# Using Computers in the Primary School

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## Acknowledgements

## Layout & Design

*For Matthew*

# Contents

# Chapter One: Overview

## Introduction to the overview

This publication will address the applications of word processing, databases, simulations, graphics and problem solving as they could apply in multi-age classrooms.

The purpose of identifying the type of application is to help teachers maximise the effectiveness of the software for learning potential and for teachers to see how the software may fit into their classroom curriculum situation. The importance of teacher familiarisation with each software package cannot be over stressed, as it provides users with the foundation on which to base their needs analysis of the students in their class and to effectively integrate the package into the curriculum providing opportunities to enhance both the teaching and learning environment not before possible.

Each application matches a piece of software supplied as a part of the **Computers in the Classroom** project.

Word processing - *Bank Street Writer III*™
Database - *Weather Report*™
Simulation (adventure game) - *Pieces of Eight*™
Problem solving - *The Factory* ™
Graphics - *MousePaint*™

## Word processing

**Word processing** software provides a flexible, typewriter-like tool for enhancing written communication. It is used widely in classrooms to encourage a process approach to writing. After text has been entered and stored it can then be edited as many times as necessary and printed out in the desired presentation.

There are a variety of word processing packages currently available. *Bank Street Writer III*™, for example, combines 20, 40 and 80 column text processing, a spelling checker, thesaurus and facility for prompted writing. Other packages allow text and graphics to be integrated (*Storymaker*™) and for text to be printed in a range of font styles and character sets, giving the user a Macintosh-like screen environment for writing such as *Multiscribe*™. User preference and the demands of the writing tasks will determine the software chosen.

## Simulations

Simulations provide students with learning environments that may not be possible to reproduce in a classroom situations. They can enhance learning by promoting group work, the development of problem solving strategies and deductive reasoning skills, as well as fostering student independence. Simulations, and appropriate software packages, are discussed fully in chapter 5.

## Problem Solving

Problem solving software allows students to be placed in learning situations previously difficult to establish in traditional classrooms. It encourages students to develop a set of problem solving strategies which are further enhanced in group situations. Learning can be easily integrated across subject areas. Suggestions for problem solving software are made in chapter 6.

## Databases

A database is a collection of information stored in fields within records similar to a card file system. By entering a command the computer can quickly sort and locate relevant data and present it in a form for comparison which can lead to generalising and hypothesising. Software for open and closed database manipulation are more fully described in chapter 7 of this publication.

## Graphics

Graphics software helps students develop an understanding of spatial relationships by allowing them to manipulate lines, shapes, textures, patterns and colours using a WIMPs (windows, icons, mouse and pull down menus) operating environment. Students develop hand-eye coordination and graphic design skills using this flexible drawing tool. Newer graphics packages allow for animated screens giving an almost video production. A list of recommended titles is provided in chapter 8.

# Chapter Two: Planning & Organisation

## Introduction

Much of the software currently available can make a significant difference to classroom learning environments. Students can be far more motivated to participate, learning can be more meaningful and relevant, and the process of learning can occur naturally.

Enhanced learning environments will be dependent on:

- careful selection of **software,**
- thorough **planning,** assuming a general understanding of the software, both its operation and the author's intention, usually found by reading the manuals,
- **negotiation** between teacher and students concerning decisions about the learning environment and choice of resources, activities and learning outcomes. When students do participate in such decision making not only do they make valid and sensible suggestions but they assume greater ownership of the learning situation and participate more seriously, resulting in a far greater knowledge and understanding of the task,
- **the teacher's role** requiring flexibility of approach so the direction for learning can vary according to student interest, available resources and on incidents that arise from time to time. The teacher should also have an understanding of context and process, and be able to adapt to a role of co-learner, responsible for initial planning and overall direction and outcome but willing to learn from and with the students.

The two most significant conditions therefore, are

> **CONTEXT**

and

> **PROCESS**

Context is a broad term ensuring that the learning is embedded in or surrounded by meaning for the student. It encompasses some prior knowledge of the learning circumstances or content and the necessary skills to be applied.

PROCESS is an approach to learning, now widely applied to the total primary school curriculum stemming from a greater understanding amongst educators of writing as a process.

Before any learning takes place, be it writing, problem solving or information handling, time is provided to prepare for learning through research, brainstorming and coming to understand. Successive attempts are then made at the problem, there is a great emphasis on sharing, discussing and responding making it a true learning situation and not an individual testing experience, and frequently the process of learning becomes as important as the end product.

To exemplify both context and process, consider the following example:

Let us assume that teacher and students decide that information is required from a business as part of a social studies unit. It would be necessary for the students to understand the nature of the business by reading company brochures and learning about their markets and products and understanding how information the business could provide would be useful.

It would also be essential for students to access a range of sample letters (usually those sent previously for a similar purpose). Students should then analyse letter parts and their purposes and discuss the style of language appropriate to business letters. Before the letter is produced a similar letter would be modelled by the teacher with the whole class.

After such a broad context had been established, a process of writing would be followed before the letter was finally ready for posting. Ideas for the letter would be brainstormed, a first draft written, changes made after children read the letter aloud to various people particularly those outside the immediate classroom such as administrators, parents or other teachers and students. After the children are satisfied with the meaning they are trying to convey they then pay some attention to the style of language, address any spelling or punctuation errors and finally check the layout or established rules for business letters.

This is in sharp contrast to introducing the writing of a business letter into a 'cold' learning environment where students are expected to write without explanation or by following a format on the board or on a sheet. In this example there is ample support for learners so a satisfactory result can be achieved, and both learners and teachers are clear about the purpose of the learning.

## Organisation of the learning environment

Organisation has two major components:
• the physical arrangement of the learning environment, and,
• the planning and organising of learning experiences suited to the students' needs.

The organisation of the **physical environment** involves room layout as well as collection and placement of resources. These should not be static but be determined by the teacher and students together where appropriate. Room layout will facilitate teaching styles such as teacher exposition or small group work. It is important, also, to include a place for the publishing and display of finished work.

Consider the following grouping patterns:

Pattern A (Fig.1) can be used for a timetabled block, for a specific teaching unit (one problem solving program) or as a model for an integrated unit. The upper shaded circle represents the class introduction which may last for fifteen minutes or the development of context for weeks before the computer-based activity is introduced, then being completed in small groups. The shaded circle at the bottom represents time for feedback which again may be short or an extended length of time for presentation of investigations as a result of using the computer.
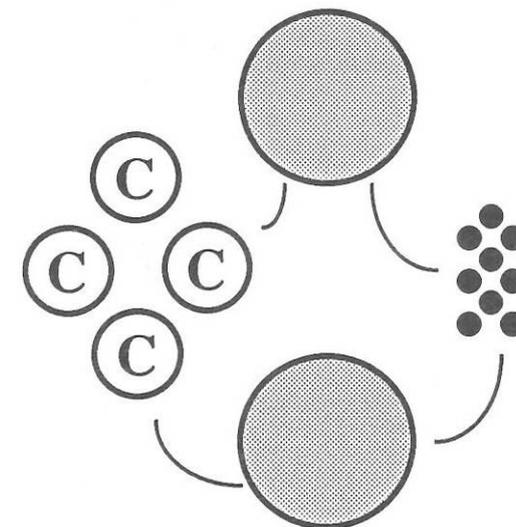


*Fig.1*
*Grouping Pattern A*

Pattern B (Fig. 2) represents the model of computer use most suited to word processing where an individual or small group use the computer throughout the day while the rest of the class participate in timetabled lessons.
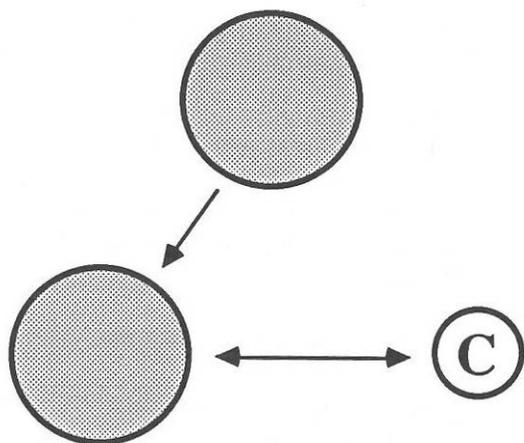


*Fig. 2*
*Grouping Pattern B*

Pattern C (Fig. 3) is particularly suited to problem solving software where there may be no introduction to the whole class leaving individuals to develop strategies for themselves, finalising in a 'feedback' session to discuss and share discoveries.
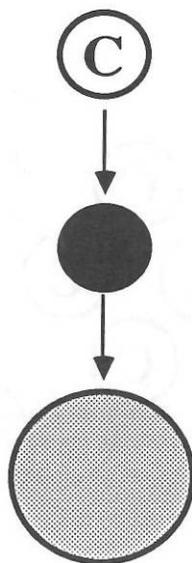


*Fig. 3*
*Grouping Pattern C*

Organisation of **learning experiences** will begin with determining the needs and interests of the students, making a basic plan for learning experiences, deciding on the most appropriate activities to develop processes or to produce finished work, and considering teaching strategies and classroom organisation.

Learning experiences should be considered in the following four stages:

- Getting ready - the initial planning
- Getting into - introductory activities
- Coming back - reflecting and consolidating
- Going beyond - applying or extending the learning situation

### Getting ready

This requires a thorough knowledge of the software, matched with the needs, interests and abilities of the students to determine the purposes of the learning to be undertaken. For example, drawing comparisons, encouraging oral language and developing purposeful note-taking.

During this time the teacher needs to establish the focus for the learning and to decide with the children what they know, what they need to know, their level and type of participation, and how they can achieve the end result. Having identified these needs the teacher can then prepare an introduction to the program, and set the tone for the learning experiences to be achieved.

The teacher must identify the skills to be learnt before using any software package, eg. right angles for *The Factory™*. It is important that before the computer becomes a part of the learning resources the teacher ensures that the learning context is thoroughly and carefully established and the children motivated with a clear understanding of the purpose. Often whole group or direct teaching needs to occur before activities are introduced.

### Getting Into

Getting into the learning involves students in problem solving, metacognition (or thinking about thinking, making thinking explicit), pupil learning, pupil self help and a range of thinking and learning behaviours.

Appropriate teacher behaviour includes sensitive intervention, questioning, direct teaching, setting achievable objectives and realistic challenges, establishing a balance between control and direction, providing honest feedback and thinking about learning and teaching.

### Coming Back

This stage involves stepping back from the learning situation to reflect, consolidate, investigate away from the computer, perform finished work, publish, question and generally to ensure that the learning situation reaches its potential.
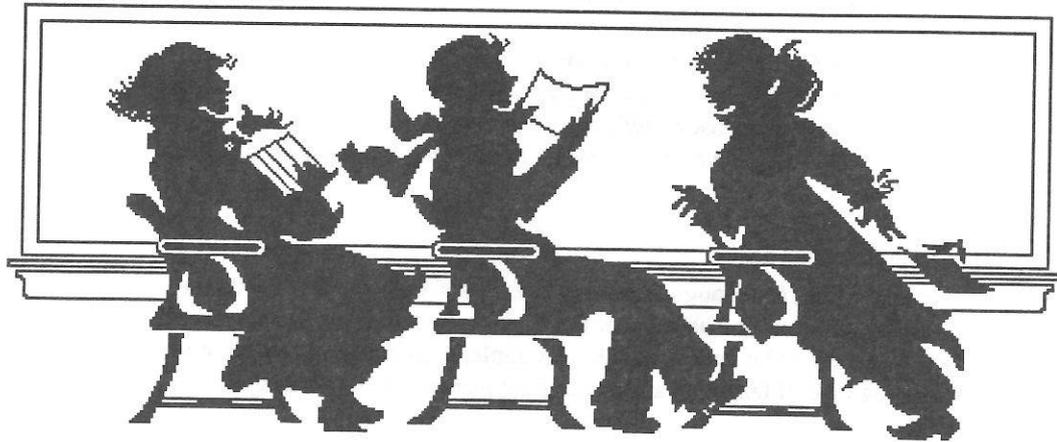
### Going Beyond

This concluding learning stage involves the application of learning to a similar situation or to a totally new situation where similar skills can be applied.

These stages will become clearer where they have been used as organisers in subsequent chapters.

# Chapter Three: Getting Started

## Introduction

This chapter has been included for those teachers who have not as yet introduced computers into their classrooms.

Traditionally, the computer has been introduced into classrooms through a teacher exposition on the names, parts and functions of the hardware with students labelling and colouring the various components. Extensive time spent on this type of activity should be unnecessary since many students will pick up a working vocabulary as it is used in context from instructions such as "put the disk in the disk drive and boot the disk", from hands-on experience, and from other children.

With so many families now owning computers, it is probable that many students will have a very good working knowledge of them. The teacher, therefore, must be prepared prepared to learn with and from students. It is important to brainstorm together what the teacher and students do know about computers and what they want to learn.

## Changing emphasis

The emphasis throughout this publication is for computers to be used as a learning tool and not for students to learn *about* computers. When computers were first introduced into education over four years ago there was a general attitude that children should learn about computers, resulting in an emphasis on computer awareness and on one-to-one hands-on. The computer *became* a teaching machine. The emphasis now is for computers to be used as a learning tool - motivating learning, generating learning away from the computer, enhancing group interactions and integrating computers across the curriculum.

## Computers in society

This topic should be for interest and extension only rather than as a major focus. It could be incorporated into other curriculum areas such as Science (technology, tools that helps us) or throughout the Social Studies syllabus. It is important to make students aware of computers for their own use by ensuring that they are exposed to a balance of activities across the year. For example, word processing, graphics, databases, games, simu-

lations, desktop publishing and for skills reinforcement, relating these uses to their application within the community.

Suggested extension activities could include:

☞ Having students identify adults who use a computer in their occupation. These adults may come to the school to share their expertise with students or the students may visit the work environment directly, in small groups.

☞ Make students aware, through the media, of any coverage given to computers. If it is advertisements, then compare the product with the school's, or if it is a press release on a new application for computers. Compare with the school's uses or how this will benefit the community generally.

## Where to begin

Decisions about where to begin will be dependent on the amount of available computer access, the age and experience of the students, the experience of the teacher, the available software resources and the school's philosophy towards education.

The software chosen should be easy to operate (user-friendly in computer jargon) and require smaller learning tasks. It may even be a piece of structured reinforcement software such as a maths drill program, software that requires relatively little planning or computer expertise that allows confidence to grow. The *Microzine®* series of electronic magazines provides excellent beginning programs. Each disk provides small activities covering a range of applications that can stimulate language development. Highly engaging programs include 'The Mystery at Pinecrest Manor', 'Haunted House', or 'Pirates of the Soft Seas', the twist-a-plot's included with each volume. Problem solving software such as *The Factory*™ or *Puzzle Tanks*™ also provide smaller learning tasks. As expertise grows more adventurous use of the computer can be planned using more open ended software embedded within learning units as described throughout this publication.

Several approaches might be considered:

• *Providing a balanced exposure to many applications:*
It may be decided to introduce word processing, databases, simulations, problem solving, graphics, tools and structured reinforcement by focusing on each application over several weeks.

• *Focusing on one application:*
If your teaching strength is in developing students' writing abilities, then word processing may be chosen as the major focus. The computer would then be used for group modelling situations, exposing students to a range of writing types such as reports, poetry and plays. A balance of whole class, small group and individual writing times may be provided. After skill growth, the culminating activity could be to produce a newspaper or another larger cooperative writing project.

• *Exploring a theme or topic:*
Using a simulation developed into a theme. *Where in the World is Carmen San Diego*™ has been a successful beginning package and units of work already exist for this program. Alternately choose a theme, such as mystery or gold discovery, and incorporate computer-based resources within it, where appropriate.

## Computers throughout the day, week and year

This will vary greatly from class to class throughout the year. Several modes of operation should be considered:

• *Changing the purpose of computer use throughout the day:*
At the start of the day the computer may be used for morning talk (recording with the word processor) and for recording weather data. Following this it may be used for problem solving with maths groups. After morning tea break it may be used for reading groups (a cloze exercise using the word processor) or for individuals to write using the word processor. After lunch, the computer may be used as part of group activities focusing on graphic art in small groups.

• *Focusing on one activity:*
The computer may be dedicated to a single application (word processing, graphic art, database manipulation or problem solving). Individuals or student pairs may be timetabled at the computer for a set period of time, the rest of the class participating in normal school lessons.

• *A learning tool with an integrated unit:*
This purpose basically relates to the computer as used within a unit of work based on a simulation such as *Flowers of Crystal*™. While groups of three or four interact with the computer, the rest of the class is engaged in activities supporting interactions with the software. This pattern of computer use continues for the total school day spanning several weeks.

# Chapter Four: Writing & Word Processing

## About word processing

Using word processors for writing is one of the most widespread applications of computers in primary schools. Research projects and classroom investigations have concluded many benefits, including increased volume of writing, more experimentation with meaning and words, increased desire to publish, and increased self confidence and attitudes towards writing. An enhanced ability to write, however, does not necessarily follow. Improved ability is dependent on the role of the teacher, the structure of the learning environment and the support of a strong literature and language development program.

The purpose of this chapter is to suggest some classroom procedures, additional support materials and suggestions for embedding writing ideas and topics within a learning context so that the potential for writing growth may be realised.

It is essential for the teacher to be comfortable with the software. Using the computer for teacher preparation of lesson plans, correspondence and worksheets will accelerate this understanding. Word processing is one activity that cannot be 'booted' up and left to the students to 'have a go'. Activities will need to be well planned, purposeful and well organised within the classroom.

## A reminder about the process

One of the greatest benefits of word processing is that the *process* of writing occurs naturally. Almost always changes are made to the original composition or draft, and the final copy, after polishing the presentation, may then be published.

Teachers may find writing with a computer easier to manage than traditional process writing classrooms and students enjoy writing more when the burden of rewriting the whole text is removed.

Many models of the process have been posited.

Pre-Writing

Publishing

First Draft Composing

Evaluating

Responding/Revising

Proof-Reading

Editing
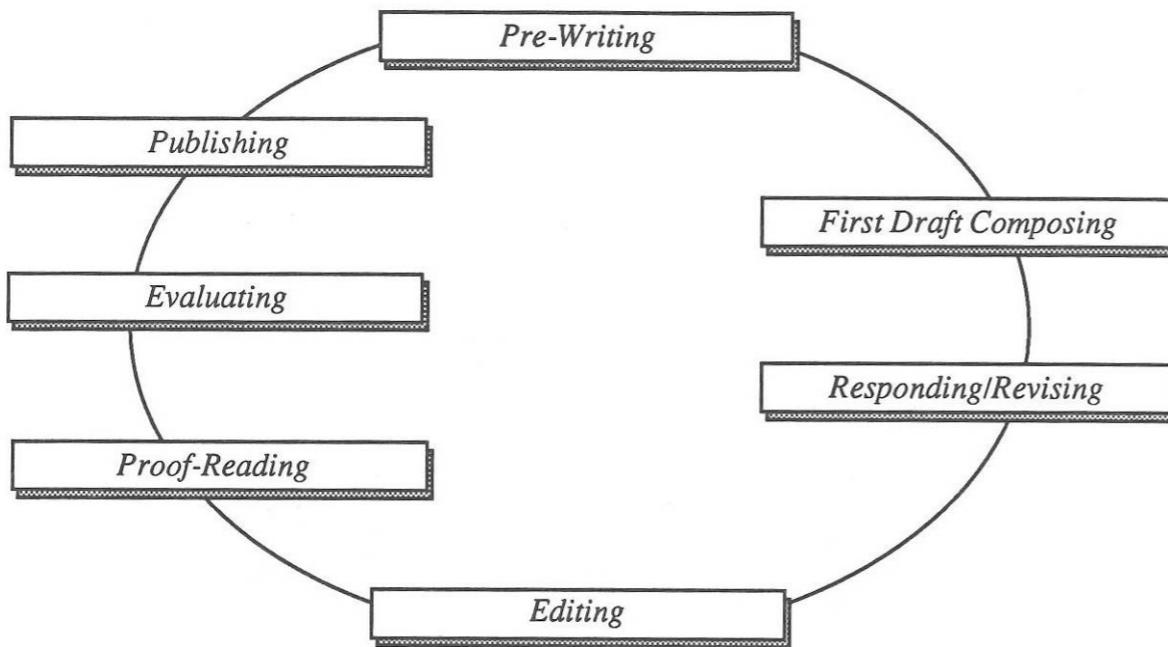
Fig. 4
Queensland Writing
Project Model

The first model (Fig. 4), from the Queensland Writing Project, provides a simplistic presentation that looks almost linear, suggesting that a writer begins at a certain point (presumably pre-writing) and moves methodically through to the final product. Writing, however, is not a linear process but moves back and forth with no strict pattern or progression.

The second, more complex diagram (Fig. 5) presents three levels for consideration. The process is roughly divided into four stages where there is a focus on meaning, on expression, on print and finally on presentation. At any and every stage there will be interaction with the text, peers, teachers or anyone else available to respond. Continually there will be informal evaluation of the writing at the writer's discretion and not as a direction from someone else, in a change or even in a fresh start.

Evaluating

PRE-WRITING

Evaluating

PUBLISHING

Evaluating

DRAFTING

Focus on presentation

Focus on meaning

**INTERACTION with**
- text
- peers
- teacher
- helpers
- family

Evaluating

RESPONDING REVISING RESHAPING

Focus on print

Focus on expression

PROOF-READING

EDITING

Evaluating

Evaluating
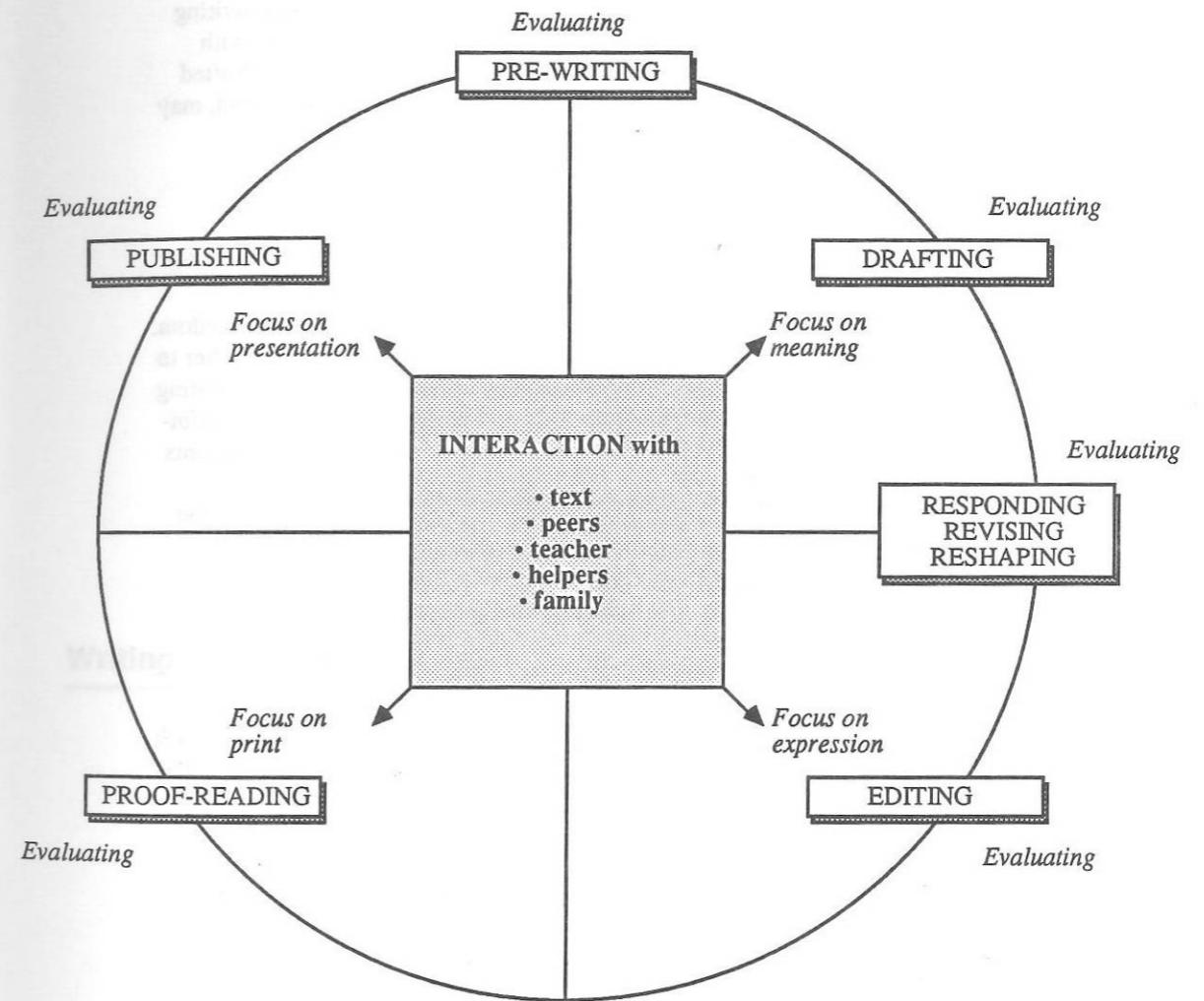
Fig. 5
The Writing Process
for the classroom

What is implied in these diagrams is that writing can start at any stage, not necessarily at the most obvious pre-writing stage, and can move in any direction rather like a pin ball machine, back and forth at the whim of the writer. It is important to remember that not every piece of writing will be processed and that as students become more comfortable with their writing much of it will be brainstormed but never written, drafted several times but never published. Some students, on the other hand, may want to publish everything that they write.

## The process in the classroom

A strict adherence to process will restrict expression and writing freedom. What is required is flexibility and confidence on the part of the teacher to write with the students and to openly share the frustrations, group writing where there is no individual ownership and where students feel uninhibited to contribute, and an emphasis on response to writing where students share what they like and don't like, what they understand and don't understand, and their suggestions for writing improvement. Initially the teacher will need to provide a model for responding to writing but the ultimate goal should be to have the students respond to each other's writing, not relying on the teacher for the 'authoritarian' response.

### Responding to students' writing

As this is one of the most important aspects of the writing process growth the following questions might be considered suitable after the student has read his/her work:

*What part do you like?*
*Where are you having problems? What parts aren't you happy with?*
*What changes have you made?*
*Where do you see your writing going from here?*
*Can you think of a different way of saying this?*
*What questions do you want to ask?*

The teacher should be supportive but not condescending. Constructive comments are important, focusing on one or two suggestions rather than trying to change everything. (This is particularly important when helping students prepare for publication. For certain age groups it is more important that the students change some things and that the teacher corrects any spelling and punctuation that may be beyond the ability of the students in the final draft.)

Writing programs should include a balance of student chosen writing and teacher directed writing. It is important for the teacher to structure writing experiences that are purposely related to other classroom learning and that are designed for specific learning purposes. For example, to expose students to a particular style or type of writing (letter, report, narrative, description, poetry), to extend vocabulary, model methods of brainstorming, purposes for writing (to clarify thinking, to command, or to entertai) or particular sentence structures. These experiences should not be written on the board or a sheet for students to complete but should be modelled together. Modelling allows the teacher to explain to students how and why writing works in particular ways for particular ends.
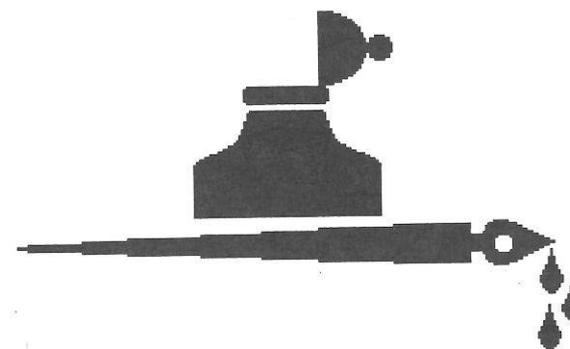
## Writing other things

Students should be exposed to and encouraged to try a wide range of writing formats, including letters, requests, questionnaires, endings for stories, recipes, instructions, directions, rules, scripts, stories, anecdotes, lists, reviews, poems, biographies and autobiographies, ballads, fables and fairy tales, legends, brochures, captions and cartoons, comparisons, mysteries and advertisements.

These should not be 'exercises' but be developed as they occur naturally throughout the school year when there is a strong purpose and context for the writing. Again the structure and type of appropriate language should be modelled so students are not expected to write without knowing how.

## Introducing word processing

Irrespective of the students' age this application is best introduced to a group gathered around an appropriately-sized computer screen. Students can then observe the teacher writing with a word processor, focusing on

the sharing and refining of meaning while at the same time learning and observing its benefits. Group writing should be purposeful and a part of the class's language program. In this way many aspects of writing as a process (planning, drafting, expression and presentation) are being modelled. Step by step lessons are time consuming and unnecessarily segment the learning.

## Organising word processing

Repeating the important elements, the writing classroom should include:
• a supportive atmosphere where everyone writes and shares, and where all writing is valued,
• a time for writing to be modelled, for published writing to be shared and for writing in draft to be responded to,
• resources for writing, including paper, pencils, publishing and reference materials (other writings, thesaurii, dictionaries and support charts),
• a strong emphasis on reading (not segmented skill lessons) with time for reading of the students' choice and for listening to 'good' models of literature which may be discussed and responded to, and,
• time for whole class writing.

In many classrooms, one computer is set up permanently for word processing so that at any time throughout the day individuals or pairs are at the computer while other class lessons continue. The other components of a writing program should be scheduled within the normal timetable.

## Publishing writing

For the sake of consistency students should determine a pattern for formatting text. They should decide on the size of margins and the amount of white space around the headings. This is particularly important as a preliminary exercise to the desktop publishing activities that students will be exposed to in high school and later. It will also ensure that the published work is readable and appealing. First drafts should be printed double-spaced for ease of editing. This can be done whilst students are waiting for their turn at the computer.

Students should also be competent in the use of the return key for placing text. One fun activity that encourages experimentation is the presentation of a shape poem such as *My Shadow*.

## Keyboarding

Never have educators disagreed more than in their attitudes to keyboarding. A decision as to its place in the total program should be made in view of the balance the total program seeks to achieve. If that focus is to be problem solving and simulations requiring only a few keystrokes or one word responses then the time required for some level of keyboard competency to develop cannot be justified . However, if writing and word processing are to be priorities in the classroom then keyboarding must be addressed seriously. Keyboarding software alone is not sufficent. What is more successful is a combination of direct teacher instruction with follow up practice using keyboarding software.

One approach might be to provide students, beginning say at Year Two, with keyboard facsimiles that can be used for five to ten minutes each day. The teacher should supervise correct finger placement while introducing new keyreaches and directing drills of letters and purposeful words. This should then be followed with five minutes of hands-on using a keyboarding program such as *Paws*™ with students keeping their own progress scores. This program should continue for several weeks until students achieve a comfortable level of awareness. Revised might be needed approximately every six months.

For infants, large keyboarding mats can provide them with a playful learning experience which will encourage familiarity of keyboard layout. For reinforcement, bingo games and jigsaw puzzles should also be considered.

## The *Bank Street Writer*™ word processor: an introduction

*Bank Street Writer III*™ incorporates a similar screen display to earlier versions but with enhanced features such as a spelling checker, thesaurus, definable function keys for storing blocks of text and a word frequency option. Pull-down menus, modelled on a window environment similar to many other modern-day computers, reveal further options for the writer.

The version supplied to schools has a choice of 20, 40 and 80 columns allowing the screen and paper print size to be tailored to the writer's needs. For young students there is nothing more demoralising than to see their writing printed out in 80 columns, single spaced with normal margins. 'Is that all I wrote?' is the usual response.

The 20 column mode is essential for younger writer's. For students there are many other uses in the upper primary school for this size of print. For example, printing books for those younger than themselves, signs and labels for charts, or for producing text for the elderly.

Many features of *BSW III* are not available with this size print. For example, there is no spelling checker, thesaurus, or word search, text formatting commands (boldface, underline), definable function keys, mouse, frozen text, display of page breaks, or the facility to print to screen or disk. Young students should have access to these options.

### Using the tutorial

A tutorial is provided on the reverse side of the *BSW III* program disk. While this may be appropriate for certain students, generally it is more appropriate to either design activities which match students reading ability and interests or to introduce the skills of word processing through whole class writing sessions as mentioned above.

### Beginning

It is not necessary to introduce all the facilities of the program before giving students some hands-on experience. Introduction to the basic skills of beginning a new file, retrieving and saving files, entering and deleting text and using the pull down menus are sufficient to begin. From there, additional features can be introduced in whole group sessions or on an individual basis as the need arises.

ERASE                    ESC FOR MENU

PUT CURSOR AT END OF TEXT TO
ERASE THEN PRESS RETURN

ENTER TEXT                    ESC FOR MENU

TYPE IN TEXT AT CURSOR
ERASES

The quick brown fox jumped over the lazy dog.
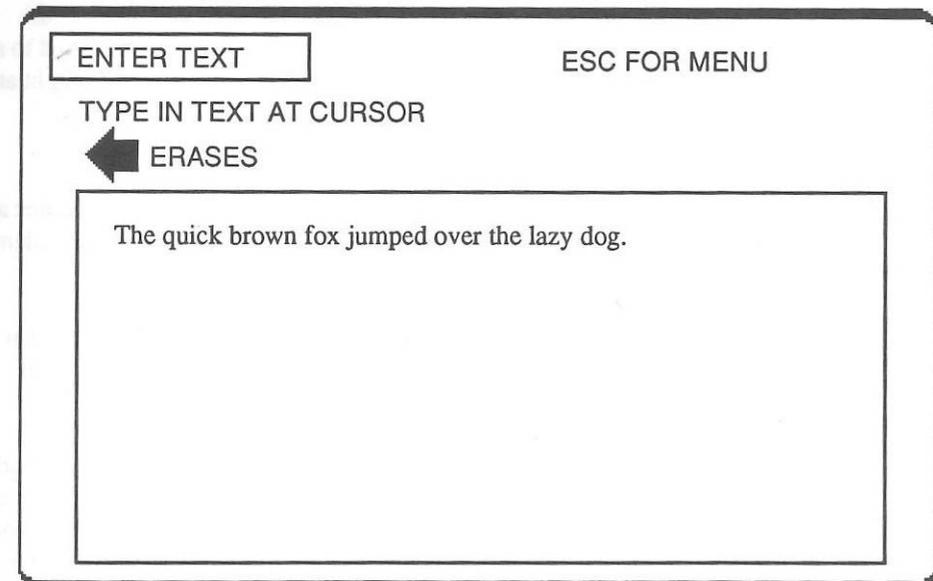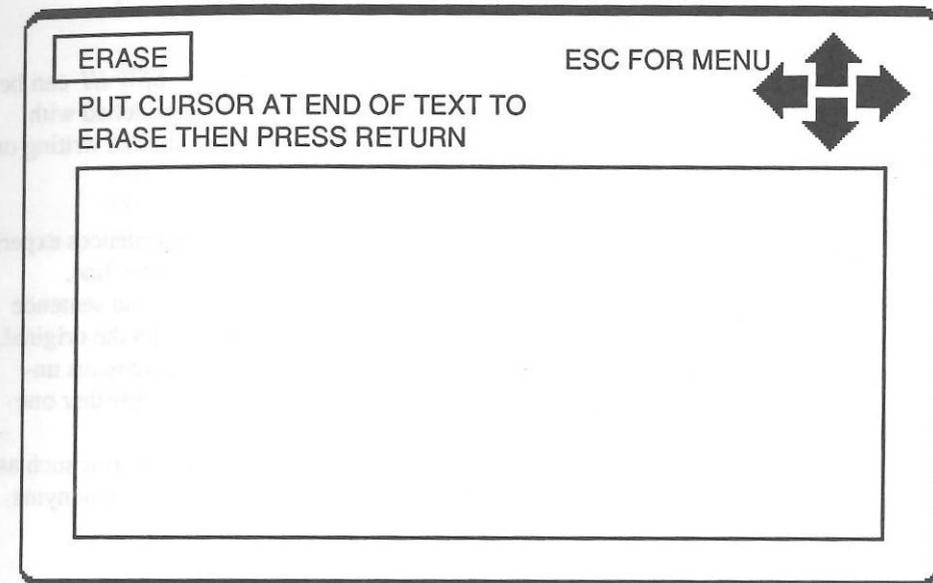
*Bank Street Writer EDIT mode (above) and TEXT mode (below)*

**Writing purposes for** *Bank Street Writer III*™

Students should understand how the various features of *BSW III* can be used when writing. These writing strategies should be modelled with student groups in front of a large screen manipulating student writing or whole group composition. For example:

☞ Use the *move* function to rearrange paragraphs or main sentences experimenting with alternative beginnings or paths through a story line.

☞ Use the *copy* function for experimenting with expression and sentence construction. A sentence can be copied directly underneath the original. One sentence can then be manipulated while the original remains untouched until a decision is made about its suitability and the other one deleted.

☞ Use the *find* function to locate overused words and expressions such as *said, talked* and *walked*. This function may also be used for synonyms and homonyms.

**About the features**

• *The Spelling checker and proof reader*

It is important to remember that a thesaurus should only be referred to at the **response to expression** stage when a better word is being sought and not as the writing is being shaped through drafting, as this greatly increases the computer time required.

Additional language development activities, discussing word families and word meanings, and the use of a thesaurus should take place for students to be able to fully utilise this feature.

Similarly, the spelling checker should be used at the **response to form** stage when spelling and punctuation are the focus, after meaning and expression have been addressed.

Spelling checkers have proven to be a valuable teaching tool particularly for students with poorly developed spelling strategies. Continued use can consolidate previously troublesome words. The final decision about correcting words always rests with the student and the computer can never address meaning. Having to type in the correct form of the word can be helpful in remembering its correct spelling.

**Using the** *Bank Street Writer III*™ **manual**

The purpose of this section will be to extend some of the ideas outlined in the manual. Obviously teachers will only choose those activities that have appeal to students and suit their writing needs. Generally it will always be more appropriate if the topic is embedded in a context rather than an isolated lesson. However, this can make planning difficult as the need may arise incidentally. Alternatively, planning may need to be specifically tailored to include the suggested activity.

Rather than have the students do the activity it should be modelled in some part, processed, shared and reflected upon and published if appropriate. Literature, where examples of all the topics can be found, should be used throughout so students can hear and ultimately model within their own writing.

The **writing workshop** section of the manual presumes a timetabled writing lesson with comments such as 'distribute the guide well ahead of the activity ... preferably a day before the activity session'. It is suggested that this section be used with caution.

☞ *Activity 1 - Quick starters*

Demonstrate this technique when large groups or whole class (or school) are composing. Brainstorm the topic - either isolated ideas, words or phrases randomly entered as suggested. Browse over the list and if time permits, come back to the list the next day. Rebrowse. Perhaps students will want to add more to the list, maybe they will want to eliminate some of the suggestions or begin ordering. The silly, nonsensical poetic compositions they suggest can be attached to any class theme to make the composition more purposeful. Once the technique has been modelled, students will incorporate it in their writing where appropriate, presuming they are given choice over topic.

Alliteration poems: Share books of tongue twisters, ask friends or pen pals for their favourites, swap new tongue twisters when completed, compose them for younger students learning and exploring new phonics.

☞ *Activity 2 - Brainstorming*

Brainstorming, or pre-writing, should include oral and written rehearsal. When hardware supplies are low, pre-writing and first drafting will often take place off the computer for more effective use of available time. Methods of brainstorming at the computer should be modelled during group compositions sessions and should include random brainstorming,

making lists, reorganising ideas, rough outlines, expanding on creativity, creating sentences and expanding on concepts by drawing, painting, colouring and mapping.

*Activity 3 - Describing a scene*

This activity should follow reading examples from published author's and relate to current learning themes. Observation skills should be developed across the curriculum, particularly in Social Studies.

Senses File: It is important that the senses be incorporated in most writing experiences rather than as an artificial exercise. Students should display sensitivity to everyday experiences, experimenting with words, finding pleasure in playing with words, displaying flexible and original thinking and modelling from literature.

*Activity 5- Writing autobiographical narratives*

Autobiographical and biographical narrative writing should be included as one of the activities for the development of self esteem along with activities such as writing their own tombstone or epitaph, designing a poster to 'sell' themselves, writing a lost and found notice, writing their own personal history and time line, or writing biographies of family members or famous local personalities.

*Activity 6 - Word Banks*

It is important that discussion of words and relevant developmental activities be consciously included throughout the school day. Students should be encouraged to use programs such as Thesaurus Generator, *Working with Words* ™ to brainstorm and classify word groups.

Using the word processor students may make files of alternate suggestions for tired words such as *said, talked, walked* and *asked*, and include interesting sentence beginnings. The built-in thesaurus should be used and added to where appropriate. Regular use should be made of the dictionary, thesaurus and other word books, and these should be on hand during all writing sessions.

The word processor may also be used to create cloze exercises or story frames where sequences of spaces connected by key language elements are presented for students to complete. This exercise encourages students to understand the intention of the writing, follow the correct tense and ensures the ideas flow from sentence to sentence.

Students should, as a group, also participate in sentence stretching activities, using sentences related to classroom learning units. For example:

She ate dinner

The lazy watchmen slurped his thermos of piping hot soup.

*Activity 13 - Writing to persuade*

Students should be exposed to good models of persuasive writing from the press and from literature. Discuss the elements of persuasion and the effective use to words and phrases. Hold short, informal debates or two minute unrehearsed comments for students to practise orally the use of persuasive language. This activity forms an effective method of brainstorming before writing.

From the suggestions listed on page 199, use those that teach the students about their community. For example, cigarette smoking, drugs, employment, the right to the dole, corporal punishment and social security. While the dissection on page 201 fits the example given, it may not fit other examples and it would be more appropriate to find a more suitable example and decide on a dissection in collaboration with the students.

Developing writing skill- examining logical sentence order: Rather than introduce this skill indiscriminately, it would be more purposeful if it was developed when a piece of student writing or group composition needed reorganising. If modelled for the students, it should help make the *move* function more meaningful.

**Ideas for prompted writing**

The other new feature of *Bank Street Writer III* ™ is a form of prompted writing refered to as frozen text. This allows files to be created with writing prompts or instructions that cannot be typed over by the students. In some way, this feature presupposes that students would be composing directly at the computer, a luxury that may not always be available. It might also suggest that in some cases no teacher modelling has taken place to give purpose and meaning to the writing or that no rehearsing (brainstorming, making lists and false starts) has taken place, leaving writers to go in 'cold'.

There may be a place for prompted writing when

- composing forms or surveys
- prompts to remind students about using their senses ( as suggested on page 129)

• prompts for the newspaper 'inverted pyramid' style,

• the contents of the character file (from the manual),

• for letter writing,

• instructions for writing particular forms either where style or discipline demands a correct procedure or where the class has decided that all writing should look the same such as a book or movie report that is going to be bound into a combined volume,

• for poetry writing. For example:

prompt - looks, sounds, feels, smells, tastes, subject

result - red, crunchy, hard, fresh, fruity, apple

• 'Fill in and mail back' letter. For example:

---

Dear _____

The greatest thing about me is _____

If I ever got a medal it should be for _____

When I grow up I'm going to be _____

If I could run my school for a day, here's what I'd do:

    I would let the children _____

    I would tell the teachers _____

    I would have a special time for _____

    I would give everyone a _____

The one thing I can't do is _____

If I had a robot of my own I would call it _____

and I would make it _____

When I'm rich and famous I'll _____

and I'll wear _____

There ought to be a law against people who _____

The best idea I ever had was _____

If I could live alone for a week, here's what I'd do _____

_____

Yours till the milk turns,

_____

---

*Fig. 6*
*Sample "Fill in and mail" letter*

## Aussie FrEd Writer, SPUD and Merlin

The public domain word processor *Aussie FrEdWriter* also has the facility for prompted writing. Its documentation should be referred to for further suggestions on prompted writing.

As an application of prompted writing and an integrated unit, *Spud* is another public domain disk of language activities that has been developed using *Aussie FrEd*. The whole unit is written around the unusual theme of potatoes and encourages students to write in a variety of forms.

*Beyond Merlin and his Magic Staff* is another volume of writing activities that utilises prompted writing and the FrEdWriter program.

## Other writing ideas

Literature may be used as a basis for many writing activities. For example, using the book <u>Alexander and the Terrible Horrible No Good Day</u> by Judith Viorst (Atheneum, 1978) students could write about:

☞    ten things that happened on their worst day,

    the story of the most horrible day,

    things to say to someone having an awful day,

    twenty things to make a very good day, and,

    memories,

Writing in other subject areas brings a wealth of activities. In Social Studies students may prepare travel brochures, advertising folders as well as recipe and menu books. Within Health they might prepare a directory of the most common diseases or first aid procedures for school, home and excursions. In Science they might prepare directions for making a bug catcher or questions for interviewing a scientist.

When preparing public communication for newspapers, radio or T.V (letters of request, for information, seeking improved facilities, providing suggestions and ideas) students might collect samples to compare with their own efforts or ask the advice of older persons such as staff or parents. *Print Shop*™ could then be used to design stationery on which to print class letters.

A newspaper project is outlined in chapter 10. However without producing a full newspaper, which can be very time consuming, students should be encouraged to develop skills and understanding of the media by reading and discussing editorials and by comparing and determining factual statements versus opinions. Students might then present opposing editorials on controversial issues. The newspapers' 'inverted pyramid' style of writing should also be investigated and modelled. Students should also collect advertising slogans and magazine models to provide them with ideas for the layout of their own work.

## Capitalising on opportunities

The word processor can be applied to most writing activities that traditionally took place on the blackboard, overhead projector or easel with butcher's paper. Consider the following:

Morning talk
By recording a summary of each morning's talk on disk and using a printed copy for display, a diary is cumulatively formed. A range of forms can be experimented with as appropriate to the type of news presented. For example, a list, story, caption, joke, sequence of events.

Letters to parents
If communication to parents concerns student events or news it is important that students become involved in preparing the letter. They should be encouraged to observe how a business letter is composed and compare that style of language to other letters they have had exposure to.

Communicating with the community
As a public relations exercise students might share a range of school news with the community from sporting, scholastic or cultural results to interesting learning projects. This can be conveyed by newsletter, pamphlet or poster for community billboard or commercial counter, through for sale or lost and found notices or notices about coming events.

Fetes or pet shows can provide excellent writing opportunities, giving students a clear purpose for writing and instiling a sense of pride in their presentation. This may be notices, reports for community newspapers, catalogues of events or exhibits and programmes. Students making a direct approach to the committees responsible, offering their writing and publishing services, gives them experience with speaking and questioning clearly and effectively (it should be brainstormed and rehearsed beforehand). Putting their offer in writing provides yet another purposeful writing experience!

# Chapter Five: Simulations

## Introduction

The term simulation can be used generically to mean any program which creates a context and poses a problem to be solved through a variety of possible courses. For example, *Pieces of Eight*™, is a software package with a pirate context set on an uninhabited island. It gives students one day, from sunrise to sunset, to locate the buried treasure.

This chapter will provide a classroom strategy that can be equally applied to any adventure game or interactive fiction package.

Teachers will need skill and commitment to use simulation programs, since much of their educational worth is lost if they are not used as part of a wider theme or topic, or if students are not actively encouraged to build upon the experiences the programs can provide.

For a variety of reasons, this type of software provides a compelling, almost believable context which motivates and engages learners with more success than the average integrated program or theme attempted in a classroom without a computer. There is enormous potential for:

- enhancing language development,
- integrating subjects across the curriculum naturally,
- providing an integrated day approach,
- establishing managed group work,
- developing problem solving strategies in a non mathematical environment,
- developing logical thinking and deductive reasoning skills,
- fostering student independence, control and decision making, and,
- utilising one computer per class more effectively.

## Planning

As with most software packages, it is essential that careful planning takes place to ensure that the potential of the software is maximised. The teacher should either have played the game or have read the manual thoroughly so there is a clear understanding of the teaching and learning opportunities.

### Getting into the experience

After establishing the focal point or activities (which does not have to be the software), only a rough outline of activities should be proposed. This then provides an opportunity for students to contribute to the investigative directions.

### Organising the classroom

Simulations can be timetabled for part of the school day or as a total replacement of the normal school program, the whole class and day's work encompassing the software and off-computer activities.

### Making the difference

The most effective implementation of simulations in the classroom depends on two important factors:

• a rich context being established, immersing learners in a similar classroom environment to the screen/software environment. For *Pieces of Eight*™ this means thoroughly exploring pirates through purposeful learning activities, resources, skill development and design of the class room environment, and,
• including sharing sessions at strategic times throughout the theme for students to swap strategies (without giving anything away) and for asking questions of each other. This is essential for helping some class members to see strategies they would never have discovered for themselves. It also provides an ideal time for presenting the outcomes of activities such as reports, writing, plays, poetry and constructions, assisting in the development of a rich context.

### Just the right intervention

Simulations give students the opportunity to solve problems independently, to be in control and to take risks - difficult conditions to establish in non computer environments. To capitalise on this, it is important that teachers are conscious that their interactions with groups of students around the computer provide suggestions not directions (or telling),

following a listen to where the students are, to what they are saying and to what strategies they seem to be using.

It is important to help them:

• look back,
• use what they already know by asking questions to help them remember (encouraging strategies for remembering) and to make connections between what they know and the new problem,
• reflect on what they did previously to solve a problem,
• by suggesting strategies for resolving the challenge, and,
• to use all available resources effectively.

Questions should be prefaced by 'Why are you moving in that direction?' 'Have you thought about...?' and 'What would happen if .....?'

### A word about contrived integration

Most theme sheets/topic webs provide a space for each subject to be included or considered. It is important that activities are not included for the sake of covering every subject area but rather because their purpose suits the needs and interests of the learners. That is one reason why the topic web included in the *Pieces of Eight*™ teacher's manual highlights the most worthwhile activities and not the full scope. It also means that teachers can expand the theme according to their strengths, interests and the available resources.

### Purposes for '*Pieces*'

Underlying the fun-engaging school environment there may be a varied range of purposes for learning. These may include pirates as a stimulus:

• for literature and language development activities,
• as historical characters stimulating research skills and report writing,
• to experience a traditional adventure game as a stimulus for students to write their own adventure games (using *Adventure Construction Set* ™) or twist-a-plot stories (using *Story Tree*™), and,
• to encourage problem solving, making strategies explicit or for developing note taking and planning skills and applying them effectively.

## Getting down to planning

Planning to use *Pieces of Eight*™ effectively may involve some or all of the following suggestions. Pre-activities may take several months to complete particularly if the teacher plans to introduce other software programs to prepare students either for the skills and concepts involved in '*Pieces*' or in preparation for the group management skills.

**Getting ready**

☞ • Focus and preparation:
Playing a smaller adventure simulation such as *Raft Away River*™ to develop planning skills,
oral discussion of strategies,
develop cooperative planning (raft building requires a team effort), and,
developing problem solving strategies such as breaking a task down into smaller tasks and sequencing them appropriately.

Similarly, using *Gold Dust Island*™'would reinforce skills of reading and using compass directions and working in an environment with explicit rules and restrictions as well as developing the skills already mentioned.

☞ • Determining the focus: For example:
discovering a pirate map, or a note in a bottle,
literature - traditional stories such as  Treasure Island, Robinson Crusoe, Coral Island, Kidnapped or shorter stories such as One-Eyed Jack or The Man whose mother was a Pirate,
drama - teacher improvisation of a pirate visit to the classroom, or, another less demanding simulation such as *Microzine* 5's 'Pirates of the Soft Seas'.

☞ • Pre-experiences before the software may include:
research into pirate history: flags, vessels, character studies of famous pirates, creating wanted posters,
preparation for a pirate voyage (may be the completion of a pirate contract of pre-activities),
room design and decoration, investigation into island environments,
description (diary form) of an imaginary island from the botanist perspective,
story telling and serial reading,
enjoyment and appreciation of sea shanties and songs of the sea
mapping and notetaking around a traditional adventure game room environment, modelling first through demonstration with overhead transparencies or a large computer screen, then with students

attempting it for themselves and discussing their results as a whole group, skill development of coordinates and using scale and general mapping skills,
discussions of the logical commands:'What words would you expect to use to command the computer?'
Discussion and prompting of the screen display 'What do you think this means?' What do you think you have to do here?',
collect resources to add atmosphere to the room environment,
display vocabulary sheet and commands,
decision making activities in small groups such as 'You have to abandon ship destined to be marooned on a desert island. Decide on the three objects you must take with you and the top priorities for activities once on the island.'

💣 **At this stage the teacher should not reveal the story solution, the complete floor plan of the room or the puzzle problem solutions to the students.**

## Getting into: the interactions

☞ Consider taping and playing, or reading the scenario from the manual to lead students into the problem or context of the situation. In smaller groups allow the students explore the simulated environment either until their mission is unsuccessful or on a time roster of twenty minutes per group. While one group is at the computer the rest of the class may be involved in a whole-class lesson or, more desirably, be involved in small group activities emanating from the interaction with the software such as suggested in the topic web:

• recording logs of their attempts - from diary form to annotated maps, timelines, drawings, reports, tapes, cartoon strips or letters,
• writing and practising play scripts,
• art and craft activities,
• continue research activities, historical descriptions, timelines,
• flag making,
• investigating, making and drawing old sailing ships,
• map making,
• pirate character descriptions, or,
• 'Treasures' in 1987

☞ Concurrently, timeshould be provided for whole group feedback sessions. During these times students should:

• share successful and unsuccessful strategies from interacting with the software, and,
• either in groups or as individuals perform poems, songs and stories they have created.

☞ Such activities provide an opportunity for teachers to develop additional skills or involve the whole class in activities more suited to this mode than the pursuit by an individual. The following could be considered:

• drama/mime sessions,
• poetry writing,
• whole-group diary writing or writing or legends and stories,
• survival games,
• story telling,
• specific language development, for example, extending sentences (My uncle David is a pirate *to* My uncle David with the purple patch on his eye, is a pirate and has been since he was eight years old *to* ..)

## Coming back

☞ This stage includes the culminating activities when creativity is demonstrated or performed. Activities developed throughout the simulation should be extended through such activities as:

• the development of a board game on similar themes,
• the use of *Story Tree*™ either for the development of a 'twist-a-plot' story or for the presentation of research information (in a similar fashion to the examples on the *Story Tree*™ disk, and,
• more adventurously, the use of *Adventure Construction Set*™ for the development of other adventure games.

## Going beyond: the next step

The next step is to apply similar learning contexts and class management techniques to other software programs.

☞ Some suggested software packages are outlined in Table 1 on the following page:

| Software Title | Distributor | Curriculum Area |
|---|---|---|
| **For infants** | | |
| Tonk in the Land of Buddy | | |
| Bots | Ashton Scholastic | Language Arts |
| Detect-a-pet | Qld Dept of Educ | Lang Arts/Soc Studies |
| Zoo Pack | Softime | Lang Arts/Soc Studies/Science |
| **For middle and upper primary** | | |
| Flowers of Crystal | Softime | Lang Arts/Sc/Environment |
| Dragon World | Softime | Lang Arts/Music |
| Dread Dragon Droom | Softime | Lang Arts/Math |
| Dinosaur Discovery | Jacaranda | Lang Arts/Soc Studies/Sc |
| Bush Rescue | Jacaranda | Lang Arts/Soc Studies/Sc |
| Goldfields | Jacaranda | Lang Arts/Soc Studies/Sc |
| Where in the world is Carmen Santiago | Imagineering | Lang Arts/Soc Studies/Sc/Gen |

*Table 1:*
*Simulation Packages*

# Chapter Six: Problem Solving

## Introduction

There have been significant advances made in approaches to problem solving in the classroom. A discussion of these advances follows:

**Firstly,** and perhaps most significantly, there is a more widespread understanding amongst educators that the full extent of problem solving is **NOT** *'If I have twenty sticks of licorice and four fit into a bag, how many packets of licorice can I fill ? Write a number sentence '*. This change in attitude must be due in some part to computer software which provides a wide range of contexts for problem solving particularly some that may otherwise have been difficult or impossible to establish in the traditional classroom. The software also provides a medium for experimenting and processing learning that was previously difficult to implement.

For example, the traditional problem with jars of water of a specific capacity where the problem was for a certain number of litres to remain by filling and pouring between the jars, left students either to trial and error with paper and pencil or to experiment with water and jars should these have been available. This problem forms the basis of the software package *Puzzle Tanks™* .

Water is poured and filled onscreen more efficiently, encouraging discussion and risk taking and allowing students to break the problem down into smaller parts. This is much easier than when the total problem had to be thought out abstractly with paper and pencil. Now students can explore the problem using the computer to fill and empty, and see the results immediately. This helps them to determine the next step and problem solve their way through to the result, often via a number of paths rather than one *right* path.

**Secondly,** teachers are now more able to make students aware that problem solving applies across the whole school curriculum. Similar processes are involved in writing, the problem being to convey meaning to the reader, in solving adventure games or simulations with situational problems; or when solving the problems of information handling by accessing a database. Success is very much dependent on the role of the teacher in establishing a real and engaging learning context and in strategically questioning and probing at times and sensitively neglecting at other times. The use of problem solving strategies across the curriculum is accelerated when processes and skills are explicitly discussed.

**Thirdly,** because there is often only one computer in a classroom, a process of learning naturally occurs. After the context is established and pre-skills developed, the problem is introduced to the whole class, then small groups or individuals take turns at the computer and attempt to solve the problem. Responding and sharing the trials and successes of problem solving are essential follow-up activities to consolidate the learning that has taken place.

## Planning for problem solving

Lists of problem solving strategies (see Fig. 7 opposite) are readily available. As there is little difference between them, it is immaterial which list is adopted. What is important however, is that students are made aware of certain strategies and that rather than giving them a list, it is created cumulatively as they explore many different packages, topics and subject areas throughout the year. If the students discover the strategy and its application within problem solving, it is more likely that they will transfer these strategies to new situations. The role of the teacher, therefore, is to provide the experiences and estalish the learning situations to involve a wide range of strategies and assist students to discover or reveal the strategy for themselves.

Most educators, when discussing this topic, refer to and agree on the Polya model: SEE - PLAN - DO - CHECK (another process approach to learning). Salmon and Grace take this four step plan and outline some appropriate strategies for each stage.

Planning for problem solving involves:

• identifying appropriate software suited to students' needs and interests,
• exploring the software thoroughly,
• establishing the learning context and developing any necessary pre-skills,
• introducing the problem and organising the classroom,
• providing any necessary resources to support the problem solver,
• timetabling 'feedback' sessions where additional support can be provided for those not solving successfully, and,
• making strategies explicit through questioning.

# Problem Solving Guide for Students

**Understand the problem - SEE**

• Carefully read the problem
• Decide on what you are trying to find
• Identify the important data

**Devise a plan - PLAN**

• Gather together all available information
• Consider some possible actions

§ Look for a pattern
§ Draw a sketch
§ Make an organised list
§ Simplify the problem
§ Guess and check

§ Make a table
§ Write a number sentence
§ Act out the problem
§ Identify a sub-task, and,
§ Check the validity of information

**Carry out the plan - DO**

• Implement a particular plan of attack
• Revise and modify the plan as needed
• Create a new plan if necessary

**Check the answer - CHECK**

• Ensure you have all of the important information
• Decide whether or not the answer makes sense
• Check that all of the given conditions of the problem are met by the answer
• Put your answer in a completed sentence

*Fig. 7: Problem solving guide for students (Salmon & Grace p.36)*

## Problem solving with *The Factory*™

The following is a unit based on *The Factory*™ used in a class 5 school with Years 4-7. These students had little prior experience with problem solving either on or off the computer and little first hand understanding of a factory. The unit assumes the students' skills and knowledge of angles was appropriate for interacting with the software.

'*The Factory*™' simulates an assembly line in which a square piece of a material is altered by passing through three machines to produce a geometric product. It involves the following problem solving strategies:

☞
- making a model,
- guess and check,
- working backwards,
- making a drawing,
- identifying a sub-goal, and,
- retracing and recording solutions.

## Getting Ready

### About problem solving

With the whole group, the teacher should discuss the question of identifying a problem. The students should be presented with problems related to everyday situations such as 'when to tell Mum if you're in trouble'. The problems should be recorded (on the blackboard in this instance) along with ways the students could solve them. The teacher may prompt certain situations or strategies to ensure that the strategies required for solving *The Factory*™ are listed. It should become evident from this that the children have and can apply a wide range of appropriate strategies. This list was displayed permanently to be added to or referred to.

### About Factories

☞ • Social Studies
Using resource materials from the library, the topic or concept of 'factories' may be introduced (slides, videos, film strips, charts, books or recall of a school trip are appropriate). Relating to their own experiences, lists are created on 'types of factories', 'what factories do', 'how factories work'. Production cycles may be drawn and discussed in relation to local industries. (This topic could be further expanded and reinforced as needed).

☞ • Language arts
The focal point of the social studies discussion may be that most or all factories rely on machines and workers for production. Students can brainstorm types of machines, machine actions, and machine noises using a variety of teaching strategies. An initial list can be created with the whole class, and small groups may continue to list and discuss their ideas. The students' lists can then be combined. From here the range of activities could include:

- linking actions and sounds
- providing descriptions for each action
- extending simple sentences to complex sentences
- exploring onomatopoeia and writing poetry in many forms
- creating a sound chain from quiet to noisy or from one end of production to another
- writing 'sound' patterns

☞ • Drama and communication
Dramatising actions and producing sounds of machines are important parts of the language development activities. The students, in small groups, may choose a factory or a product they are producing, each might explore a machine and how it works. Then they might sequence and practise their 'production line' (with each student's machine relating to the next) and present them for the rest of the class.

(All the activities listed above could be developed in any order, for any particular length of time. That is, each sub-topic could become a separate lesson or could be part of an integrated afternoon's learning unit. Art and craft activities could also be included.)

## Getting into the software

Through whole group interaction around a large monitor the students may be introduced to the software. Each screen might be discussed with the teacher prompting 'What do you think you have to do here?' 'What does this mean?' Individual students operate the keyboard.

Initially the whole group can work through the first section being introduced to each machine and its function, again with questioning such as 'What do you think it does?'

Students may then be presented with the first challenge - to make a machine. This is demonstrated with the whole group. Working in pairs of their choosing, each group can use cardboard templates, a guide sheet and paper and pencil to draft a machine. In turns they can practise and present their machine at the computer. It is then another groups' challenge to try and make that machine. This strategy is a useful one because students would naturally produce machines as simple or as complex as their level of thinking would allow.

### Teacher scaffolding

The teacher must still play an active role with the students and the computer while they working in small groups. Thinking out loud is an important aspect of teaching thinking skills. It is important that teacher's 'scaffold' students to take them from what they know to where they ought to be by directing their thinking and making processes and skills explicit and assisting the transfer of learning.

## Coming back from the software

Whole group discussion is essential for students to discuss the problems they have faced, and share successful strategies and machines.

During discussion, it is important for the teacher to refer back to previous lists, to add to those lists as necessary and to help students apply the computer-based problem solving to other problem solving situations particularly everyday problems.

### The next step

From here, there are many strategies that could be adopted. Students could continue to produce machines or move to the third option of being challenged by the software at their own level of difficulty.

## GRADE 5 - BRAINSTORM

**Theme: The Mean Machine**
**Introduction: depends upon main area of the curriculum that is stressed**

**SCIENCE**

- simple machines
- lever: ancient & modern use
- energy: conservation
          pollution
- improved technology (prefab houses, etc.)

Game
Describe a machine in class
What Am I? (oral)
Same for machine in particular area eg. farming (research)
Written report
Make an advertisement
Compose a jingle song for sale

**SINGING MUSIC**
The Most Wonderful Day, compose sales jingle

**MATHS**

- angles, rotation, symmetry
- game: using spinning shape and die
- rotation activity sheet

**COMPUTERS**

- use **The Factory**™
- use Product Sheet
- two challenge Activity Sheets (including timing graphing)
- design a machine (possible use of **Apple Logo**™)
- problem solving

**SOCIAL STUDIES**

- effect of Industrial Revolution
- effect of Technical Revolution
- before/after research notes
- class/individual timeline showing changing machinery

**MACHINE**

**PHYSICAL EDUCATION MOVEMENT & DRAMA**

- warm up - machine movements eg. rotating, punching
- groups form an assembly line and one student at a time moves through the line and describes him- or herself at the end

Extension
- Write about possible use of that machine
- What happens if one machine jams

**ENGLISH**

- writing - magical machines, **Chitty Chitty Bang Bang**, time machines, future problems
- vocals - charts for classroom, sounds of machines, noise pollution, ways they move
- letter - complaint about machines
- literature - **Charlie and the Chocolate Factory**

*Fig. 8: Problem solving and The Mean Machine*

## The unit approach

*The Factory*™ provides an excellent opportunity for the development of a much wider learning unit than has been detailed here.

An good starting point could be an excursion to a factory with all the planning and follow up language and social studies development that can be involved. A careful analysis of relevant curriculum documents should provide extension activities and the inclusion of directly related curriculum activities.

Many writing activities may be included. Students should be involved with the naming and marketing of their product including the design of advertising materials.

### Other starting points

While this approach ensures that students have a broad context to base their explorations of the factory on and ensure the development of strategies, it is only one suggested approach. If a class were competent problem solvers, it may be appropriate not to introduce the software at all nor to develop any context but rather to leave the students to themselves.

The rationale behind this approach is that when people solve problems in the real world there is never a teacher available to help explain the problem, break it down into manageable pieces or develop the necessary strategies. If the sink or swim approach is adopted it would be important to structure the groups carefully. This may mean pairing students of either differing abilities (for support), of similar abilities (so there is no outside help and each student must contribute) or of differing approaches to problem solving (for example, a creative thinker with a lateral thinker who can record and plan). As well feedback sessions are essential to ensure the learning does take place and frustration is reduced.

## Going beyond

Going beyond *The Factory*™' means that students should then be exposed to similar strategies in another subject area or should continue with other problem solving software.

Sunburst Communications provide a most versatile and worthwhile range of problem solving software that is highly engaging for students and effective in developing a range of strategies. Here is an overview of suitable packages and their content or purpose/s.

**Ant Farm**
(trial and error, analysing and projecting)
**Gears**
analysing and predicting the number of rotations of the last gear in a series)
**Managing Lifestyles**
(budgeting, analysing and calculating everyday maths problems)
**Memory Castle**
(working to extract information, developing memory methods)
**Puzzle Tanks**
(filling and empting tanks to arrive at a pre-determined amount of liquid in a tank)
**The Enchanted Forest**
(logical thinking, concepts of conjunction (and), disjunction (or) and negotiation (not))
**The Incredible Laboratory**
(hypothesis formation and testing, organisation of data)
**The Pond**
(forming patterns, sequencing, generalising from data, )
**The Super Factory**
(visual resoning and thinking in three dimensions, analysing a sequence and working backwards)
**Trading Post**
(logical reasoning, decisions based on a set of rules, planning)

*Table 2:*
*Sunburst problem*
*solving software*
*packages*

## The LOGO programming language and problem solving

LOGO is a programming language involving students with turtle graphics. There are a range of LOGO software packages available and various purposes for its use. Whilst it can be used as an introduction to the skills of programming the most potentially valuable approach is to develop problem solving strategies.

After introducing students through discussion and experimentation to the LOGO commands it is more appropriate for students to explore and develop through 'guided discovery' rather than the extremes of free exploration which can overwhelm some students and does not ensure that learning takes place or through directed activities which doesn't develop any problem solving strategies in the students.
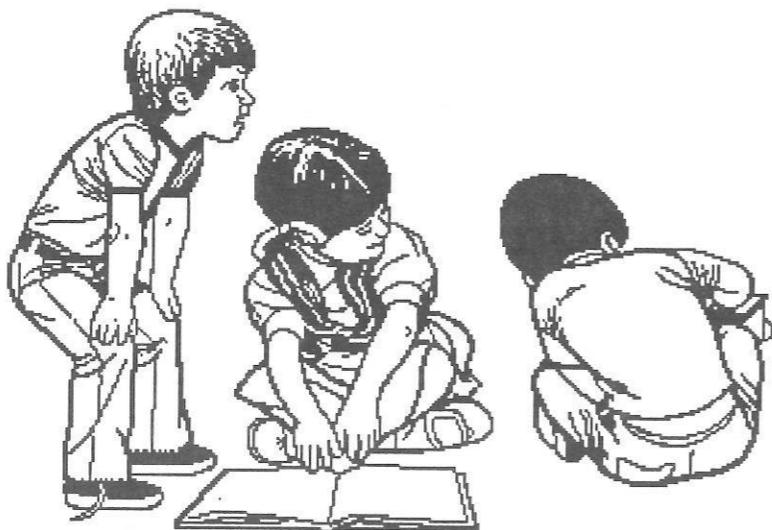
An explanation and unit development is not be provided because there is wealth of LOGO material presently available. Each Queensland school, for example, was provided with a kit **Activities in Problem Solving and Spatial Knowledge based on LOGO,** developed by the Independent Learning Support Group within Production Services of the Queensland Department of Education in 1986. A recent package *Logowriter*™ extends the applications of LOGO more thoroughly to writing and other subject areas.

# Chapter Seven: Databases

## Introduction
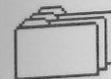
A database is an information handling tool, described in the introduction as being similar to a card filing system. Information is relatively easy to store, update and retrieve. It can be sorted more quickly than most manual methods especially when large amounts of information or data are stored. Many databases also feature report generators that enable a clearly formatted hardcopy of the data to be printed.

### How is information stored?

To continue the analogy of the filing system, each card is called a record. Within each record there are headings of information called fields. The total collection of records is called a file. As an example, using *Weather Report*™, a file could be created called a class's name, there would be one record for each day's weather data, and within each record, decisions would need to be made about what information should be collected and stored. Fields may be selected from a choice of twenty seven and could include max temp, min temp, cloud type, wind direction, rainfall, hours of sunshine, and length of shadow.

## Types of databases

File management database software (where information is stored in records as described) is either open, closed or shell. *as in the case of library catalogues*

• Closed databases have large volumes of data already stored in them, on a diverse range of subjects in many curriculum areas, for example *The Bushranger's Database*™. Users can explore, analyse trends, hypothesize and generaliseabout the information stored therein. For example, one of the first surprises for students is the multitude of bushrangers since the author has collected data on over four hundred bushrangers. Most students only have experience with famous names such as Captain Starlight and Ned Kelly.

Information can be collected from either the major database, with eighty three entries, or the minor database, which includes the majority of names but only summarised data.

• **Open databases** contain no stored information but provide the structure for users to collect and enter their own data on any topic. This provides greater flexibility enabling the teacher to tailor information to suit students' needs. Open database software suitable for primary school students includes *Bank Street Filer*™ and *Appleworks*®.

Most schools now store student records in an open database, making it quick to print a list of all boys ten years of age in Macarthur House, for example, in preparation for a sports day. Libraries are beginning to convert their catalogue system to computer.

*Weather Report*™ is an example of a **shell database** (partly closed and partly open) where the fields of information have been predetermined. The user may choose the fields within each file but cannot add to the list of fields stored. It would be impossible to record data in *Weather Report*™, for example, on any other topic except weather.

## Purposes for using databases

There are many examples within the community where information is stored that can be accessed electronically. Seventext, a non-interactive news service from Channel Seven, was an early example. Now Telecom's VIATEL, based on the U.K.'s Prestel, an interactive public information service, may be accessed using a modem attached to a computer by any business or home. As well as retrieving news, weather, sporting results and stock market information, VIATEL has facilities for sending messages, banking and making travel and entertainment reservations.

The foyers of some city office buildings no longer support large display boards of individual office locations. Citizens are expected to find the information from a computer display terminal. The Brisbane College of Advanced Education, also, no longer keeps a catalogue on cards and students must reference books via a computer database.

Predictions about the future of computerised storage and retrieval systems suggest that being able to retrieve information electronically will soon be a basic survival skill. Eventually telephone directories will be replaced by small household computer terminals, as they have been in France, and there will be similar applications for many other functions within society. For this reason alone educators have a responsibility to ensure that students begin in the primary school to develop an understanding of computer-based information retrieval.

Retrieving information requires an elementary level of understanding. Databases have the potential to be used as a tool for learning assisting with the development of thinking skills and enhancing students understanding of the curriculum. Using databases in this manner requires a much greater understanding of their operation. The long term goal for using databases in the classroom is to progress from retrieving facts to retrieving sub sets of facts and then analysing the information to assist learning.

### Developing thinking skills

The current Queensland Social Studies Syllabus is based on the principle that teachers should be encouraging students to develop higher level thinking skills. Databases can facilitate development of skills such as analysing relationships, identifying trends and testing and refining hypotheses. The progression of skill development as listed in the syllabus is comparing, classifying, conceptualising, inferring, hypothesizing, imagining and evaluating. Higher level skills are not the domain of the Years 6 and 7 curriculum. Students, even in infants, are capable of thinking at a high level using appropriate materials and relevant concepts, expressed at their own level of understanding and in their own language. Therefore, it would be fair to suggest that databases have a place in all years of the primary school.

## Classroom applications

The structure of databases is a new and different concept. Manipulating the software can be one of the most difficult applications for both teachers and students particularly while they are becoming comfortable with a computer. Capitalising on the potential of databases for developing thinking skills, rather than just finding information, is dependent on several factors.

### The Role of the Teacher

Before databases can be used effectively, teachers must have a basic understanding of the software and feel comfortable in demonstrating its use to students. Unlike games, it is not as easy to grasp the underlying idea by looking at the screen.

The most difficult part of utilising database software is in interpreting the hardcopy following a successful search and retrieval. Students generally, cannot initially interpret what the columns of information

all mean. The results of a search presented as a graph (provided within *Weather Report* ™) can, however, assist children to see patterns and aid their understanding and interpretation of the data. Some open databases do not contain the facility to graph results and generally this facility is only available on numerical fields. *Weather Report*™ and several closed databases particularly *The Bushrangers Database*™ and *The Explorer's Database*™ do contain graphing facilities.

Developing children's higher level thinking is critically dependent on sensitive teacher questioning, carefully guiding and prompting students to synthesis and analysis and helping them confirm or reject hypotheses.
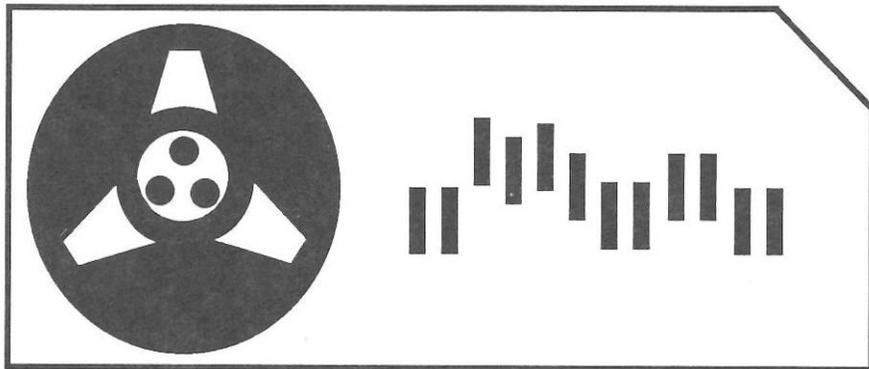


### Time

Each student must be provided with the opportunity to manipulate the software, independently or in small groups, to understand how the information is stored and to develop skills of analysing and hypothesizing. This takes many school hours. Within the early months of database investigation, there maybe little output to justify the hours involved.

Students also need experience with both open and closed databases. It has been suggested that students will need to experience three or four different databases before they can begin to generalise about their operation. Converted to school time this is probably years. It has been found from classroom trials that although young students can retrieve data successfully, it is really upper primary students that are capable of using them as serious work tools to enhance their learning. It is important that a balance of open and closed databases is provided for students.

### Relevant Content

Although there is now a wide variety of relevant closed Australian database software available, open databases allow for data storage and manipulation of information frequently of more immediate relevance to students. Data collected from within the community has greater relevance to students, is more motivating, assists with recall and understanding and accelerates the development of higher-level thinking skills. For example, one of the benefits of using *Weather Report*™ is that the information is interesting and immediately appropriate to students. The amount of information stored can be tailored to suit the ages and abilities of the students and the purposes of the investigation.

## The differing potential of open and closed databases

*Closed* databases have the advantage of containing larger amounts of information than students have time to collect and enter. Part of the development costs involve a researchers' time collecting large volumes of data most often from original sources and ensuring its validity. This means the focus for classroom activities can begin with an exploration of the data, providing greater time for analysing, hypothesizing and interpreting and greater opportunity for output or utilisation of retrieved information.

Using an *open* database involves some or all of the following stages:

• establishing a purpose for the investigation,
• discussion of the fields to be used,
• method of collection, either book research, survey, or interview,
• collection and entering of data- all learning is a process and entering data may reveal problems with the fields which may need to be edited,
• proof reading of records,
• retrieving, sorting and manipulating,
• comparing, analysing and interpreting,
• hypothesizing,
• inferring and drawing conclusions, and finally,
• reporting.

The printing of records will occur frequently throughout the process. Like any learning process there are no strict starting point or prescribed activity flow. Constructing open databases takes considerable time. Investigations tend to be concentrated at the beginning and peter out at the retrieval stage. Valuable learning takes place as students

discuss, collect and enter data. However, generally smaller amounts of data are collected compared with the large amounts contained in closed databases. The time factor and the amounts of data are two of the factors influencing the differing learning potential between the types of databases, each concentrating their activity at different stages of the process.

## Introducing databases

Students can be introduced to an elementary database through either a closed or open database. Suggestions for closed databases included *Microzine* Number 3 which contains a database of library books, motivating the students to build their own database from books they have read. Also recommended are the programs *One World Countries Database*™ , *The Bushranger's Database*™ , *The Explorer's Database*™ and *The Solar System Database*™, or one of the following introductory packages:*What's in a Name*™, *Hounds in History*™ , *The Dream Machine*™ , and *Crime in Society*™ . A number of other interesting databases are available from Dr. Robin McLachlan at Mitchell College of Advanced Education, Bathurst. These include *The Colonial Census 1838*, *The Point Puer Lads*, *Convicts Absconded & Convicts Physical Features* and an AppleWorks™ based *Conflict Database*.

When using open databases, one of the most successful topics is data on the children themselves - names, age, birthday, addresses, hobbies, interests, with fields chosen by the students.

Databases should be introduced to a group (not necessarily the whole class) using a large screen. After the students have watched the teacher model its operation , with the aid of help sheets, students should then be given the opportunity to use the software for themselves in smaller groups.

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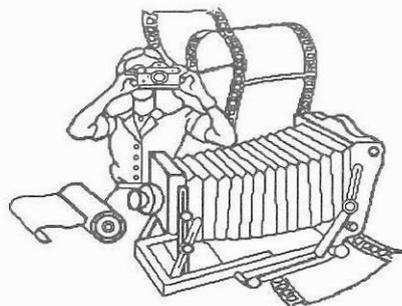
## *Weather Report*™ in the classroom

*Weather Report*™ 'provides a good starting point because the data is something students can quickly relate to. The program can be tailored to suit the students' abilities being as complex or as simple as required. It also provides experience with large amounts of data as in a closed database as well as the experience of collecting data of their own. The students can come slowly to an understanding of databases as they enter their own data day by day. It will be several months before there is enough information to manipulate, matching the students' growing understanding. The built-in simulations of weather recording instruments provide students with experiences they would not otherwise have and the ability to graph results of searches will greatly assist their understanding and help them to generalise about databases from one package to another.

The manual supplied with *Weather Report*™ is most thorough and provides all the required information for operating the package and for realising the potential of the software.

Ideally children should first participate in one of the introductory activities as mentioned above.

When using the open database facility it is highly likely that *Weather Report*™ will form part of morning activities (or a small part of the daily timetable) for several weeks before a unit can be built around the data collected. Teacher planning will have to include any necessary skills to be developed (interpreting graphs, understanding weather maps), any pre-activities such as constructing weather instruments, experiencing the simulated weather reading instrument section in the software or researching the history of weather instruments, and, any vocabulary or concepts to be introduced, any research required or any community members with expertise in this area who could talk to the children.

Once enough data has been collected, the class may participate in further activities based on the weather theme. Alternately such a theme could be carried out using the stored data on 1974 while weather data on the current year is being collected. Students should be encouraged to collect weather maps and reports from newspapers to model how and why they are presented in that format, to listen to reports on the television and radio comparing them to each other to note differences and to compare with their own predictions for their area of the state justifying any differences. Then students could be

expected to prepare their own oral (taped and replayed) and written reports modelled on those from the real world and using the same style of language or genre. Students should also collect a file of newspaper stories about the effects of weather on other countries. For example, hurricanes, tornadoes, heat waves, snow storms and volcanic activity.

Research may centre on the effect weather has on our lives through occupation, life styles, clothing and food. Literature involving weather may also be found and enjoyed.

☞ Database search and retrieve activities may focus one:
• a comparison of this year's weather with that of 1974,
• the effect of cloud cover on temperatures during various seasons,
• the effect of rainfall, temperature and wind direction on clouds,
• the relationship between phases of the moon and tide heights, and,
• comparison of searches with previously determined relationships (always engaging students in prediction and evaluation).

Searches may range from the simple to the complex. The database can be used each year for different purposes and, as the package is open ended, the possibilities are unlimited.

*Weather Report*™ **and Infants**

*Weather Report*™ has been designed for use with the whole school. The infants' section of the program results in a weather chart similar to those produced with other age groups. Data is not stored but the habit of using computers daily for weather discussion is established. Comparisons can be made using the printed sheets as graphs are constructed. There are many opportunities for incidental learning such as revision of phonics, word recognition, maths terms (including most, more, least, few, the same), and number activities. With older infants, activities may be be extended to include chronological order, use of appropriate colours and vocabulary associated with weather and seasonal changes in nature.

## Extending the context

As with all learning and the use of computers as a resource within the classroom, databases should not be used in isolation. They can be used as a resource within a unit of work or as the focus for the unit. The data contained in the software should be supplemented with information from the school, home and community such as books, videos,

slides, charts and maps to extend the context and provide a point of comparison.

## Making the link between databases and writing

Database manipulation provides many opportunities for students to be engaged in a range of language development activities particularly writing. Students should be encouraged to use the data they retrieve and the conclusions they draw within reports, diaries, stories, biographies, descriptions, lists, letters, newspaper reports, designing advertisements and poetry, among other forms.

## Ideas for constructing open databases

Open database software lends itself well to recording and comparing data collected from the local community. Topics could focus on people (occupations, ages, nationalities), events, information from tombstones in graveyards (surname, first name, year of birth, year of death, country of birth, occupation), housing (type, availability, cost), and community facilities such as shopping centres and sporting facilities.

Frequently collecting this information involves the use of surveys, interviews and active research. Again a wide range of activities can emanate from the investigations integrating reading, writing and creative activities such as preparing advertisements and crosswords.

Within the school community, students could be involved in constructing records on the books they have read, on art appreciation (including artists personal facts, type of art works, any influences on their work, places where the art is displayed, and students comments on their work, particularly for studies of Australian artists), current events and poetry.

Teachers could establish databases on relevant student information, stock information such as maths equipment, reading books, PE equipment, art materials and the library collection, although most school computers would not have sufficient disk storage space for all this data.

The following software packages have been recommended for use in Queensland Primary schools:

| | |
|---|---|
| *First Fleet Database* * | |
| *One World Countries Database* | Active Learning Systems |
| *The Bushrangers Database* | Know Ware |
| *The Explorers Database* | Know Ware |
| *The Solar System Database* | Know Ware |

* Produced by the NSW Computer Education Unit and highly recommended. Contact: Resource Services, P.O. Box 6, Burwood NSW 2134. (02) 747 2299.

Other titles to be aware of are:

| | |
|---|---|
| *What's in a Name* | Prologic |
| *Hounds in History* | Prologic |
| *The Dream Machine* | Prologic |
| *Crime in Society* | Prologic |

(a series designed to introduce the concept of databases, the last two being more suited to lower secondary school)

| | |
|---|---|
| *Australia: A Profile* | Active Learning Systems |
| *Birds of Antartica* | Info. Technology Week |
| *Hometown* | Active Learning Systems |

(all more suited to secondary education)

Many states have constructed databases with localised data, usually investigating Australia's early history. Titles include *Convicts Absconded, Convicts: Physical Features, Point Peur Database, Colonial Census* and a recent title from Victoria containing data on all shipping wrecks off their coast.

Table 3:
Recommended
closed database
software

# Chapter Eight: Graphics

## Introduction

Primary school art programs, regardless of the media, are concerned with developing students knowledge and skills. Through art learning experiences students make sense of and respond to their environment, express their ideas and feelings and describe their experiences similar to creative pursuits within other curriculum areas. This applies equally to traditional media or the latest computer graphics.

Computer graphics programs such as *MousePaint*™, *Colour Me*™ and Macintosh programs such as *MacPaint*™ and *MacDraw*™ provide a new dimension to primary art programs. To date it is an area that has been relatively unexplored. Many of the principles suggested within this publication for effectively using other computer applications apply equally to computer art.

In any art program it is important to consider the context and purpose of an activity and the processes involved . Context, so the computer art relates to classroom learning and students's interests; process, so that the students can successfully learn through their computer art experiences.

It is important that art programs involve a wide range of media, both computer-based and traditional, that the students can explore their environment using all their senses and expand their understanding of concepts and that problem solving techniques are developed.

## Art as a process

As with the preceding applications it is important that a strict process is not applied to art learning experiences but rather that teachers are aware of and encourage the general stages. There should be a time for **discovering**, **planning**, **doing**, and **evaluating** leading to further discovering, planning or doing. It is a recursive, not linear, process which can start at any point and move in any direction (remember the pin ball analogy). Discovering and evaluating have often received a lower priority but are essential and should be encouraged.

### Discovering

This is perhaps the most important stage of the learning process. During discussion, art should be looked at in different ways, classifying similarities and differences, finding patterns and discovering new images.

Students will be making discoveries, having ideas, becoming aware of needs and discovering a purpose. It is through discovery that a new plan may evolve and so the process continues.

### Planning

Traditional materials as well as computer based materials should be encouraged during this stage. Students will be considering how to act on the purposes and ideas identified during the discovering stage, choosing which materials, tools and visual elements to work with, who to work with and where to work. They should be organised individually or in groups of varying size as appropriate. Different focuses or contexts should be established as starting points for learning. Art activities and purposes should grow from or lead into other curriculum programs, particularly the language arts.

### Doing

This stage involves carrying out the plan with flexibility so as to use new ideas as they arise. By doing students are being helped to become aware of themselves and their environment, to become aware of visual elements, to explore art materials and techniques, and to discover a purpose.
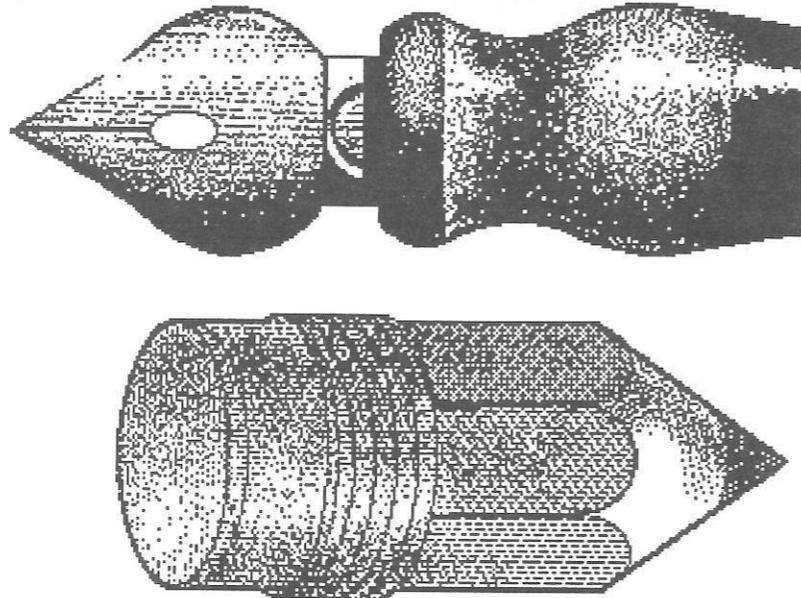
Depending on the classroom organisation and timetabling, several different arrangements may be considered:

• Individually - where the one assignment, topic or concept is explored by all students. Time is provided throughout the day on a roster basis while other classroom lessons are taking place. Time for response is provided after all students have completed their work.
• Small groups- again one assignment might be explored by all students through a group response. The whole class may be involved simultaneously in art activities rotating in groups using computer based and traditional materials. When all students are involved in art activities, response can be more productive with all students engaged in similar pursuits and thinking processes. Alternatively, students may be engaged in a range of activities, the computer art activity being just one. Students rotate throughout the blocked time and respond as a whole class after all groups have been completed. A computer art learning centre may be established with self paced and self-help type activities. Students could be involved at the learning centre either at a set time, as part of a learning contract or flexibly when other classroom work has finished.

### Evaluating

Throughout the learning process students should informally evaluate to decide if they are succeeding in their intentions, assessing which parts work well and whether any parts could be improved. Questions may be asked such as 'Do I like it? What parts work best? Did I do what I originally planned? How could it be improved?' Individual differences should be encouraged where all students feel comfortable to express their opinions and helped to develop their own personal style. Teachers should be aware that students need to develop an appropriate vocabulary for discussion, expression and appreciation.

It is important that computer art is appreciated in its own right. Sharing sessions may be positioned around the computer and large screen while all students respond to the computer image and also to a printed image.

In responding to computer art, a comparison should always be made to the students' immediate environment, to other representational dimensions (two-dimensional, three-dimensional and the computer representations of these) and to the possibilities with other materials. Students should be encouraged to apply problem solving processes, generating a large number of different solutions to a given visual problem. Sensitive intervention and effective questioning and prompting by the teacher are important to maximise the learning potential. Talk should be encouraged throughout. Emotions should also be an important part of any response.

## Introducing *MousePaint*™

An initial period of experimentation with *Mousepaint*™ is essential so that teachers and students can become familiar with its use. Teachers need to be aware of the available facilities so they can use this tool appropriately throughout the curriculum.

During experimentation it is vital that response and discussion is highlighted so students refine issues such as:

• What is unique about this medium?
• What new tools are available?
• What can I produce?
• What things can be done better this way?
• What can be done better with traditional materials?

## Computer based 'exploring' art activities

The elements that should be explored through art programs are:

• line
• shape
• colour
• texture

In exploring differing visual qualities, an art program could be designed to include the following:

• explore the pencil tool and compare the feel and product when drawing with the computer and a range of traditional pencils (2B, 4B or 6B),
• repeat the above activity with the different widths of brushes provided with *MousePaint*™ and compare the feel and outcomes when using the class's paint and brush resources,
• explore the various textures to determine what emotions or what parts of the environment they represent. How do different textures affect emotions or environmental representations? Compare computer representations of texture with environmental textures,
• manipulate colour and texture and examine its effect on emotions and feelings, and,
• explore lines. Can lines be grouped? How can lines represent the real world? Consider the types of lines and colours that could be used. How could they be changed, combined or arranged to express ideas or feelings or a particular topic?

After a general exploration of pencils, brushes, lines, shapes, colour and textures start restricting their use. For example:
• select three shapes and one brush width. Give another group a different set of shapes and the same or a different brush width. Compare the results. Explore shapes and brushes traditionally and compare.
• select a number of textures and shapes for experimenting. Compare with environmental textures and representations.
• build a pattern based upon a single shape. Build a pattern for a particular purpose or to represent an emotion or statement.

It is important that individual purposes, not just those set by the teacher, be explored.

## Implications of computer art

Teachers should encourage students to broaden their awareness of the uses and impact of computer imagery within society. Examples should include imagery in electronic games, movies, television and advertising and the uses of graphic art within interior design, industrial design, architecture, commercial art, medical technology and science.

The elements of space, light and balance should be explored not only through computer graphics but with other applications particularly the production phase of any written work in Language, Social Studies or Science. In developing and applying layout skills which require space,

light and balance, students should be encouraged to collect and analyse examples from the community and to be constructively critical of their own and other students' work. Teacher modelling is, once again, very important.

## Other graphics packages

Many teachers were introduced to computers through packages such as *Print Shop*™. These graphics packages are supplied with sample graphics that only require the user to manipulate the program's options to achieve a neat and clear end product that previously required many hours of hard and sometimes close work.

While this form of application will always have a place in classrooms and more appropriate and specific packages are being produced, their worth should be placed in perspective. Students should be encouraged to see that this form of graphic art has a place but that their own individuality can be developed with open ended graphics tools such as *MousePaint*™.

Other graphics packages that could be considered are listed in Table 4:
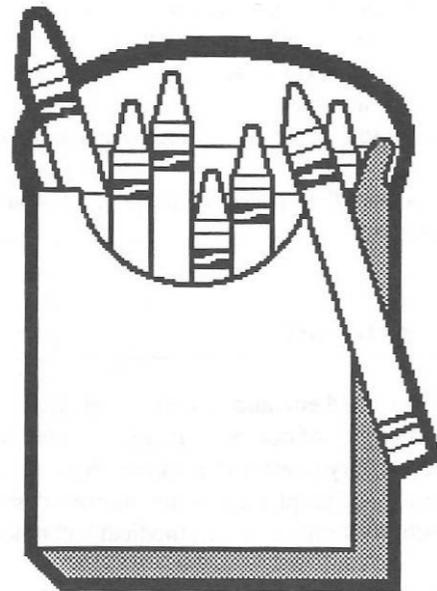


*Printshop*™ (and companion disks)
*Printmaster*™
*Certificate Maker*™
*The Principal's Assistant*™
*Colour Me*™ (less sophisticated and more suitable for infants)
*Create with Garfield*™
*Teddy Bear•rels of Fun*™
*Dazzle Draw*™
*Animate*™
*Fantavision* ™ (with facilities for animated graphics)
*Fact Fiction Toolkit*™ (and *Story Maker*™ , providing graphics and fonts for writing)
*Bank Street Storybook*™ (another text and graphics package for creating a paged storybook. There are a multiplicity of uses for the package as a display and communication medium.)

*Table 4:
Recommended
graphics software*

# Chapter Nine: Early Childhood

## Why use computers with students so young?

Computer software can provide meaningful contexts, models and tools for the development and enhancement of a wide range of literacy, thinking and problem solving skills, knowledge and attitudes. They can provide complementary and vicarious experiences. Socially, computers with small groups of students can stimulate interactions encouraging them to share and help each other.

As a basis for this discussion it is important to highlight the basic **principles of learning:**

It is generally agreed that students learn best (particularly at this age) when they:
• are actively involved,
• experiment and play while they are engaged,
• are self motivated, self directed and self regulated,
• perceive some relationship with their own knowledge and experience, and,
• receive positive responses to their attempts.

Brian Cambourne's **conditions for language development** are appropriate to all learning and must also be considered. The following conditions need to exist within a supportive learning environment:

• **immersion** - a broad engagement (or almost saturation) in the learning,
• **demonstration and modelling** - showing and demonstrating models, particularly of reading and writing,
• **expectation** - the expectation that all students will succeed, communicated to the learner,
• **approximation** - not expecting the student to create the adult form of communication but understanding that, over time, they will approximate the correct form
• **feedback** - providing positive feedback to guide learners,
• **responsibility** - giving the learners responsibility for the direction of their learning, and,
• **employment** - engaging the students, directly in all forms of learning as opposed to passive involvement.

## What type of experiences are most suitable?

Infants should not be treated differently to any other students. Just as a balance of applications is desirable for middle to upper primary schoolers, so too infants deserve not only a balanced exposure to computer based resources but the teacher's confidence and expectation that they can handle open ended software.

Software developed for students 3 to 8 years of age has traditionally made good use of colour, graphics and sound, and it generally provided highly structured experiences particularly reinforcing letter, word and number recognition skills. While drill and practice, or structured reinforcement, software has a place within the curriculum it should not hold a high priority because it has a tendency to, on occasions, segment learning, not provide a context or purpose for activity or hold the students' attention in the long term, and frequently can become a solitary experience as opposed to encouraging small group interactions which occur when students are exposed to more open-ended software.

Students in Years 1 - 3 could be exposed to the following range of software:

• **Applications**
- word processing (20 column)
- graphics
- database (limited at this age)

• **As a stimulus** for language development (including interactive fiction)

• **Problem solving** (including logical thinking skills developed through language or mathematical contexts)

• **Structured reinforcement**

From the core list of software, infants could interact with *Bank Street Writer III*™'(20 column mode) as a tool for language development, *Weather Report*™ for daily observation, recording and printing of the weather chart and *Mousepaint*™ for experimenting with graphics and enhancing learning in other subject areas. Other relevant software will be discussed throughout this chapter.

## Word processing with infants

Computers can provide another vehicle for helping students make the links between reading and writing. As with any language development program there should be a strong literature base and all activities should be purposeful and part of an overall program.

Language development programs that incorporate computer-based resources provide opportunities for frequent practice of reading and writing, provide:

• the tools for shared book experience,
• for students to write and dictate their own stories,
• for them to see models of the process, and,
• to stimulate their need to share.

Word processing allows students to experiment with their language in an environment where new ideas are encouraged and can be used by the teacher as an indication of the next modelling and learning to focus on.

Word processing reinforces in children an awareness of print in society. It develops their concepts about print (print carries a message, left/right progression, reading a page from top to bottom), develops some keyboard familiarity, consolidates knowledge of the alphabet, provides opportunities for emergent reading activities such as letter and word sequencing, matching, and name and word recognition. Students will develop these
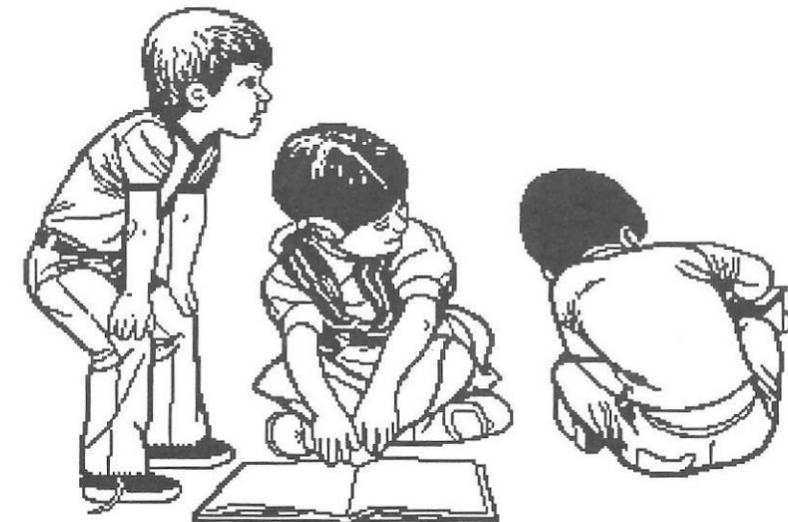
skills, attitudes and understandings in their own learning style, at their own pace and using their own contexts when a *play mode* of word processing exists.

Initially students should watch as the teacher models how to word process using a large screen with either the whole class or a small group. Using small writing tasks that are related to literature or to classroom investigations the pressure on them to handle the computer keyboard and software for themselves is removed.

Activities might include:

- captions for paintings and displays,
- diary recordings of events,
- recording of known songs, poems and stories,
- whole class composing,
- scribing for individuals in a wide range of composition,
- whole class or individual invitations,
- whole group letters to adults (parents, administrators, community), and,
- shape poems, recipes or other print material normally on display.

When students are given the freedom to experiment, they should engage in a wide range of activities such as playing with letters of no apparent meaning and copying words, phrases and sentences from their environment, gradually building to meaningful units. Progress will be uneven and unpredictable involving regression for some children from time to time. For some students, their emergence into literacy may be accelerated through playing and manipulating with letters on a screen, particularly those children with poor gross motor skills who find the physical process of pen to paper slow and untidy.

Organisationally word processing can operate in one of three modes:

- **whole class** to:
    introduce how to word process,
    introduce a new program,
    introduce a new skill or topic,
    model a form of writing, for example a rhyme or letter,
    model a particular sentence structure, and,
    compose with whole group ownership,

- **small group** to:
    introduce, model or compose as the list above suggests,
    develop skills with a needs group,
    scaffold a small group through a language development activity,

for example cloze or sentence patterning, and, experiment with language in a small group.

- **individually** to:
    encourage students to experiment with language.

## Activities for word processing

There is little need to list activities as those activities developed in traditional classrooms can and should be easily converted to computer based experimentation. One of the advantages of the 20 column word processor is the immediate publication of students' work, so vital to this age group.

Almost every book of literature provides a model and a stimulus for language development activities - retelling the story, modelling on the sentence structure or story line to apply to a new situation, writing another episode, introducing new characters or events and telling that story and so the list continues. Hence literature provides an excellent springboard for students' word procesing. Using other pieces of software will also stimulate students to writing at the computer.

### Planning for language development

When planning to incorporate computer based resources, consideration should be given to the following:

- what types of language development does it assist?
- what language or learning purposes can be developed?
- what modelling needs to be planned to support onscreen interactions?
- what activities extend to other learning?
- what activities extend to other curriculum areas?

## Graphics and younger students

The preceding chapter on graphics and school art programs applies equally to this age group. Classroom investigations with young students have shown that, where they have experimented freely with *MousePaint*™ and other graphics programs such as *Color Me*™, they easily adapt to using the mouse, producing and experimenting with great freedom. These graphic tools may also be used to illustrate many areas of learning, not just writing.

Within mathematics, there are a wide range of applications for experiment with shapes, lines and numbers and patterns. These may be both teacher-directed or child-challenged (one to another). The hardcopy might be bound together to produce the traditional number and counting books.

Graphic manipulation packages such as *Print Shop*™ and *Stickybear Printer*™ provide a useful introduction to computers for younger students and have widespread application throughout the school year and across many curriculum areas. Many other programs provide the context for learning concepts about life, encouraging experimentation as they learn. For example, the program *Kids at Work*™ encourages students to manipulate graphics to produce a particular scene.

*Mask Parade*™ allows students to manipulate shape, eye and ears to create a mask and other dramatic accessories such as jewellery, badges and shoe covers. The hardcopy can be glued to cardboard and used as a stimulus for a wide range of creative dramatics.

Graphics and writing programs provide an excellent stimulus for this age group. Examples (some of which will be discussed later) are *Teddy Bear•rels of Fun*™, *Paint with Words*™, *Story Maker*™ and the Explore-a-Story™ Series.

## Databases and younger students

Once students have sufficient literacy skills to read and write their own name and address and a basic vocabulary they can be involved in creating a class database of personal data (students from Year Two have been involved in such an activity) or on books they have read. No manipulation of data at this age should be attempted.

The infants' section of *Weather Report*™ is not an example of database work but does provide an excellent learning tool.

Data is not stored but the habit of using computers daily for weather discussion is established. Each day's weather report sheet is displayed with graphs being constructed daily or when discussing the weather pattern at the end of a month. The hardcopy could be integrated with various Art activities.

The program can be operated as part of morning activities or pairs of students could be rostered to use the program independently. Either way, a series of coloured flashcards will assist these emergent literates with the appropriate word recognition and spelling.

There are many opportunities for incidental learning such as revision of phonics, word recognition, maths terms (including most, more, least, few, the same), and number activities.

With older infants, activities could be extended to include chronological order, use of appropriate colours and vocabulary associated with weather and seasonal changes in nature.

## Other applications software

The only other applications software that must be mentioned is for mathematics. It is unique in that most maths software for this age group provides structured reinforcement. This provides a context for experimenting with concepts about number - patterns, shape, conservation and operations. The two programs are *Number Detective*™ and *Number Explorer*™.

Students select the number to be experimented with which is presented as graphic icons (such as objects and things) or coloured shapes and from there they experimenting by taking some away, adding more, boxing the

number together in twos for example, joining and unjoining numbers, counting them one by one. No formal mathematical symbols are used and the program provides no direction for the students. They have to do something with the icons. Used in conjunction with traditional materials and activities, and at times involving directed play with small groups and the teacher, this software is excellent with great learning potential.

**Support Software**

The remainder of this chapter presents other software important for enhancing learning.

**• As a stimulus**

Several pieces of early childhood software are difficult to classify but provide stimulus for learning. A brief description is provided below:

*Animal Photo Fun* ™ (an animal environment) and *Comparison Kitchen*™ (a cooking environment) are examples of structured reinforcement where there is one right answer and usually one path to that answer with little opportunity for play. These two programs are very colourful and relate to experiences students can enjoy while they consolidate conceptual learning. They can provide a springboard to many integrated activities away from the computer.

*Bike Hike*™ is a memory development program built around a simulated bike ride. During the ride, students see many things which they must remember afterwards. The students can relate this to their own community visits and bike riding.

*Facemaker*™ allows students to make faces by choosing head shape, eyes, ears, nose, hair, accessories (glasses, hats) and actions which the face can perform such as winking. The result can be printed out. Apart from the open ended fun, students will return to this over time. As a teaching tool it can be integrated when developing body concepts, associated with literature, for developing the skills of observation or social studies topics such as stranger danger.

*Paint With Words*™ is a graphics and writing tool. Students place words within a frame which then turn into the graphic. The hardcopy presents the picture and list of words encouraging students to write a story.

Explore-a-story™ Series. *Rosie the Counting Rabbit*™ is one of four programs which present potentially the most worthwhile application of computers for early childhood. The programs are most easily used with a mouse. Within the kit there is a story of a counting rabbit whose story line is cumulative and highly predictable. There is much language work to be extracted from this book before the students reach the software. The software itself represents the pages of the book in full colour graphics. No text is presented providing great motivation for story telling. Most of the elements can be picked up and moved around the scene - can you imagine Rosie going for a walk? On each page there is interaction and movement with an emphasis on changes in nature - the ducks hatch out of eggs, the butterflies emerge from caterpillars.

With any screen the students can add extra story elements such as another rabbit to be a friend for Rosie, more flowers or turtles. The picture can be labelled (built-in vocabulary) or full text can be entered from the keyboard. The result can be printed out in full colour on an Apple® Imagewriter II™.

The potential for this story is enormous as it is completely open ended- no story line need be used. Activities could include writing about Rosie and her adventures, telling another episode, another animal as the central character. It could be used to create factual writing about the seasons, animals or changes in nature or used to produce number books.

*Teddy Bear•rels of Fun*™ is a graphic and text tool that allows students to manipulate teddy bears in a variety of scenes, adding story lines and printing in full colour.

### Interactive fiction

This type of software is most desirable for this age group as learning is presented in context, encouraging experimentation, stimulating reading and the learning outcomes are not prescriptive. Chapter 5 provides background on the potential of this software within the classroom which should be no different for this age group.

*Alice in Wonderland*™ and *Jack and the Beanstalk*™ are two programs which engage students in the original story line through two word commands such as *take cow, sell cow*. They are highly colourful and do allow students to experiment with the story line though no creative alternatives are presented. They can be used as springboards to integrated language development themes.

*Tonk in the Land of Buddy-Bots*™ is a graphics-only package which is perfect for this age group. An extended three week theme demonstrating the potential of the software for learning and integration is included in this publication.

### Problem solving

Many software programs provide stimulating problem solving activities complementary to other types of experiences in early childhood classes.

*Gertrude's Secrets*™ and *Teddy's Playground*™ both involve problem solving with attributes of colour and shape, *Moptown Parade*™ with manipulating variables of size, colour and classification, and *The Pond*™ with developing strategies for pattern forming and sequencing.

*Puzzle Master*™ is a computer based jig saw puzzle which can be cut into pieces from two to two hundred whilst *Stickers*™ involves completing a picture using correctly sized coloured shapes that students have to choose and place, developing skills of perceptual matching.

### Skill reinforcement

There are quite a large number of software packages suitable for inclusion in this section. Two that are representative are *Reader Rabbit*™ and *Word Spinner*™.

*Reader Rabbit*™ is a colourful and engaging piece of software with four components - matching letters, completing three letter words, sequencing words with one letter difference and a game of concentration that can involve matching picture to picture, picture to letter through to word to word. The Apple IIGS™ version includes speech which guides emergent literates through the software.

*Word Spinner*™ reinforces three and four letter phonic words.

# Chapter Ten: The Project Approach

## Introduction

The ultimate aim for computers as learning tools within primary class-rooms is for students to approach them naturally, to be aware of the potential and limitations of a range of software and to then use the appropriate application from their own initiative and purpose as much as with teacher direction. When a computer is available in every classroom to be used when needed rather than when available, it will be a truly technological classroom.

Students in small schools will have a greater chance of reaching this desirable situation of computer access and knowledge due to the flexibility of their learning environment and their early introduction of computers when compared with students in large metropolitan schools.

Perhaps the projects outlined below are adventurous for most classrooms in 1987. In each situation, **Sports Day** and **Newspaper Project**, a range of computer applications are integrated into the one project assuming the students can already operate the software with some independence. It is in this way that computers are truly used as tools.

## Integration One: The Sports Day Project

Depending on the age and abilities of the students, this project could incorporate the following activities after teacher and students have negotiated the broad parameters for the day:

• a database could be/or may have been established. Students could be responsible for retrieving the participant lists for each event,
• a spreadsheet (not discussed in this publication - a mathematical tool with columns and rows for quickly and automatically manipulating sets of numbers) could be set up to record running totals for each house on the day,
• *Print Shop*™ could be used for advertising the day to the community,
• students could use a combination of word processing and *Print Shop*™ (for designing letterhead) inviting parents and guests (eg Regional Director) for the day,
• using similar tools (word processing and graphics) students could create the program for the day,
• using word processing and graphics tool (*Crossword Magic*™, *Create with Garfield*™, *Wonderword*™) older students could create an activities book for spectators with activities relating to sports or to the school

environment,

• students may like to take advantage of the opportunity of having the community at school to hold a sweet stall on the day for a good cause (themselves or a charity).  A spreadsheet could be used to estimate costs (or Budget Maker- *Microzine*™) and expected returns/profits; graphic tools could be used for signs and advertisements, and,
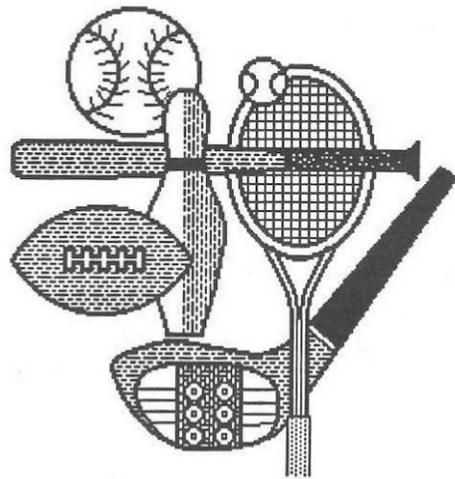


• when developing the background context to **Sports Day** involving research and reporting on the history and development of certain races and sports, students could use word processing to report their investigations. Alternately they could use other forms of computer-based presentation (that is, the final product is viewed at the screen) using *Story Tree*™ as a bulletin board or using *Bank Street Storybook*™ for creating text and graphics in full colour that is turned like a computerised book. This could be on display for parents to 'turn' and browse through on the day. Students could also be involved in writing rules for playing sports or using *Microzine*™ on the history of the Olympic Games.

## Integration Two: The Newspaper Project

The establishment of a newspaper project is not new to primary schools. What has been applied to this presentation of the project is a range of tools not always available and more student-based responsibility and decision making. Mention is made in the chapter on word processing and writing of other newspaper-related activities.

As an alternative to producing a newspaper for the broad experience it provides, a range of other purposes could be considered- to create a purpose for writing, to emphasize report and factual writing, to demonstrate *Newsroom*™ or *Springboard Publisher*™, to provide a wider audience for publishing students writing, to provide a purpose for students to publish, to raise money, to conclude and present or announce a semesters' work, to announce next semester's events, possibly a fete or centenary, to commemorate a special event such as a school anniversary, retirement or graduation, or as part of a theme; for example,  a newspaper set in Goldfield days, if using *Goldfields*™ or Bushranging Era if using *The Bushrangers Database*™.

**The process**

The purpose should be jointly determined and clearly communicated. Together a plan and production timeline and an outline of tasks should be constructed. Teams or individuals should be allocated for the various roles and responsibilities.

The content should be determined based on the purpose modelled from reality. That is, a range of newspapers should be analysed to determine the range of sections to be included and the style of the paper. Visits from community members with expertise in graphics or the newspaper industry could be arranged to advise the students. Alternately students could visit the local newspaper to watch the industry at work.

**The tools**

Students will be involved with word processing to refine and present their message, graphics programs to enhance the presentation, page layout tools for the final presentation and other programs such as *Crossword Magic*™ for items included. What should be stressed is a team approach with some students responsible for certain aspects of the project. Not everyone needs to be able to operate all the software but everyone should be able to present their ideas on the content, layout and presentation.

**The contents**

Students should consider the inclusion and design of:

• the front page,
• the editorial,
• the headlines,
• a range of news items, such as an accident report, and feature stories such as travel logs,
• comics or jokes,
• the sports results,
• entertainments- movie and program guide or review,
• the classified ads and/or lost and found, using classified ads as a model-children create their own - using Lost and Found Ads as a model, create For Sale Ads, Birth Notices, and Homes for Sale,
• selling advertising space to local retailers,
• a children's page, and,
• the index.

There will be many more opportunities within the school year for students to be involved in computer use for real and integrated purposes. Computer applications will also be integrated within learning units and across subject areas or when using simulation software.

# Chapter Eleven: Tonk in the Land of Buddy-Bots

## Credits

Tonk in the Land of Buddy-Bots, by Mercer Mayer.
Designed and developed by Angelsoft, Inc for Mindscape, Inc.
The TINK!TONK! characters and the words TINK!TONK! are © 1983
TINK TONK, Inc. All Rights Reserved.
Software © 1984 TINK TONK, Inc.
Handbook © 1984 Minscape, Inc.

## Introduction

The establishment of context is vital to ensure the potential for the software to enhance learning is achieved. Planning, therefore starts with the needs and interests of the students considering their past experiences and the available resources. For the unit based on *Tonk in the Land of Buddy-Bots* the software should be introduced after the students have participated in a number of off-computer activities. This is particularly important to provide opportunities for their own imaginations to be stimulated. The software then presents one view of Buddy Bot Land and not the only one.

### Purposes

• to encourage creativity,
• to stimulate problem solving techniques, independence and social skills within group interaction and decision making,
• to develop skills of oral interaction and speaking, and,
• to develop skills pertinent to the specific needs of students.

### An overall plan

No unit of work (such as is being presented here) should be exactly imposed onto any set of students in a classroom. There are many variables which affect its implementation, the most important being the needs of the students. Good interactive fiction should be flexible. One suggestion might be to develop a three week theme thus:

• Week 1 - Tink Tonk Land- establishing the context before the computer software is introduced
• Week 2 - The Buddy Bots- playing the games
• Week 3 - The Adventure- the full adventure

## Establishing the context: some activities

### Format

The student handbook handbook presents a chapter called "Meet the Tink Tonk's". Rewrite this into a big book format to introduce Tink Tonk Land and the characters that live there.

• The teacher may consider embellishing the story but it is a perfect task for the students, or,

• tell the story using drawings, paintings, puppets, a model of Tink Tonk Land, felt board cut outs, or a map of Tink Tonk Land that you cumulatively draw as the story is told, or,

• have the older students play the game, read the handbook and then create, write, script and prepare an audio tape to set the scene.
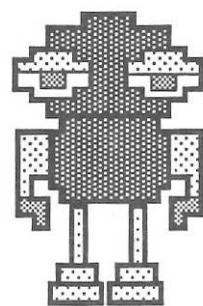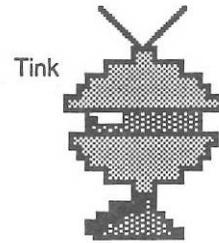
Tonk     Tink

©1983 TINK TONK, Inc.

### Extending the focus

The following suggestions involve group work and individual activities across curriculum areas. Specific classroom organisation and timetabling should be flexible but it is important to ensure that students are exposed to a range of whole class writing and discussion activities before being expected to create individually.

• Mapping and Labelling
Have the students draw their own map of Tink Tonk Land and label the location of the characters (both those mentioned in the story and the other characters they imagine might live there). The land could be painted or represented in three dimensions.

• Literature
Read or tell other stories (serial reading) set in imaginary community settings such as Milly Molly Mandy, Noddy, or Winnie the Pooh. Locate other library resources focusing on soldiers or characters in castles such as Jim and the Beanstalk. Discussion could also focus on *Heroes*.

• Writing/Reading
'Adventures in Tink Tonk Land' may be the basis for class writing with butcher's paper at an easel. The process should be modelled as writing is drafted and polished over several days. Writing may also grow out of other suggested activities, for example, writing lists of community

rules, comparing characters and their roles in Tink Tonk Land with those in the students' own community. Students should be encouraged to write individually for class books, and to caption the products of other activities particularly art. Students may be engaged in shared reading experiences with group and individual writings, any appropriate big books and literature in the reading corner.

• Speaking and Listening
Use of puppets or masks produced by either the students or the teacher will encourage oral creativity about Tink Tonk Land. Drama/movement activities may follow questions such as 'Do Tink Tonk characters have any special ways of moving?' Music from the software could be taped for movement sessions or students could be encouraged to decide what sort of music is most appropriate to this imaginary community. As a control technique, a symbol representing one of Gork's soldiers could be used.

• Language Development
Suggested activities depend on the ages of the students but could involve any of the following: initial phonic 't'; rhyming words for 'ink' and 'onk'; vowel digraph 'ee'; word endings- 'Tinka and Zoomer; 'ar' sound in garden and castle. These should be developed through whole class or individual activities using the students's language with a lesser focus on specific lessons.

• Social Studies
Students may compare Tink Tonk characters with people they know, discussing how they are similar and different. They may list other types of people communities need and their roles then turn them into Tink Tonk characters. They may then determine the community rules for Tink Tonk Land, again reflecting on real community rules. List rules and discuss their purposes.

• Art and Craft
The students may be involved in activities to present characters and places in Tink Tonk Land using a variety of media: clay, plasticene, paint, collage, construction and computer graphics.

Activities such as these, provide opportunities for Tink Tonk Land to come alive for the students, for teacher modelling of reading and writing, for sharing ideas, for shared reading and for expressions of creativity. Note: students have, as yet, not been introduced to the computer software.
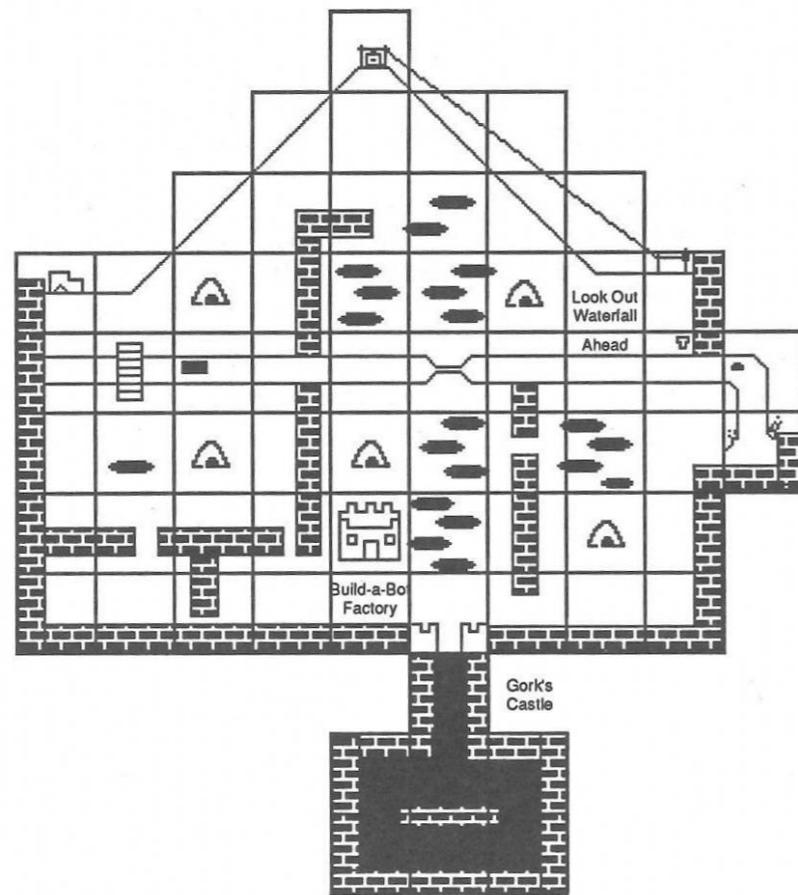
*Fig. 9:*
*The Land of*
*Buddy-Bot Map*
*© 1984 TINK TONK, Inc.*

## The Buddy-Bot Games

Using a large screen or a small group of students, introduce the Buddy-Bot games. Through careful questioning students should be helped to make meaning of the screens rather than being told how the games are played.

As each game is discovered  a description of how they are played could be written using the students' language. This guide then remains in a visible position as a help sheet for students when they are playing independently. Whole group modelling sessions should be sufficient introduction. A different type of game could be timetabled for each day of the week, the game introduced only on that day. Students should be clear of the different expectations associated with each level of difficulty.

After the games have been introduced,  students may be organised in pairs for playing. One suggestion would be to play one game at a time having students increase the difficulty after they have been successful three times at that level. A recording sheet or the Student Record Sheet on page nine of the teacher's manual may be positioned on the classroom wall for students to fill in.

| Game: Alike and different | | | | | |
|---|---|---|---|---|---|
| Names | Levels | 1 | 2 | 3 | 4 |
| Troy and Lucy | | | | | |
| Ryan and Daniel | | | | | |
| Rebecca and Samantha | | | | | |

### Off computer activities

The teacher's manual suggests many off computer activities such as 'Kim's Game' to reinforce and enhance skills learnt.  These should be used sparingly as students will be developing the skills of comparing, discriminating, memory and recall, perceptual match and logical reasoning with the onscreen games with out the need for further reinforcement. School time is better directed towards learning in context as a whole rather than a segmented approach which may develop skills of secondary importance to literacy and communication skills.

## Buddy Bot Activities

☞ • Writing/Reading
A range of whole class composing may lead to shared reading experiences and individual writing about Buddy Bot. These should be presented in the author's chair, published and stored in the library corner.

☞ • Listening/Drawing
Playing in pairs, one student is asked to draw a buddy bot without revealing it to his/her partner. He/she then describes it, part by part while the partner draws. For example, 'My buddy bot's got a large rectangular head, skinny neck, a circular body and straight legs'. After the drawing has been finished, it should be compared with the description to see how effectively the message was given and received. This activity may then repeated with the other partner giving instructions.

☞ Playing 'Twenty Questions' or 'Who Am I?'
In this activity one Buddy Bot is chosen from a range of the students's drawings or paintings. Other students must determine which one has been selected by asking questions such as 'Does it have triangular feet?' As possibilities are eliminated students find the Buddy Bot selected.

☞ • Cooking
Through whole class discussion students must decide how Buddy Bots could be represented with food either by baking a gingerbread version, icing biscuits, or constructing them using various pices of fruit and cheese connected with tooth picks. After a recipe has been determined writing activities should follow: preparing the shopping list, writing the list of ingredients and the method involved, invitations to the Buddy Bot feast could be composed and sent to administration or other school and community members.

☞ • Drama/movement
With the focus of the 'Buddy Bot Factory', students could decide how buddy bots are made, in what order their parts are produced, what sort of machines make the parts and what sounds they make. A conveyor belt scene could be improvised.

☞ • Art and Craft
Using teacher prepared potatoes representing various geometric shapes, students choose different shapes and colours to create their buddy bot. The results may be displayed or used for listening activities.

## The Tonk Adventure

**Preparing for the adventure**

Suggestions made in the chapter on 'Simulations' are appropriate here. Considerations are:

• What materials and resources need to collected or made?
• What skills are prerequisites for successful interaction with the software?

**Extending mapping skills**

☞ For this activity students should be provided with a map which is completely different to the onscreen map or the copy in the handbook. Have students follow your instructions around the map, pencilling in their route. Give other students the opportunity of giving instructions around the map.
Have students in groups decide which is the quickest way to a certain point. Increase the difficulty by inserting obstacles or making the environment more complex. Students may like to use objects to move around the map.

**Introducing the adventure**

☞ The adventure is best introduced to the whole group using a large screen or with a small group of students around the computer monitor. Questioning the students, for example 'What do you think you have to do? Where do you think you might go?' What do you think might happen here?' What does that mean?', will help them to develop thinking skills and to make meaning of the screens rather than being told how. The rules, outlined on pages 8, 9 and 14 of the manual, should be explained to the students. A wall reference chart may be constructed with the students using the 20 column *Bank Street Writer*™ for text preparation.

**Action Plan**

☞ Introduce the beginning level as suggested above. With one group working at the computer, other students should be participating in either whole class writing, small group or independent activities. After each group has been successful at the first level, a whole class discussion might be organised to share the fun and frustrations. The next level should be explained at this time. Continue in this manner, keeping the

class to the same level of difficulty and making sure students have a chance to share before moving to a more difficult level.

## Off the computer activities

☞ **Journal writing**

This will be dependent on the students' ages. During their interactions, younger students may be given a sheet with a structure for them to note their movement through the adventure, while older students may make notes for themselves. After each session students might write a diary of their experiences or express themselves in painting, drawing, mapping and labelling or taping a story of their journey.

☞ **Expression through language**

Many writing and reading activities will become obvious. Students may like to create a boardgame similar to *Snakes and Ladders* based on Tonk's adventures. Older students could write questions and design obstacles for the board.

**Mapping**

This will be dependent on the students's ages. Very young students should be given a copy of the map from the handbook to use while interacting with the program. Older students might sketch the map as they move around the environment, cumulatively adding to a full map after each session at the computer.

**Buddy Bot Puzzle**

As suggested in the handbook on page 24.
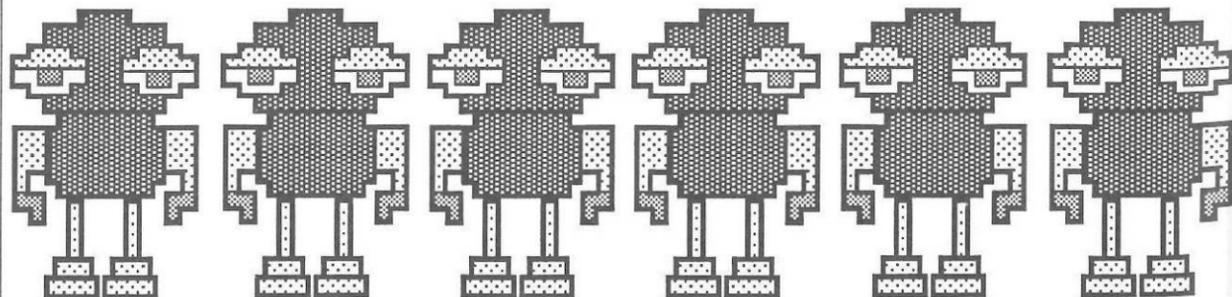
**Other subject areas**

☞ Teacher and students should be able to suggest appropriate activities stimulated by the adventure expressed through music, art and craft, drama and movement, speaking and listening or cooking. Students may also suggest other investigations, such as learning more about caves, castles or robots.

**Physical education**

☞ An obstacle course might be prepared using the playground or free standing equipment. Blindfolded students may be guided by partners around the course as a feature of Buddy-Bot Land is described to them.

An improvisation on the game of *Streets and Lanes*, perhaps calling it Caves and Rivers, may be organised. The two characters who chase each other could be Tonk and Gork.

**Culminating activity**

☞ A successful activity may be to invite parents into the classrooms to share in some of the experiences of the previous weeks, to participate at the computer and to provide an audience for the stuents, such as drama, writing and craft.

# Index

Throughout this publication various software packages have been mentioned by the author. At the time of publication all these packages were available commercially, either through local educational retailers, from distributor's representatives, or from government resource distribution offices. For further details readers are urged to obtain a copy of *The Australian Apple Educational Software Directory, 1986-87* compiled by Gary Ferguson-Smith and published by Apple Computer Australia Pty Ltd.

## Software packages

Education '87
LB 1247