
3210 NEXT I
3212 FOR J=1 TO 9
3213 FOR K=1 TO 7
3214 READ XX
3215 VV=M1(J)+79+K
3216 POKE VV,XX
```

```
3217 NEXT K
3218 NEXT J
3226 DATA
17,58,17,21,9,20,-96,-96,-96,-96,-96,-96,-96,-96,-96,-96,-96,
27,18
3227 DATA 29,58,3,1,12,3,32
3230 DATA
36,47,19,8,5,5,20,32,32,32,32,32,32,32,32,32,32,32,32,32,32
3231 DATA
32,12,5,14,7,20,8,32,32,23,9,4,20,8,32,32,4,5,16,20,8,32
3232 DATA
32,32,32,32,32,32,32,32,32,32,32,32,32,32,32,3,15,19,20,32,32
3233 DATA 19,16,1,3,5,32,20,15,32,1,4,22,1,14,-96,-96
3234 DATA -96,27,18,29,58,3,1,12,3,32
3235 DATA
19,16,1,3,5,32,20,15,32,1,4,22,1,14,3,5,-96,27,18,29,58,3,1,1
2,3,32
4000 RETURN
7000 REM ******************************
7001 REM GET TABLE ENTRIES FROM SCREEN
7002 REM ******************************
7005 FOR I=1 TO 9
7006 A$(I)=""
7007 NEXTI
7010 FOR I=1 TO 9
```

```
7020 FOR L=0 TO 5
7030 V2=M1(I)+L
7040 C=PEEK(V2)
7050 A$(I)=A$(I)+CHR$(C)
7054 V$=A$(I)
7055 A(I)=VAL(V$)
7060 NEXT L
7070 NEXT I
7071 RETURN
7100 REM **********************
7101 REM   INPUT VALUES
7102 REM **********************
7110 FOR I=1 TO 9
7120 FOR J=1 TO LEN(A$(I))
7130 Z$=MID$(A$(I),J,1)
7140 YY=ASC(Z$)
7160 VV=M1(I)+J-1
7170 POKE VV,YY
7180 NEXT J
7185 FOR JJ=J TO 6
7186 VV=M1(I)+JJ-1
7187 POKE VV,32
7188 NEXT JJ
7190 NEXT I
7200 RETURN
```

```
8072 REM *********
8073 REM CALCULATE
8074 REM *********
8075 A(9)=(A(4)*A(5)+A(4)*A(6)+A(5)*A(6))*2*A(1)/3.12
8077 A(9)=(INT(100*A(9)+.5))/100
8080 A$(9)=STR$(A(9))
8095 RETURN
9000 REM **********
9001 REM DELETE KEY
9002 REM **********
9010 L=L-1
9020 IF L<0 THEN L=0
9030 POKE V-1,160
9050 RETURN
10000 REM ********************
10001 REM INTRODUCTORY SCREEN
10002 REM ********************
10005 PRINT "s"
10010 FOR S=1 TO 8
10020 PRINT
10030 NEXT S
10040 PRINT TAB(8);"o                    p"
10050 PRINT TAB(8);"                     "
10052 PRINT TAB(8);"                     "
10060 PRINT TAB(8);"    BOX CONSTRUCTION     "
```

```
10070 PRINT TAB(8);"                                    "
10071 PRINT TAB(8);"                                    "
10072 PRINT TAB(8);"1                                   "
10080 RETURN
11000 REM  ************
11001 REM  SCREEN COLOR
11002 REM  ************
11010 PRINT"s"
11020 PRINT"QQQQQQQQ]QQQ]]]]]]]]";
11030 PRINT "COLOR MONITOR? (Y/N)"
11040 GET V$:IF V$<>"Y" AND V$<>"N" THEN 11040
11060 RETURN
```

```
10 POKE53281,1
20 GOSUB 11000
90 GOSUB 10000: REM INTRODUCTORY SCREEN  (BUDGET)
100 GOSUB 1000: REM SET SCREEN LOCATIONS
110 GOSUB 3000: REM PRINT BORDERS
120 GOSUB 3175: REM PRINT LABELS
125 IF V$="N" THEN POKE 53281,11
130 GOSUB 1300: REM ENTER NEW VALUES
140 GOSUB 1050: REM REVERSE VIDEO
150 GOSUB 7000: REM GET TABLE VALUES
160 GOSUB 8072: REM CALCULATE
170 GOSUB 7100: REM INPUT VALUES
180 GOTO 130
1000 REM ********************
1001 REM SET SCREEN LOCATIONS
1002 REM ********************
1005 V1=1275
1010 M1(1)=V1
1011 M1(2)=V1+10
1012 M1(3)=V1+20
1013 M1(4)=V1+200
1014 M1(5)=V1+210
1015 M1(6)=V1+220
1016 M1(7)=V1+400
1017 M1(8)=V1+410
```

```
1018 M1(9)=V1+420
1020 RETURN
1045 REM ********************
1046 REM REVERSE VIDEO
1050 REM ********************
1060 FOR K=0 TO 5
1065 V=M1(J)+K
1067 Z=PEEK(V)-128
1069 IF Z<0 THEN Z=Z+128
1070 POKE V,Z
1080 NEXT K
1090 RETURN
1300 REM ***********************
1301 REM ENTER NEW TABLE VALUES
1302 REM ***********************
1303 FOR J=1 TO 9
1304 FOR K=0 TO 5
1305 V=M1(J)+K
1306 Z=PEEK(V)+128
1307 IF Z>255 THEN Z=Z-128
1308 POKE V,Z
1309 NEXT K
1318 FOR L=0 TO 5
1320 V=M1(J)+L
1321 REM:POKE V,102
```

```
1322 GET K$
1325 IF K$="Q" THEN PRINT"s":END
1326 IF K$=CHR$(13) THEN GOTO 1360
1327 IF K$=CHR$(32) THEN GOTO 1352
1328 IF K$=CHR$(20) THEN GOSUB 9000:GOTO1320
1330 IF (K$<"0" OR K$>"9") AND K$<>"." THEN 1322
1341 Z=ASC(K$)
1342 REM:V=V+1
1343 POKE V,Z
1350 NEXT L
1352 GOSUB 1050: REM    REVERSE VIDEO
1355 NEXT J
1357 GOTO 1303
1360 RETURN
1390 IF L<0 THEN L=0
3000 REM ***************
3001 REM  PRINT  TABLE
3002 REM ***************
3004 PRINT "s"
3050 P1=1233
3060 FOR I=1 TO 29
3070 POKE P1+I,99
3080 POKE P1+160+I,68
3090 POKE P1+360+I,70
3100 POKE P1+560+I,100
```

```
3110 NEXT I
3120 FOR I=0 TO 560 STEP 40
3130 POKE P1+I,93
3140 POKE P1+10+I,93
3150 POKE P1+20+I,93
3160 POKE P1+30+I,93
3165 NEXT I
3170 RETURN
3172 REM ******************
3173 REM PRINT TABLE LABELS
3174 REM ******************
3175 V1=1995
3180 FOR I=1 TO 26
3190 READ M
3200 POKE V1+I,(M+128)
3210 NEXT I
3212 FOR J=1 TO 9
3213 FOR K=1 TO 7
3214 READ XX
3215 VV=M1(J)+79+K
3216 POKE VV,XX
3217 NEXT K
3218 NEXT J
3226 DATA
17,58,17,2[illegible]9,20,-96,-96,-96,-96,-96,-96,-96,-96,-96,-96,-96
```

```
3227 DATA 27,18,29,58,3,1,12,3,32
3230 DATA
9,14,3,15,13,5,32,32,8,25,4,18,15,32,32,16,8,15,14,5,32,32,6,
15,15,4
3231 DATA
32,32,32,32,7,1,19,32,32,32,13,9,19,12,32,32,32,12,15,1,14,19
,32,13
3232 DATA 15,14,20,8,19,32,32,32,19,1,22,5,32,32,32
4000 RETURN
7000 REM ******************************
7001 REM GET TABLE ENTRIES FROM SCREEN
7002 REM ******************************
7005 FOR I=1 TO 9
7006 A$(I)=""
7007 NEXTI
7010 FOR I=1 TO 9
7020 FOR L=0 TO 5
7030 V2=M1(I)+L
7040 C=PEEK(V2)
7050 A$(I)=A$(I)+CHR$(C)
7054 V$=A$(I)
7055 A(I)=VAL(V$)
7060 NEXT L
7070 NEXT I
7071 RETURN
```

```
7100 REM **********************
7101 REM   INPUT VALUES
7102 REM **********************
7110 FOR I=1 TO 9
7120 FOR J=1 TO LEN(A$(I))
7130 Z$=MID$(A$(I),J,1)
7140 YY=ASC(Z$)
7160 VV=M1(I)+J-1
7170 POKE VV,YY
7180 NEXT J
7185 FOR JJ=J TO 6
7186 VV=M1(I)+JJ-1
7187 POKE VV,32
7188 NEXT JJ
7190 NEXT I
7200 RETURN
8072 REM *********
8073 REM CALCULATE
8074 REM *********
8075 X1=A(2)+A(3)+A(4)+A(5)+A(6)+A(7)
8077 A(9)=(A(1)-X1)*A(8)
8080 A(9)=(INT(100*A(9)+.5))/100
8090 A$(9)=STR$(A(9))
8095 RETURN
9000 REM **********
```

```
9001 REM DELETE KEY
9002 REM **********
9010 L=L-1
9020 IF L<0 THEN L=0
9030 POKE V-1,160
9050 RETURN
10000 REM ********************
10001 REM INTRODUCTORY SCREEN
10002 REM ********************
10005 PRINT "s"
10010 FOR S=1 TO 8
10020 PRINT
10030 NEXT S
10040 PRINT TAB(8);"o                    p"
10050 PRINT TAB(8);"                     "
10052 PRINT TAB(8);"                     "
10060 PRINT TAB(8);"    FAMILY BUDGET    "
10070 PRINT TAB(8);"                     "
10071 PRINT TAB(8);"                     "
10072 PRINT TAB(8);"l                    "
10075 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
10077 PRINT TAB(8);"PRESS ANY KEY TO CONTINUE";
10078 GET ZZ$: IF ZZ$="" THEN 10078
10080 RETURN
11000 REM  ************
```

```
11001 REM  SCREEN COLOR
11002 REM  ************
11010 PRINT"s"
11020 PRINT"QQQQQQQQ]QQQ]]]]]]]";
11030 PRINT "COLOR MONITOR? (Y/N)"
11040 GET V$:IF V$<>"Y" AND V$<>"N" THEN 11040
11060 RETURN
```

```
10 POKE53281,1
20 GOSUB 11000
90 GOSUB 10000: REM INTRODUCTORY SCREEN  (PANCAKES)
92 PRINT:PRINT:PRINT:PRINT:PRINT
93 PRINT:PRINT:PRINT
95 PRINT TAB(8);"R PRESS ANY KEY TO BEGIN r";
96 GET ZZ$:IF ZZ$="" THEN 96
100 GOSUB 1000: REM SET SCREEN LOCATIONS
110 GOSUB 3000: REM PRINT BORDERS
120 GOSUB 3175: REM PRINT LABELS
125 IF V$="N" THEN POKE 53281,11
130 GOSUB 1300: REM ENTER NEW VALUES
140 GOSUB 1050: REM REVERSE VIDEO
150 GOSUB 7000: REM GET TABLE VALUES
160 GOSUB 8072: REM CALCULATE
170 GOSUB 7100: REM INPUT VALUES
180 GOTO 130
1000 REM ********************
1001 REM SET SCREEN LOCATIONS
1002 REM ********************
1005 V1=1275
1010 M1(1)=V1
1011 M1(2)=V1+10
1012 M1(3)=V1+20
1013 M1(4)=V1+200
```

```
1014 M1(5)=V1+210
1015 M1(6)=V1+220
1016 M1(7)=V1+400
1017 M1(8)=V1+410
1018 M1(9)=V1+420
1020 RETURN
1045 REM ********************
1046 REM     REVERSE VIDEO
1050 REM ********************
1060 FOR K=0 TO 5
1065 V=M1(J)+K
1067 Z=PEEK(V)-128
1069 IF Z<0 THEN Z=Z+128
1070 POKE V,Z
1080 NEXT K
1090 RETURN
1300 REM ************************
1301 REM ENTER NEW TABLE VALUES
1302 REM ************************
1303 FOR J=1 TO 9
1304 FOR K=0 TO 5
1305 V=M1(J)+K
1306 Z=PEEK(V)+128
1307 IF Z>255 THEN Z=Z-128
1308 POKE V,Z
```

```
1309 NEXT K
1318 FOR L=0 TO 5
1320 V=M1(J)+L
1321 REM:POKE V,102
1322 GET K$
1325 IF K$="Q" THEN PRINT"s":END
1326 IF K$=CHR$(13) THEN GOTO 1360
1327 IF K$=CHR$(32) THEN GOTO 1352
1328 IF K$=CHR$(20) THEN GOSUB 9000:GOTO1320
1330 IF (K$<"0" OR K$>"9") AND K$<>"." THEN 1322
1341 Z=ASC(K$)
1342 REM:V=V+1
1343 POKE V,Z
1350 NEXT L
1352 GOSUB 1050: REM  REVERSE VIDEO
1355 NEXT J
1357 GOTO 1303
1360 RETURN
1390 IF L<0 THEN L=0
3000 REM ***************
3001 REM   PRINT   TABLE
3002 REM ***************
3004 PRINT "s"
3050 P1=1233
3060 FOR I=1 TO 29
```

```
3070 POKE P1+I,99
3080 POKE P1+160+I,68
3090 POKE P1+360+I,70
3100 POKE P1+560+I,100
3110 NEXT I
3120 FOR I=0 TO 560 STEP 40
3130 POKE P1+I,93
3140 POKE P1+10+I,93
3150 POKE P1+20+I,93
3160 POKE P1+30+I,93
3165 NEXT I
3170 RETURN
3172 REM ******************
3173 REM PRINT TABLE LABELS
3174 REM ******************
3175 V1=1995
3180 FOR I=1 TO 26
3190 READ M
3200 POKE V1+I,(M+128)
3210 NEXT I
3212 FOR J=1 TO 9
3213 FOR K=1 TO 7
3214 READ XX
3215 VV=M1(J)+79+K
3216 POKE VV,XX
```

```
3217 NEXT K
3218 NEXT J
3226 DATA
17,58,17,21,9,20,-96,-96,-96,-96,-96,-96,-96,-96,-96,-96,-96,
27,18
3227 DATA 29,58,3,1,12,3,32
3230 DATA
32,14,21,13,2,5,18,32,6,12,15,21,18,32,32,2,11,32,16,23,4
3231 DATA
32,19,21,7,1,18,32,32,19,1,12,20,32,32,32,5,7,7,19,32,32
3232 DATA
32,13,9,12,11,32,32,32,32,15,9,12,32,32,32,32,32,32,32,32,32,
32
3233 DATA 32,19,16,1,3,5,32,20,15,32,1,4,22,1,14,-96,-96
3234 DATA -96,27,18,29,58,3,1,12,3,32
3235 DATA
19,16,1,3,5,32,20,15,32,1,4,22,1,14,3,5,-96,27,18,29,58,3,1,1
2,3,32
4000 RETURN
7000 REM ******************************
7001 REM GET TABLE ENTRIES FROM SCREEN
7002 REM ******************************
7005 FOR I=1 TO 9
7006 A$(I)=""
7007 NEXTI
```

```
7010 FOR I=1 TO 9
7020 FOR L=0 TO 5
7030 V2=M1(I)+L
7040 C=PEEK(V2)
7050 A$(I)=A$(I)+CHR$(C)
7054 V$=A$(I)
7055 A(I)=VAL(V$)
7060 NEXT L
7070 NEXT I
7071 RETURN
7100 REM ***********************
7101 REM  INPUT VALUES
7102 REM ***********************
7110 FOR I=1 TO 9
7120 FOR J=1 TO LEN(A$(I))
7130 Z$=MID$(A$(I),J,1)
7140 YY=ASC(Z$)
7160 VV=M1(I)+J-2
7170 POKE VV,YY
7180 NEXT J
7185 FOR JJ=J TO 6
7186 VV=M1(I)+JJ-2
7187 POKE VV,32
7188 NEXT JJ
7190 NEXT I
```

```
7200 RETURN
8072 REM ********
8073 REM CALCULATE
8074 REM *********
8075 A(2)=INT((312.5/8)*A(1))
8076 A(3)=INT((15/8*A(1))+.5)
8077 A(4)=A(3)
8078 A(5)=INT((2.5/8)*A(1)+.5)
8079 A(6)=INT(A(1)/8): IF A(6)=0 THEN A(6)=1
8080 A(7)=INT((290/8*A(1))+.5)
8081 A(8)=2*A(3)
8082 FOR SS=1 TO 8
8083 A$(SS)=STR$(A(SS))
8084 NEXT SS
8095 RETURN
9000 REM **********
9001 REM DELETE KEY
9002 REM **********
9010 L=L-1
9020 IF L<0 THEN L=0
9030 POKE V-1,160
9050 RETURN
10000 REM ******************
10001 REM INTRODUCTORY SCREEN
10002 REM ******************
```

```
10005 PRINT "s"
10010 FOR S=1 TO 8
10020 PRINT
10030 NEXT S
10040 PRINT TAB(8);"o                    p"
10050 PRINT TAB(8);"                     "
10052 PRINT TAB(8);"                     "
10060 PRINT TAB(8);"        PANCAKES     "
10070 PRINT TAB(8);"                     "
10071 PRINT TAB(8);"                     "
10072 PRINT TAB(8);"l                    "
10080 RETURN
11000 REM  ************
11001 REM  SCREEN COLOR
11002 REM  ************
11010 PRINT"s"
11020 PRINT"QQQQQQQQ]QQQ]]]]]]]";
11030 PRINT "COLOR MONITOR? (Y/N)"
11040 GET V$:IF V$<>"Y" AND V$<>"N" THEN 11040
11060 RETURN
```