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The computerized landscape: The potential of utilizing computer integration technology in landscape architecture

Li, Ning, M.L.Arch.

The University of Arizona, 1990

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

THE COMPUTERIZED LANDSCAPE: THE POTENTIAL OF UTILIZING COMPUTER INTEGRATION TECHNOLOGY IN LANDSCAPE ARCHITECTURE

by

Ning Li

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SIGNED:_____

APPROVAL BY THESIS COMMITTEE

This thesis has been approved on the date shown below:

E. H. Zube — Date: 5/24/90
Professor of
Renewable Natural Resources

H. R. Gimblett — Date: 5/24/90
Assistant Professor of
Landscape Architecture

D. Wilkin — Date: 5/29/90
Associate Professor of
Landscape Architecture

J. L. Sell — Date: 5/25/90
Adjunct Research Associate in
Landscape Architecture

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ABSTRACT

In this thesis, computer integration technology and human interfaces will be assessed to determine if it can help in sharing, connecting, and transferring information in Landscape Architecture. Traditional methods of integration using manual techniques need to be modified for computer applications. Existing user friendly computer integration technology was researched and an experimental demonstration based on the Landscape Architectural applications was developed. Other applications and benefit of computer integration technology in Landscape Architectural practice are discussed.

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CHAPTER 1

INTRODUCTION

This thesis addresses the problem of integrating the vast amount of information generated by computers in landscape architectural practice. The problem arises out of the integrative nature of the profession which utilizes graphics in the form of technical drawings and artistic renderings, text in the form of descriptive reports and technical specifications, and numerical data for estimating quantities and cost. The problem is compounded by the current trend in the profession to computerize much of the information and applications. Traditional methods of integrating information using manual techniques are no longer appropriate once information is computerized. As the volume of information increases and computer applications become more pervasive, the problem of inter-relating information in design and planning becomes more acute.

The Relationship of Landscape Architecture and Computers

The computer has rapidly changed society into an "information society" (Itami, 1989). All the professions have to adapt and respond to the change, otherwise they will fall farther and farther behind. Landscape architects are accepting the changes although they appear

to be slow compared with other design professions. The advantages of effectiveness and usefulness of computers should not be ignored (Sharky, 1988). This acceptance can be attributed in part, to the advantages and benefits of computers as well as the increasing number of programs for applications in landscape architecture.

1. The Advantages of Computers

Good design work is based on correct information and inventory. By performing the rudimentary aspects of technical operations, computer technology allows the designers more time for the creative aspects of the design process. The obvious advantages of using computers are speed, accuracy, and time/data management.

a. Speed

The first and perhaps most obvious advantage of using computers is speed. An example of the speed advantage would be faster plant material selection done with a keyword search of a plant database.

b. Accuracy

If the program is correct, computers rarely cause mistakes. The accuracy of computer work depends primarily on the user's input. Technical work uses a lot of mathematical calculations and computers not only speed up the calculation time but also promote better accuracy.

c. Efficiency of Data Management

Computers can make the working process more efficient. Data entered for one purpose may be reused for other purposes, thus the redundant working time and data storage room can both be saved. At the same time, the data in computers can be more useful because the information can be manipulated to provide various interpretations.

2. Application Programs for Landscape Architecture

With the increasing awareness and acceptance of computers, more programs are directly developed for landscape architecture. The existing computer software and hardware can be used for office and job management, geographic information systems, computer aided design/drafting, and site engineering and technical applications.

Software packages that could be used in the landscape architectural office and job management are word processing, spread sheet, and data base management. Word processing is an effective and powerful tool in day to day correspondence, report writing and the preparation of specifications for design construction. With the memory function of the computer, the documents can be easily corrected, reformatted or updated. Word processing can save a lot of

time on retyping the documents. Landscape architects can use spread sheets for job management, such as cost estimating, office budgets and financial projections. Data Base Management Systems(DBMS) can help summarize information with certain common characteristics from a large database of information in a short time, for example, the mailing list of clients, plant selection, geographic information systems, cost estimating, and anything that involves large quantities of frequently reused data.

Geographic information systems are analytic tools used in part by landscape architects. Landscape planning was one of the first branches of the landscape architectural profession to use computers beginning in 1960. Geographic Information Systems are an important application of computer technology that can assist landscape architects in site planning, resource analysis, and regional landscape planning.

Computer Aided Design/drafting is the design tool for Landscape Architects. Computer-aided design (CAD) refers to the use of computers to generate, manipulate and transform drawings as a basis for a design product. CAD provides landscape architects with the freedom to change or edit a drawing, to correct any mistakes which may have been made during input, and to improve the design without the pain of redrawing everything in the process.

Site engineering and technical application are also needed by landscape architects. These applications usually require a lot of

repetitious mathematical calculations. Traditionally the calculations were done by hand with a large potential for error. Computers not only have the benefit of speed but also help eliminate arithmetic errors.

Although landscape architects may derive a lot of benefits from computers, there is one very important thing missing in the process of computerization. Traditionally landscape architects work on a big table, having calculator, drawing tools, graphics, maps, pens, and reports on it. On such a table the integrative work central to design could be done physically, manipulating materials on the table top. This manual integration was lost after information and techniques became computerized. Data on separate computer programs are hard to integrate. With the not-so-friendly interface of most computer software, it is difficult for designers to know what planners are doing, or to see everything at once. An integration of the individual task oriented programs is needed.

The Need for Integration among Applications

The advantages and the benefits of computerization in landscape architectural practice are hard to question. However, technical problems related to professional practice have appeared in transferring the manual approach to the computer. This is

characterized by the loss of integrative capability when techniques are transferred to software packages. If professional design practice is to continue in the computer age, integration is therefore needed between different applications and between the users and the applications.

a. Applications Integration

Landscape architects integrate different types of information (graphics, numbers, text, and so on) in the design and planning process. Thus the integration between applications is especially necessary in landscape architecture. Due to the large amount of data that will be generated from computer applications, new techniques are needed to solve the problem of integration between documents.

b. User Friendly Interface

Each application has its own way of operation. There are very few software applications designed with an unified user interface. The different operating commands in each application have actually increased the difficulty of learning more applications. A more user friendly interface is required to solve the barriers between the users and the applications.

In this thesis, computer integration technology and human interfaces will be assessed to determine if they can help in sharing, connecting, and transferring information in landscape architecture.

Problem Statement

The problem addressed in this thesis is to determine if existing technology can assist in the problem of technology transfer and integration of landscape architectural applications and information in the computing environment. From this problem, four objectives for the thesis are identified:

a. Explore the development of the human interface and the potential of computer integration technology as an approach for integrating computerized landscape architectural applications.

b. Search for user-friendly computer integration technology products and develop a framework for integrating landscape applications within the hypertext environment.

c. Experiment with and demonstrate landscape architectural applications using an existing computer integration technology product.

d. Identify other uses and benefits of computer integration technology.

Computer integration technology should help landscape architects become more productive through better integration of information and greater flexibility of communication. It may also improve the organization, presentation, design and planning of landscape architecture projects.

Development of the Research

Based on the problem and objectives, this research is developed in four stages. A review of the origin of computer integration technology concepts and the development of the human interface is provided in Chapter Two. Chapter Three describes the research method. Chapter Four presents an example of integration. The final chapter presents the research results and discussion which provides an agenda for future research and development.

CHAPTER 2
LITERATURE REVIEW

This chapter examine solutions to connecting and managing information that has been tried in the past. It reviews different methods of integrating data and applications.

The applications shown in Table 1 may be used for office and job management, geographic information systems, computer aided design/drafting, and site engineering and technical applications in landscape architectural practice as discussed in Chapter One. Rarely do application programs use the same command structure or interface. This lack of uniformity results in a loss of productivity at the very least because of the time needed to learn different command languages. The development of computer technology has addressed improving the user interface and solving the integration of applications. The problems faced by landscape architects might be solved by looking at the experience of computer technology in addressing problems of integration.

1. The Development of Human Interfaces and Hypertext

The problem of connecting and managing information has been addressed in the past. People have been trying to find a solution for connecting and managing information by utilizing

Table 1. Applications in Landscape Architecture Practice.

	Types of Information			
Applications	text	graphics	spatial	numeric
Word Processing	x			
CAD		x		
GIS	x	x	x	x
Presentation Graphics		x		
Spread Sheet				x
DBMS				x

*CAD - Computer Aided Design/Drafting
*GIS - Geographic Information System
*DBMS - Data Base Management System

computer technology since the early age of computers. The following review section discusses its origins with the Memex idea and resulting technologies.

Memex

The concept of the modern digital computer was born in the 18th and 19th centuries, but the ability for the implementation of those ideas didn't become available until the 1930s and 1940s. Computers were first developed to speed up the routine and laborious calculations needed for ballistic and atomic energy computation.

Vannevar Bush is probably the first person who saw the real implications of computerized thinking. His idea was first published in his classic paper, "As We May Think" in 1945. He assumed that computers might be able to transform human thinking and human creative activity. Within this transformation he saw the difficulties of managing and disseminating the results of research. In his paper he wrote:

> There is a growing mountain of research. But, there is increased proof that we are being bogged down today as specialization extends.... Yet specialization becomes increasingly necessary for progress, and the effort to bridge between disciplines is correspondingly superficial.... Professionally our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose....Mendel's concept of the laws of genetics was lost to the world for a generation because his publication did not reach the few who were capable of grasping and extending it; and this near catastrophe is undoubtedly being repeated all about us, as truly significant attainments become lost in the mass of the inconsequential (Bush, 1945, pp 101-102)

Bush assumed that artificial storage of information did not have to be organized alphabetically or numerically, and information did not have to be found from subclass to subclass. Bush wrote:

> The human mind operates by association. With one item in its grasp, it snaps instantly to the next that is suggested by the association of thoughts, by some intricate web of trails carried by the cells of the brain (Bush, 1945, p106).

People cannot hope fully duplicate this mental process artificially, but they certainly should be able to learn from it. In minor ways they may even improve, for their records have relative permanency. The first idea, however, to be drawn from the analogy concerns selection. Selection by association, instead of by indexing, may yet be mechanized.

Vannevar Bush envisioned an outline text and retrieval system called "Memex" which could contain post-war scientific literature, sketches, photographs, and personal notes(Fiederio, 1988). The "Memex" is supposed to imitate how the human mind works to store and retrieve information by referential links for quick and intuitive access.

Bush's vision of "Memex" was remarkable.
He not only foresaw the application of the computer to information storage and retrieval, and the value of associative indexing with the activity, but he also correctly foresaw the multimedia nature of computer use in the future (Baecker, 1987, p21). Memex was never

created, but the theory has become the foundation of all integration systems.

Man-Computer Symbiosis

In the 1950s, Licklider began to see the potential of the computer as a facilitator of aspects of human creativity and problem solving. Licklider first explained how symbiosis works in nature: "The cooperation of two dissimilar organisms living together in intimate association or even close union" (Baecker, 1987, p43). He then described what he meant by Man-Computer Symbiosis:

> "Many problems which can be thought through in advance are very difficult to think through in advance. The problems would be easier to solve, and they would be solved faster, through an intuitively guided trial-and-error procedure in which the computer cooperates, turning up flaws in the reasoning or showing unexpected turns in the solution.... To bring computing machines effectively into processes of thinking that must continue in real time, when moving too fast to permit using computers in conventional ways.... To think in interaction with a computer in the same way that you think with a colleague whose competence supplements your own will need much tighter coupling between man and machine than is suggested by the example and than is possible today.... Although there is a voluminous literature on thinking and problem-solving, including intensive case-history studies of invention, I could find nothing comparable to a time-and-motion-study analysis of the mental work of a person engaged in a scientific or technical enterprise.... About 85 per cent of my thinking time was spent getting into a position to think, to make a decision, to learn something I needed to know. My

> thinking time was devoted mainly to activities that were essentially clerical or mechanical: searching, calculating, plotting, transforming, determining the logical or dynamic consequences of a set of assumptions or hypotheses.... The main suggestion conveyed by the findings just described is that the operations that fill most of the time allegedly devoted to technical thinking are operations that can be done more effectively by machines than man (Licklider, 1961, Baecker 1987, p43).

Licklider's idea was that computers can effectively help in improving the thinking process.

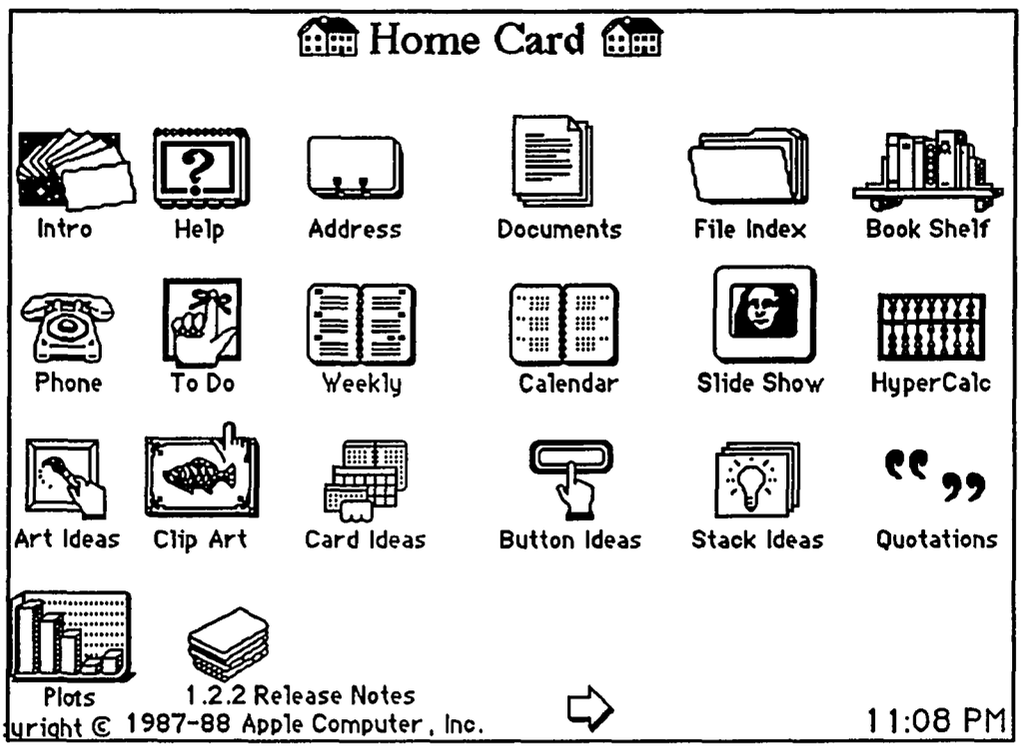
Sketchpad

Around 1963, Ivan Sutherland, an MIT graduate student, designed a graphics program called "Sketchpad" for his Ph.D. thesis (Nace, 1984). It could be used to manipulate pictures as well as to manipulate numbers or text in the computer. Sketchpad enabled people to create lines, circles, and other geometrical figures directly on the screen with an input device called a light pen. The following ideas and concepts introduced by Sutherland were very important to the future development of human computer interface:

*The concept of the internal hierarchic structure of a computer-represented picture and its definition in terms of subpictures. The concept was later used in hypertext as a control device, such as "home card" (see fig 1) in HyperCard which controls the

access of all information in the HyperCard working environment.

Figure 1. Home card of HyperCard



*The concept of a master picture and of its instances which are transformed versions of the master, a concept which helped lay the foundation for modern object-oriented programming.

*The ability to display and manipulate iconic representations of constraints.

*Recursive operations such as "move" and "delete" applied to hierarchically defined pictures (Baecker, 1987).

All the above concepts played very important roles in the current integration products. The following section discusses some of those products.

Computer Aided Document Creation

Bush's concept of the "Memex" was elaborated by Doug Engelbart and Ted Nelson. Engelbart focused on hierarchic structure in documents while Nelson was interested in the links and interconnections.

Hypertext

Nelson termed the concept of "the role of the computer in building and manipulating richly structured complexes of structure, interconnected, and interlinked bodies of text" as hypertext. He introduced the word hypertext to mean

> a body of written or pictorial material interconnected in such a complex way that it could not conveniently be presented or represented on paper. It may contain summaries, or maps of its contents and their interrelations; it may contain annotations; additions and footnotes from scholars who have examined it.

> Let me suggest that such an object and system, properly designed and administered, could have great potential for education, increasing the student's range of choices, his sense of freedom, his motivation, and his intellectual grasp. Such a system could grow indefinitely, gradually
>
> including more and more of the world's written knowledge (Nelson, 1965, Baecker 1987, p47).

Nelson presented the concept and the design of links and interconnections called "Xanadu" as a hypertext system 16 years later.

Augment

Engelbart spent twenty-five years designing a real working system called "Augment." Engelbart considered his work as "the augmentation of man's intellect":

> By 'augmenting man's intellect' we mean increasing the capability of a man to approach a complex problem situation, gain comprehension to suit his particular needs, and to find solutions to problems. Increased capability in this respect is taken to mean a mixture of the following: the comprehension can be gained more quickly; that better comprehension can be gained; that a useful degree of comprehension can be gained where earlier the situation was too complex; that solutions can be produced more quickly; that better solutions can be produced; that solutions can be found where earlier the human could find none (Engelbart, 1963, Baecker 1987, p47).

Ten Minute Rule

Engelbart was one of the first pioneers who recognized the need for "user interface." Nelson shares the concept of user interface and saw the potential of young people interested in computer technology. In the famous "Nelson Ten Minute Rule"(1974) he suggested, "Any system which cannot be well-taught to a layman in ten minutes, by a tutor in the presence of a responding setup, is too complicated." The evolution of interactive text editors was developed by IBM in the 1960s and 1970s (Baecker, 1987). The ten minute rule has also driven the computer interface developer to provide easy to learn and easy to use (user-friendly) interfaces.

The Personal Workstation

The Xerox Palo Alto Research Center (PARC) has contributed many new advances in computer design and implementation since it was formed in 1971. Xerox developed the Alto, a new type of computer called a "personal workstation" (Thacker, 1986), which was a computer designed for individual use with local processing power and memory, a high resolution bit-mapped display, a key board, and the mouse - a pointing and drawing device.

Xerox also started to develop more congenial graphical user interfaces on personal workstations such as various kinds of windows, menus, scroll bars, mouse control and selection mechanisms, and views of abstract structures (Baecker, 1987).

The Dynabook

Alan Kay, who was an artist, musician, and computer science student (Nace, 1984) saw that the relationship between human and computer needed to be improved:

> the interactions of humans with their media have been primarily nonconversational and passive in the sense that marks on paper, paint on walls, even " motion "pictures and television, do not change in response to the viewer's wishes.... Every message is, in one sense or another, a simulation of some idea.... Although digital computers were originally designed to do arithmetic computation, the ability to simulate the details of any descriptive model means that the computer, viewed as a medium itself, can be other media if the embedding and viewing methods are sufficiently well supplied. Moreover, this new" metamedium " is active - it can respond to queries and experiments - so that, the messages may involve the learner in a two-way conversation..(Kay and Goldberg, 1977, Baecker, 1987, p49)

Kay (1977) goes on to say that:

> A dynamic medium for creative thought is the "Dynabook." Imagine having your own self-contained knowledge manipulator in a portable package the size and shape of an ordinary notebook. Suppose it had enough power to outreach your senses of sight and hearing, enough capacity

> to store for later retrieval thousands of page-equivalents of reference materials, poems; letters, recipes, records, drawings; animations, musical scores, waveforms, dynamic simulations, and anything else you would like to remember and change.

Alan Kay also stressed that computers had to be useful to people. He said "never design a programming system that children can't use"(Nace, 1984). Later in 1971, Kay created a new programming language, Smalltalk, for a personal computer with a keyboard and a pointing device like a mouse.

Although Xerox PARC had developed software techniques to support a variety of advanced user interface concepts, including pop-up menus, overlapping windows, and icons, they underestimated the growing power of hobby computer companies. They missed the chance to take advantage of their huge technological lead and dominate the personal computer industry. Alan Kay convinced the PARC group "We've got to come out with a computer that looks like a paper and works better. The Dynabook will replace notebooks, textbooks, telephones, and typewriters." He admitted that "What I completely misunderstood about the microcomputer industry was the hunger people had for any kind of computer" (Nace, 1984).

The Personal Computer

The first commercial personal computer which successfully implemented the Xerox-style user interface (mouse, windows, icons, and pull-down menus) was the Apple Macintosh (William, 1984; Baecker 1987) which saw the need and desire for an interface that is "more congenial, more forgiving, more user-friendly than that required by the mathematical and technical user of the past" (Baecker,1987).

From Vannevar Bush's "Memex" idea, human interface systems were developing along with the computer technology. The hypertext concept which was started from the "Memex" was not achieved until recently. Hypertext is based on the assumption that human idea processing occurs through association. A hypertext system uses electronic capabilities to overcome the limits of the linear nature of printed text (Carlson, 1988). Generally paper text (or flat text) can provide only linear information flow or hierarchical information flow (see Fig 2).

A hypertext system is structured with a network of nodes and links, allowing three dimensional information navigation. Nodes (pools of information) can be graphics, maps, text, or any type of information that can be displayed as a window on the screen (user interface, see Fig 3).

Figure 2. 2-D Information Processing(from Carlson, 1988)

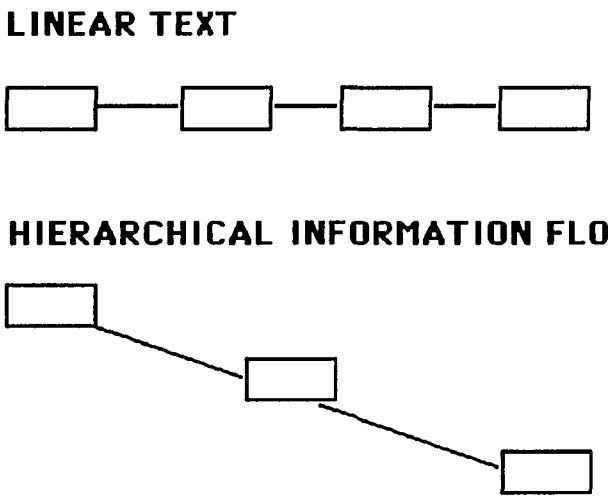
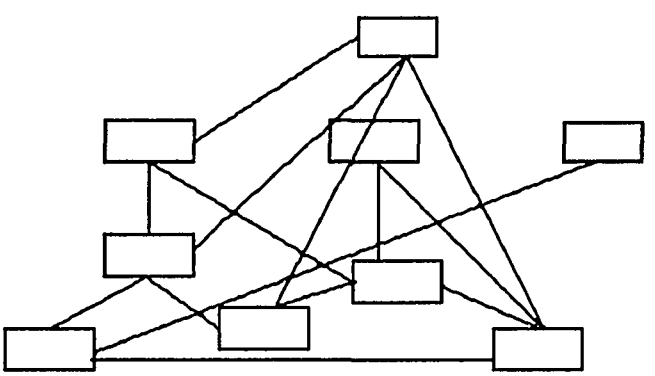


Figure 3 3-D Information Processing(from Carlson, 1988)



2. Conclusion

From this description of the evolution of computer interface and integration, hypertext has emerged as the most probable solution to the problem faced in landscape architecture.

Landscape planning and design has to deal with many different aspects of environmental information. For example, landscape design work has to associate the basic elements of landscape architectural design such as the landform, plant materials, pavement, basic structures, architecture, site, and water (Booth, 1985). Currently this information can only be presented as a traditional written paper document in linear or hierarchical information flow. Landform, plant materials, and site elements have very complicated relationships. Also, landscape planning has to deal with the varied information of elevation, existing land use, soils, vegetation, and wildlife. Again, the relationship between this environmental information is very complicated. The hypertext approach could be a better way to associate and interpret such information instead of the traditional linear or hierarchical means of presentation.

Hypertext has the features that we were searching for in the problem statement, such as ease of use, multiple connecting ability, and the application managing interface. The next step will be an examination of this hypertext technology for use in landscape architecture.

CHAPTER 3

METHODS

The purpose of this chapter is to review hypertext products and select one to demonstrate its use in landscape architecture. A procedure for integrating landscape architectural applications software will be given to show how the features of hypertext technology may be used in landscape architectural applications.

1. Archival Research

Archival research was used in the search for the user friendly (easy to use) hypertext computer hardware and software. Once the computer hardware and software are chosen, computer application methods are used to explore the power of hypertext, and a variety of traditional environmental interpretive media such as graphics, maps, sound, and text are applied on the chosen computer hardware and software. The linkage (association) between the environmental information such as graphics, maps, sound, and text will be designed with the application of hypertext hardware and software in the experimental demonstration.

The Selection Criteria

The ideal hypertext hardware and software for this study should have the following features on: cost, easy to use, flexible, interactive with users, and flexible in information communication. An easy to use, flexible, and interactive computer interface is very important to a landscape architect, who should devote more time to design and planning work instead of struggling with difficult commands of the applications programs. For economic reasons, the hypertext products also have to be compatible with the available resources of a typical practicing landscape architect.

a. Filevision

Filevision is basically a graphical database management software which works on Macintosh computers. The concept of Filevision is to provide information in the same way users associate it, by graphically drawing objects connected to textual and graphic database information.

As an object oriented integrated imaging database, Filevision includes the function of a powerful drawing program, a miniature word processor or/mail merge program and a multiple database with 32 possible drawing layers attached to their own unique database. The drawing layers can be displayed in several combinations with all layers showing, selected layers showing, selected objects in each layers showing or in any combination. Each object (shape, symbol, line or text) is attached to its own record within that drawing layer's database type(Marvelin, 1988).

If desired, up to 32 layers of data can be created within one file. Information can be represented in pictures, as well as numbers and words. Files can be associated by the link function provided by Filevision. It is designed for easy set up and use and provides all of the standard database features with one of the most flexible and understandable methods provided on any computer. Filevision IV, Integrate Imaging Database costs $495.00 and Business Filevision costs $395.00 each (Marvelin, 1988).

b. Guide

Guide is one of the first commercial hypertext authoring programs for personal computers. Messages can be presented in text, graphics, numbers, sound, and still video images. Guide allows links within a document and between documents and other applications. The links can be created by pointing and clicking from a pull down menu. Guide for the Macintosh costs $199.95, for the IBM PC (5-1/4 360K diskettes) costs $300.00, and for the IBM PC (5-1/4 1.2MB diskettes) costs $275.00(Owl, 1988).

Table 2. Review of existing hypertext products

Hypertext products	Computer Applications						Hardware
	WP	CAD	GIS	PG	SS	DBMS	
Business FileVision	x	x		x		x	Macintosh Plus Macintosh SE Macintosh SE/30 Macintosh II Macintosh IIx
Guide	x	x		x		x	IBM PC,AT,PS/2 IBM XT Macintosh
HyperCard	x	x	x	x	x	x	Macintosh Plus Macintosh SE Macintosh II
InfoWindow System	x	x		x		x	IBM touch sensitive screen. IBM XT, AT IBM PS/2 30, 50, 60. control programs non-IBM laser videodisc player
KMS	x	x	x	x	x	x	Sun 3, 386i Apollo DN 3000, DN 4000

*WP - Word Processing
*CAD - Computer Aid Drafting
*GIS - Geographical Information System
*PG - Presentation Graphics
*SS - Spread Sheet
*DBMS -DataBase Management System

c. HyperCard

HyperCard can be used on Apple Macintosh Plus, Macintosh SE, and Macintosh II computers. It is an integrated software tool kit used

to create interactive applications that communicate knowledge. It is the first authoring system to reach the general public (Dear, 1988). HyperCard may use, customize, and create new information using text, graphics, video, music, voice, and animation (Williams, 1987). It is an authoring system and a complete development system for Macintosh with the addition of HyperTalk language, which is an object-oriented programming (OOP) language. It is the first programming language for many Macintosh users.

The retail price of HyperCard software is $49.00, and it comes free with every newly purchased Macintosh computer (Apple, 1987).

d. InfoWindow System

The key element of the InfoWindow system is the IBM Info Window Display. With a touch-sensitive screen, the InfoWindow system is highly interactive with the touch of a finger. It has the versatility to present full-motion video picture or still video images. It also has narration, music, and sound effects because it contains an integrated audio amplifier and two integrated speakers (IBM, 1988)

InfoWindow System can coordinate the functions of audio, video, computer graphics and text into single presentations. It can support applications addressing education and training, merchandising of products and services, and public information access Each device of the Info Window System costs several thousand dollars.

e. KMS

KMS (Knowledge Management System) works on Sun or Apollo environments. It is a hypermedia system for individual and collaborative work environments. With an efficient and easy to use interface, KMS allows users to create notes or "frames" (a screen sized workstation) of information and link them into the larger network within the distributed computing environment. It also provides an "action language" which allows users to initiate database queries and to execute other programs with a single mouse click. The student price of KMS is $495.00 (Scribe, 1988).

The Selected Hardware and Software

According to the selection criteria which are: easy to use, interactive with users, and flexible in information communication, HyperCard has all the available hypertext functions. It is also the most economic hypertext package. The multifinder ability and HyperTalk scripting language in HyperCard make it most compatible with landscape architectural applications. These characteristics make HyperCard the package selected for this study.

2. Computer Software Application

The object is to demonstrate how the hypertext function works for the landscape architectural computer applications. The applications used are GIS, painting software, and word processing. HyperCard will be used as the hypertext application. MacGIS, MacPaint, and Microsoft Word will be used as the other applications. A typical application using information collected in a landscape planning project for the Oracle State Park, Oracle, Arizona, will be used for the demonstration. Different ways of connecting and organizing applications and information within a hypertext system will be demonstrated in the next chapter. A more in-depth examination of the selected applications follows.

a. HyperCard

Bill Atkinson, one of the early developers of the Macintosh computer, started the idea of HyperCard in 1984. HyperCard was called WildCard in the early days. It was designed to be an authoring system to help create systems to teach and guide students and learners. While developing the three user preference levels from browsing (moving around and viewing a database by clicking images on screen), painting (using a MacPaint tool to draw graphic images), to cutting and pasting (selecting areas of text or drawing and moving them to other locations), Atkinson realized that much more had to be

provided than simply an authoring system. Thus the fourth and final layer was, a programming language for manipulation of the objects that are created. HyperCard moved beyond a mere authoring system and became a complete development system for the Macintosh.

HyperCard was designed to let the users organize information much the way humans do in their minds, by association and context. It allows users to explore large amounts of information at exceptional speeds, or to quickly zero in on exactly the needed information. HyperCard is also good for creating, exchanging, and managing information.

HyperCard was designed with the advantage of the various capabilities of the Macintosh user friendly interface which was developed on a solid psychological theory of mental representation (Dear, 1988) and which takes advantage of the Xerox-style user interface (mouse, windows, icons, and pull-down menus) introduced in the literature review. The theory of mental representation can be traced to the work of psychologist Jerome Bruner and his colleagues in his book Toward a Theory of Instruction (1966).

Bruner studied the intellectual development of children between four and eleven year of age. He analyzed the results of the experiment based on the response of children of different ages to the same event according to the following question: "how the child gets free of present stimuli and conserves past experience in a model, and the rules that govern storage and retrieval of information from this

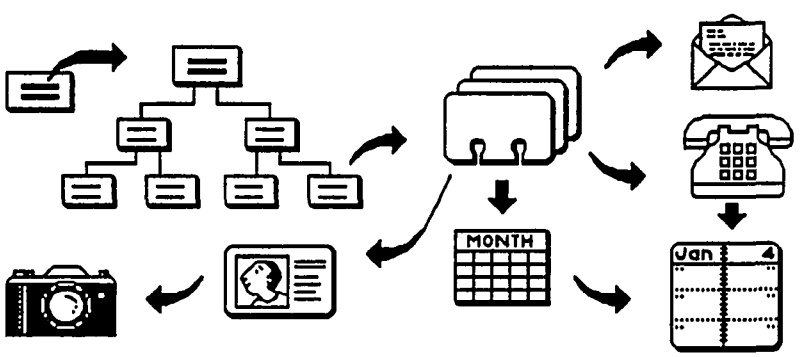
model.... What is meant by representation? What does it mean to translate experience into a model of the world?" Bruner suggested that there are probably three ways in which human beings retrive informations through: action, visual or other sensory organization, and words or language. He decided that those were the three forms of mental representation: enactive representation, iconic representation, and symbolic representation.

The Macintosh interface has all three forms of mental representation. The first, enactive representation, was shown as: the "tear off" tools menu, and the clicking, dragging, and releasing actions of the mouse. Interaction is also an active process. The second type of mental representation, iconic, is shown as icons and bit-mapped graphics. The third representation, symbolic representation, appeared as the word HyperCard itself or naming an object that stands for something else.

HyperCard was designed according to the most common method for sorting information: the index card (see Figure 4). The "index card" is assumed to be 3-by-5 inch size which is shown on the monitor as 342 by 512 pixels. Text, graphics, and sounds are stored on cards that appear on the Macintosh screen. One group of these cards is called a "stack". Stacks work as a file in the general applications. To browse through the cards in a stack, the users have to use "buttons". "Button" is the name of the icon in HyperCard which is the key of the dynamic linkage of HyperCard. Through the commands of HyperTalk, buttons

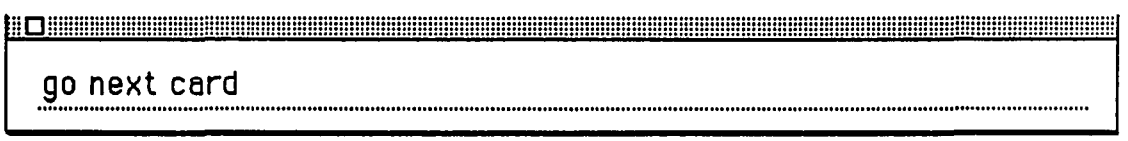
allow the users to create the linkages between cards or quickly find the information by pointing and clicking on it (see Figure 5). Buttons also can launch other applications through the instruction of the scripting language which comes with HyperCard - HyperTalk.

Figure 4. HyperCard was designed according to the most common method for sorting information - the index card.



HyperTalk is a scripting language which works with HyperCard and can be applied in a messenger box (see Fig 5) or in the buttons, cards, and stacks.

Figure 5. Message Box of HyperCard



HyperTalk is the key to linkage in HyperCard. It is similar to an "object oriented" language which is very "forgiving" and quite "friendly". It uses a syntax (grammar) very much like real English.

For example the following five scripts all have the same message. Choosing any of the scripts will bring the user to the same place.

Go Art Ideas

Go to Art Ideas

Go stack Art Ideas

Go to stack Art Ideas

Go to card 1 of stack Art Ideas

To integrate the applications with HyperCard, the Open command of HyperTalk is the command to use. The standard syntax of Open:

open *application*

open *document* with *application*

To open an application in HyperCard actually saves the time of quitting HyperCard. HyperCard has integrating character. User can open another application software in the middle of working with HyperCard and come back to it when the work in another application program is done. Most application softwares currently on the market do not have such feature. If user wants to change to another software

while working with a software and come back later. He has to quite current one, then open another one; quite the software after the work is done, and reopen the previous one.

b. MacGIS

MacGIS is a Macintosh Geographic Information System application which is a Beta testing version and is newly released by the University of Oregon.

A Geographic Information System is basically a digital cartographic modeling system. It is used to computerize and grid a landscape map into a numeric database format then analyze the data through a manipulation process. It was originally designed for academic use on a mainframe computer. In 1986, the IBM version of the Map Analysis Package (MAP) was formally released (Tomlin, 1986). GIS can be applied in a wide variety of application projects. In the field of landscape architecture, it can be used to work on landscape planning analyses, one of the research fields that this study would like to introduce to the general public.

The MacGIS takes full advantage of the Macintosh interface system, such as icons, menu bars, and dragging features. It also revised Tomlin's GIS commands (Larsen, 1988). One of features of the MacGIS package is its adapted ability for enlarging and reducing the size of maps from drawing applications. Thus a large database can be viewed on the screen (approximately 240 rows and 240 columns).

The original Tomlin GIS package on IBM can only show 24 rows and 60 columns on the screen at one time.

c. MacPaint

MacPaint is a computer aided drafting package. The author of MacPaint, Bill Atkinson, is also the author of HyperCard. The graphic tool package in MacPaint is basically the same with HyperCard. The MacPaint program helped propel the acceptance of the Macintosh because it demonstrated many of the Mac's superior features over other computers, particularly in the area of graphics. MacPaint is compatible with other image capture hardware such as Thunder Scan and MacVision and makes it possible to capture the graphic image of pictures and videotapes for realistic graphics. The realistic graphics captured by MacPaint can be easily transferred into HyperCard files through the import function.

d. Microsoft Word

Microsoft Word is a word processing package for Macintosh computers which also has all the Macintosh interface features such as menu bars, mouse, and pull down menus. This word processing package can import graphics from graphic packages through the clipboard(a temporary storage place). The window function of this word processor can show several documents on the screen at the same

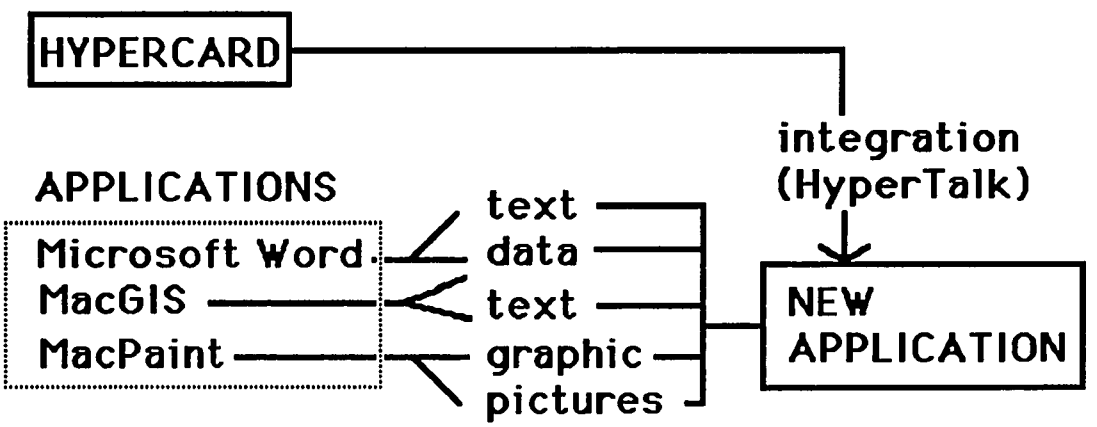
time. Microsoft Word can easily be accessed from the HyperCard package with the HyperTalk scripting language.

3. Design of Links Among HyperCard and Other Application

Theoretically, with the multi-linking ability of HyperCard, scientific research such as using MacGIS can be easily presented to the general public. This is one of the purposes of this study: to use the hypertext technology to link the Geographic Information System with other common environmental knowledge. Another purpose is to let the interested general public or landscape design colleagues know what the researchers are doing, what has been done by researchers, and what has been learned about land suitabilities. Landscape planners usually make significant recommendations on the environment, such as where a new landfill should be located and suitable locations for new industrial developments . GIS is one of the planning tools that landscape planners use. With the help of hypertext technology, GIS will no longer be an unreachable computer mystery to many landscape architectural colleagues and the general public.

In the demonstration, a relationship of landscape architectural applications is designed based on the HyperCard multifinder and the HyperTalk programming ability. The flowchart of the relationship is shown in Figure 6:

Figure 6: Relationship of landscape architectural applications in demonstration.



To integrate applications with HyperCard, strategies need to be developed. According to Schatz(n.d.), existing hypertext systems have six basic mechanisms for document composition and viewing: hierarchies, nonlinear authoring, pedagogical ordering, argumentation structure, versions & annotations, and trails.

a. Hierarchies

Hierarchical documents are common in ordinary literature, thus most of the hypertext systems were designed to support the hierarchical arrangements of links. Hypertext can for example, use a commercial "outline processor", design the basic structure of a document and then flesh it out section by section. A reader could view a high-level outline of the document in progressively greater detail.

b. Nonlinear Authoring

Nonlinear authoring structure makes little attempt to linearize the presentation of material. Instead, an initial topic is provided, while making diversions to other topics as they occur in the "stream of consciousness". Such nonlinear structure might be especially valuable for composing the documentation for a large, complex system, or in more interactive settings.

c. Pedagogical Ordering

Pedagogical ordering is designed to allow a student unfamiliar with a topic to explore it in a less rigid way than a single linear presentation. A student would be expected to eventually traverse the entire system.

d. Argumentation Structure

In the argumentation structure, a reader would typically be expected to begin at the first conclusion, possibly examining the supporting and contradicting evidence, and then move on to later conclusions in a single well defined order. Usually argumentation structure is set up with a single path through the document graph, with optional branching side paths.

e. Versions and Annotations.

The versions and annotations structure is used to support most documents. Links are used to eliminate redundant

material, such as quotes of earlier documents. A new document contains only new text, with links to the older incorporated material.

f. Trails

Trails was generated by Vannevar Bush, which let readers browse through an existing collection of documents in the hypertext system.

Each mechanism fits different types of information, and a demonstration of the integration based on the hypertext mechanisms will be shown in the next chapter using an actual landscape planning project, that of Oracle State Park.

CHAPTER 4

DEMONSTRATION

One of the objectives of this thesis is to demonstrate the utility of hypertext technology with Landscape Architectural computer applications including GIS, Painting software, and word processing. The demonstration uses information typically collected in a landscape planning project, in this case from the Oracle State Park master plan study in Oracle, Arizona. Different ways of connecting and organizing applications and information within a hypertext system are demonstrated in this chapter.

1. Available Information on Oracle State Park

Oracle State Park, which is still in the development stage is a new park dedicated to environmental education. A landscape architectural firm and research institute are heavily involved in the inventory and design of Oracle State Park.

a. History and location of Oracle State Park

The site of Oracle State Park is located in Oracle. It was the property of the Kannally family around 1900, used as a ranch headquarter. The last survivor of the family Lucille Kannally, willed 4000 acres to the Defenders of Wildlife as a wildlife refuge in 1975. The Defenders gave this land to Arizona State Parks in 1985. Environmental education projects have

been carried on this land ever since it was donated by the Kannally family.

Environmental education, according to the Oracle State Park program, is for the statewide public, including preschool and school-age children, school classes, individuals, families, local citizens, organized groups and senior citizens. Therefore, the activities in the park will vary according to the users. The master planning process of Oracle State Park is currently being developed under the legislative mandate of Arizona State Parks to make parks for the "education, pleasure, and health" of the people of the state.

b. The information content of Oracle State Park

Much of the environmental inventory information for Oracle State Park is in computer format. The interest of this demonstration is to bring current information about the development of Oracle State Park to the concerned general public in an interesting and easy to use computer system. At the same time, it shall also be an easy-to-operate system for the manager to maintain the system and to update the information. Later on, when Oracle State Park is open to the public, this information system could serve as a multi-function information system. For example, it could serve as an interactive tool for environmental education, it will faithfully bring the updated

information of Oracle State Park to the visitors, and the park manager can use the same system for bookkeeping purposes.

2. The Set Up of the Oracle State Park Information System

Due to the different purposes of the information system and the nature of presenting documents, the Oracle State Park information system was designed as a combined hypertext mechanism of hierarchies, nonlinear authoring, and trail structures. The trail structure allow users to browse through the whole system. Hierarchies are used according to the format of most inventory documents of the Oracle State Park. Nonlinear authoring is used especially for the children's computerized game , "The Impact Monster" and the Development Master Plan (stack 4.10).

Using the inventory information about Oracle State Park, the related environmental information from text books, and the digital GIS data base, an information system is set up with HyperCard in the following stacks (see Appendix):

1. Home Stack of HyperCard
2. Home Stack of Oracle State Park

3.1 Instruction Stack

3.2 Plant Index Stack

3.3 Wildlife Stack

3.4 History Stack

3.5 Park Information Stack

3.6 Geographic Information Stack

4.1 Riparian Woodland Stack

4.2 Oak Woodland Stack

4.3 Oak Scrub Stack

4.4 Mesquite Scrub Stack

4.5 Riparian Scrub Stack

4.6 Desert Grassland Stack

4.7 Oak Grassland Stack

4.8 Seeded Grassland Stack

4.9 Planning Process Stack

4.10 Master Program Stack

4.11 Environmental Education Stack

4.12 Current Events Stack

4.13 Oracle State Park Geographic Map Stack

The structure of the information system can be viewed as a hierarchical structure, at the same time it allows the user to browse through the entire system. The stacks combine different information formats such as graphics, numbers, text, and video images which were generated from different applications.

There are two levels of integration in this structure. Level one only exists in the "Home Stack of HyperCard" which allows direct integration among different applications. The icons connected to different applications are provided in the HyperCard home stack.

HyperCard home stack also controls user preference of the information system. Once the "scripting level" is selected, users are allowed to communicate with other applications in the whole information system through HyperTalk. The second level starts from the "Home Stack of Oracle State Park" and includes the rest of the stacks, and has limited operating authority. The second level is designed to stay within the "browser's level", thus the visitors of the Oracle State Park are allowed to browse through the information system without changing or erasing anything in the system.

a. The Technique Used in Building the Stacks

To demonstrate the integrating ability of HyperCard, some hardware and software are used in the construction of the information system. As discussed in Chapter Three, HyperCard can use, customize, and create new information using text, graphics, video, music, voice, and animation. The Oracle State Park information system used graphics, number, text, and video images generated from different hardware and software.

1. Graphics

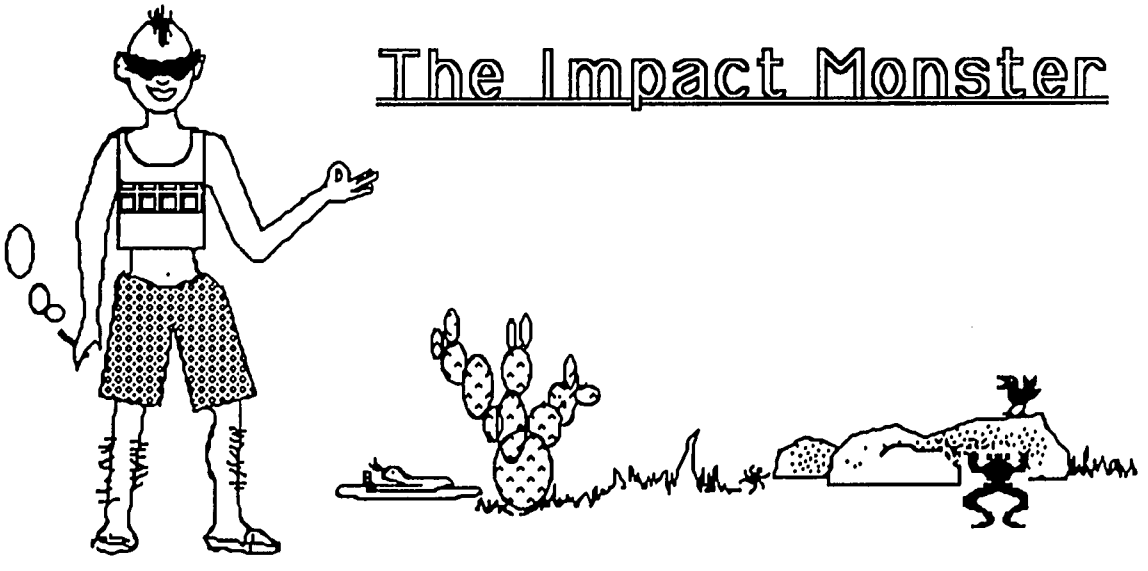
Graphics are generated from three different sources: HyperCard graphics tools, MacPaint, and ThunderScan.

HyperCard graphic tools and MacPaint are compatible, because Bill Atkinson is the author of both of

them. However, HyperCard also has a small graphics library for references. Graphic examples can be seen in all the stacks, particularly the monster game stack (see the following graphic) which is an interactive story generated to enhance children's environmental awareness.

It is difficult to use HyperCard graphics tools and MacPaint to produce realistic graphics. ThunderScan hardware and software is a simple and inexpensive device to input realistic graphics (Figure 6).

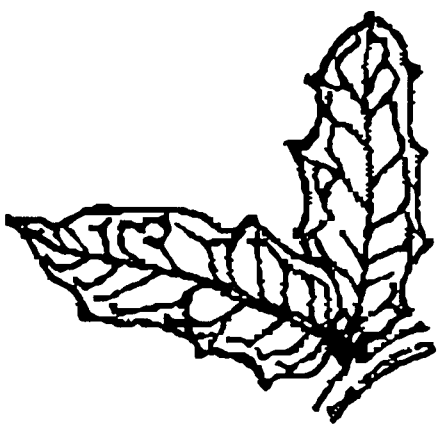
Figure 7. Graphic Generated with HyperCard Graphic Tools



Examples can be seen in all the plant material stacks (stack 4.1-4.8). ThunderScan hardware works with Macintosh

Imagewriter to scan the graphics or pictures. The software captures the scanned images as MacPaint files. The HyperCard import command then transfers the MacPaint files through the Clipboard to the cards in stacks.

Figure 8. Graphic generated with ThunderScan

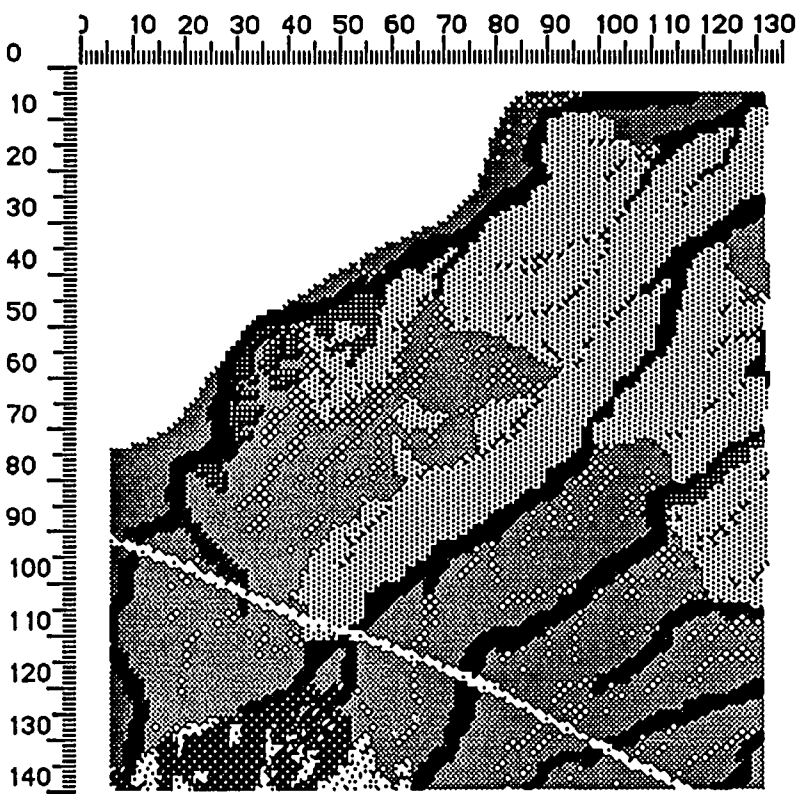


2. Numeric

The rasterized spatial data base of Oracle State Park was transferred from IBM format into Macintosh format and imported into the MacGIS software. Maps generated from MacGIS (see the graphic) can be transferred into MacPaint files. The MacPaint files are placed on the startup disk. The maps are then transferred into

HyperCard stacks; an example of this can be seen in the Geographic Information Stack.

Figure 9 Rasterized GIS Map of Oracle State Park's Vegetation Map.



3. Text

Text can be generated from the HyperCard graphic tools as graphic images or, by using the mini word

processor of HyperCard in the "field" as text files. The text files in Microsoft Word can be transferred through the MacPaint package as described in the Numeric section above. Examples of text can be seen in all the stacks in Appendix.

4. Video Image

Video Images (Figure 8) are also used in the information system. Video imaging is the fastest way to insert an image into computer.

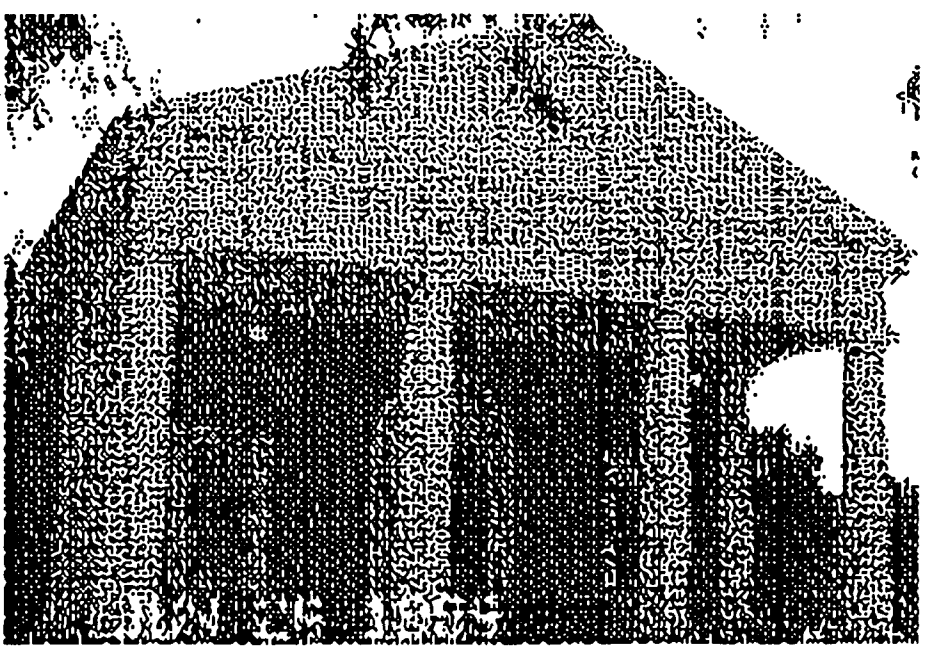
MacVision hardware and software are used to capture the video image from the view window of a video camera or television screen. Video images can be scanned through MacVision hardware, captured by MacVision software, and then transferred as a MacPaint file into HyperCard. An example can be seen in the home stack of Oracle State Park.

Information Protection

In order to protect the existing system from being accidentally destroyed, and for management purposes, it is important to limit visitors' access within the Oracle State Park information system. Several methods of protection were set up to protect the original copy:

1. Hide the menu bars on the top of the screen
2. Set up the user level at "Browser Level"

Figure 10. Video Image Generated with MacVision



3. Request a password
4. Maintain a back up copies of the Oracle State Park stacks

1. Hide the menu bars on the top of the screen

The menu on the screen can be hidden by using the command Key and space bar at the same time or by scripting with HyperTalk in the card information. This prohibits the visitors from using the menu on the top of the screen. If any one knows HyperCard very well or hits the command key and space bar at the same time by accident, then HyperCard has to depend on the other protective measures.

2. Set up the user level at "Browser Level"

The "User Preference" is the last card of the HyperCard Home Stack. On the Browser's level, users can only use the Browser tool instead of the other editing tools. Users will not have the ability to type, paint, author or script. Thus visitors will not be able to change the information in the stack.

The three possible accesses for users to change the user's level are:

a. use the "go" menu on the top of the screen and use the "home" command to go to the home stack,

b. use the "file" menu on the top of the screen and use the "open stack" command to go to the home stack;

c. use the "file" menu on the top of the screen and use the "Quit HyperCard" command to go to the home stack; then the user may go to the "User Preference" card in the home stack. That is why the password is needed.

3. Password

Passwords are set up in "Stack Information". HyperTalk is the script language. Only those who manage the park know the passwords. When people click the command of "Open Stack","Quit HyperCard", or "Home", the computer will beep and ask the user, - "What is the password?" If the password is incorrect, the computer will show some greeting words, such as "Hello! How are you today". If the password is correct, then the command will work. Otherwise the user will stay put, without going anywhere.

4. Back up copies of Oracle State Park stacks

In case of unforeseen damage to the cards, the manager should always prepare at least one back up copy

of the HyperCard and Oracle State Park stacks. It is easy to install fresh copies of the Oracle State Park stacks into the computer.

Due to the protection design, the manager has to do some routine work before showing the card to the public:

1. Turn on the computer and make sure the user preference is in the Browser's level.
2. Use command-space to hide the menu bar on the top of the screen.
3. Go to the home card of Oracle State Park.
4. Once in awhile, refresh the stack by copying the original stacks into the computer.

The Oracle State Park information system is an example of integrating the information, generated by landscape architectural practice including graphics, numbers, maps, and text. This process has great potential for wider applications in landscape architectural practice.

CHAPTER 5

RESULTS AND DISCUSSION

The purpose of this thesis is to determine if existing computer integration technology can assist in the problem of technology transfer in the integration of landscape architectural applications and information in the computing environment. The ideal computer integration product has to be user friendly, so that landscape architects can devote more time to producing professional products rather than learning the computer commands.

The historical review of how people have tried to solve the problem of connecting and managing information by utilizing computer technology indicates that people have been addressing this problem since the early age of computer technology. Vannevar Bush started to explore the possibility of using computers to integrate information in 1945. The dreamed machine, "Memex", inspired research on human interface and hypertext technology. Xerox-style user interfaces (mouse, window, icons, and pull-down menus) represent the accumulated experience of human interface development. User friendly hypertext products for the general public became possible after personal computer developers adopted the Xerox-style interface.

In the search for an economical, powerful, and user-friendly existing commercial integration package for landscape architectural practice, HyperCard was considered more qualified than Business File Vision, Guide, InfoWindow System, and KMS. MacGIS, Microsoft Word,

and MacPaint, were chosen to perform as landscape architectural applications for the demonstration.

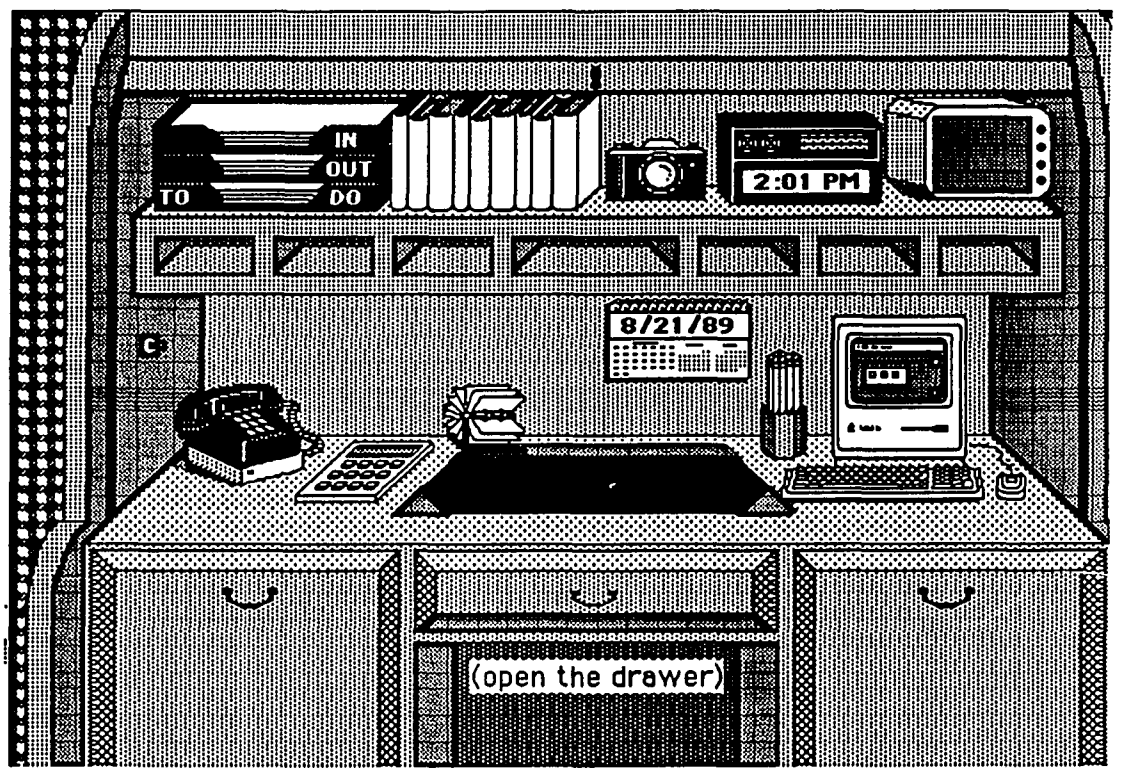
HyperCard is not a perfect hypertext product. It has a number of limitations: print out speed is not fast enough, its open command is not flexible enough (not only must every directory and file name be spelled correctly but it is also case sensitive), and its search function does not work on the text generated from the graphic tools. Some of these problems may be solved in the future, yet it is the most appropriate tool among the existing hypertext products at the moment. To demonstrate the integrative ability of the hypertext product, HyperCard was used to integrate with the chosen landscape architectural applications. HyperCard does have the advantage of saving time while working with several applications. The example working procedure will be compared as following:

HyperCard Environment	Non HyperCard Environment
get into HyperCard	get into graphic application "X"
draw a map	draw a map
(Some ideas for a research paper came up while working on the map. We need to go to the word processing to do some editing work before forgetting the ideas)	
open document "Y" with application "Z"	save the map
work on paper "Y"	quit application "X"
save paper "Y"	open document "Y" with
Quit application "Z" -back to the map	application "Z"
in HyperCard	work on paper "Y"
	save paper "Y"
	Quit application "Z"
	open map with application "X"

At the same time, this kind of working environment will help people to start a package without having to memorize the configuration. For example, if some one works on WordStar in the IBM environment, he

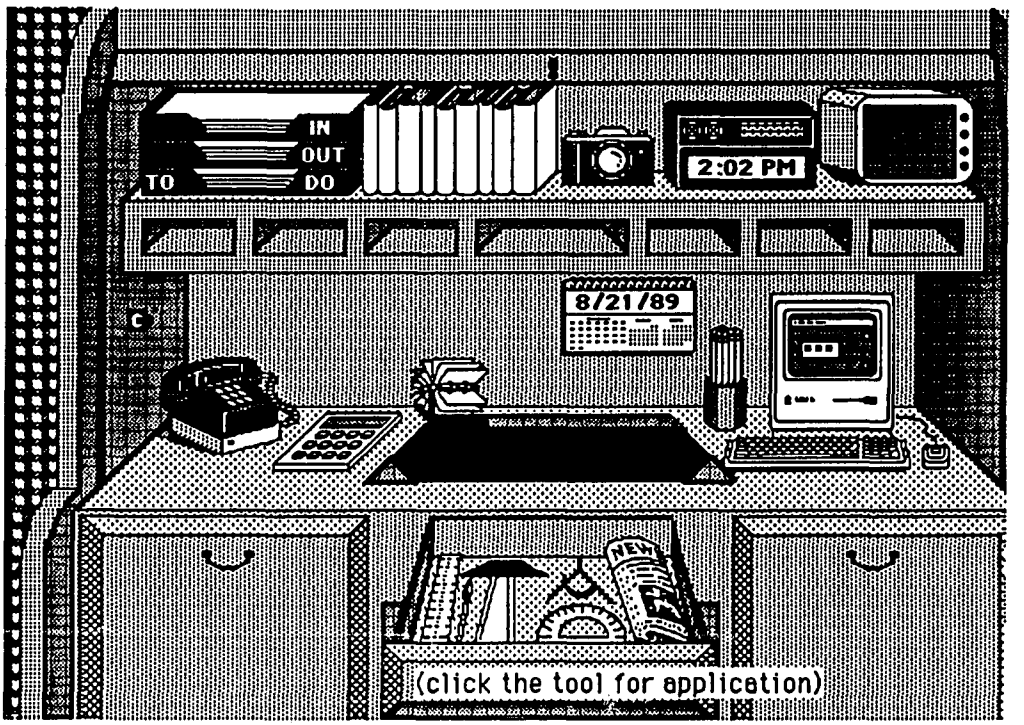
has to open the package with the correct configuration. To make the Hypertext product more usable and friendly to landscape architects, the user interface should be even more pictorially oriented.

Figure 11. User Interface Simulating the Desk Working Environment



The above interface (Figure 11) would be a good example. In the example, the image on the computer monitor shows a desk with a file cabinet, pens, books, and many other pieces of equipment that we are familiar with in our daily practice and which operate as we would expect. This kind of interface should make the computer more comprehensive to use.

Figure 12. User Interface Simulating the Desk Working Environment.



By applying the documentation and inventory of Oracle State Park, which was generated by the consultant landscape architects, the demonstration of HyperCard integrates different formats of information (graphics, spatial data, text, and video images) generated from different type of hardware and software. Due to the multi-user nature of the park, the information system has to be designed as a read only memory (ROM). In this demonstration the hidden menu bar, password, the browser level, and the fresh copy of the system were used as protective devices. Read only memory can be easily achieved by using the laser compact disk (CD/ROM). The laser disk does not

allow the general disk drive to write on it thus the design of passwords and other protection is not necessary. However, the laser disk is very expensive and not very flexible for updating.

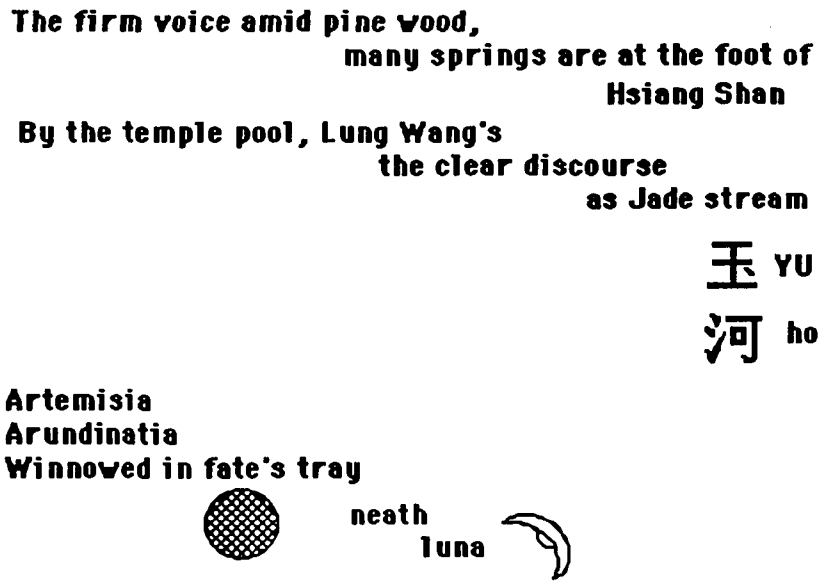
One of the shortcomings of the Oracle State Park information system is that there is no facility map in the system due to the fact that the park is still in the development stage. As soon as the design of Oracle State Park is confirmed, the facility map and facility information should be attached under the park information stack.

Hypertext products have great potential in landscape architectural practice. Some of the possible projects that can be generate by using hypertext technology are:

Product 1: Interpretive use: the information system for visitor centers

Information systems similar to that of the Oracle State Park can be used in any visitor center, especially where there are many international visitors. Slatin (1988) has used the hypertext technology with a multi-language poem for teaching purposes (see Figure 13). A multi-language information system can help the interpretation work, for most of the visitor centers can not afford to employ interpreters who speak too many foreign languages. A multi language information system will enhance the visit of international visitors (see Figure 13).

Figure 13: An excerpt for Ezra Pound's Canto CXII (this poem makes multiple linguistic and cultural references -English, Chinese, Latin)(Slatin, 1988).



Product 2: Academic use: the curriculum information of Departments of Landscape Architecture in the United States

In the experience of studying in the Department of Landscape Architecture at a United States university, information about curriculum is still very difficult to reach. Although there is advanced communication technology, many students within Landscape Architecture Departments do not enjoy the benefit of it. By using the hypertext technology the departmental information can be easily reached on one computer disk. Figure 14 illustrates how this would work.

Figure 14. Department and University Information may be chosen interactively by user with different icons on the first card. Faculty, student, curriculum, facilities, and history information can be chosen by clicking icon on the second card(see next page).

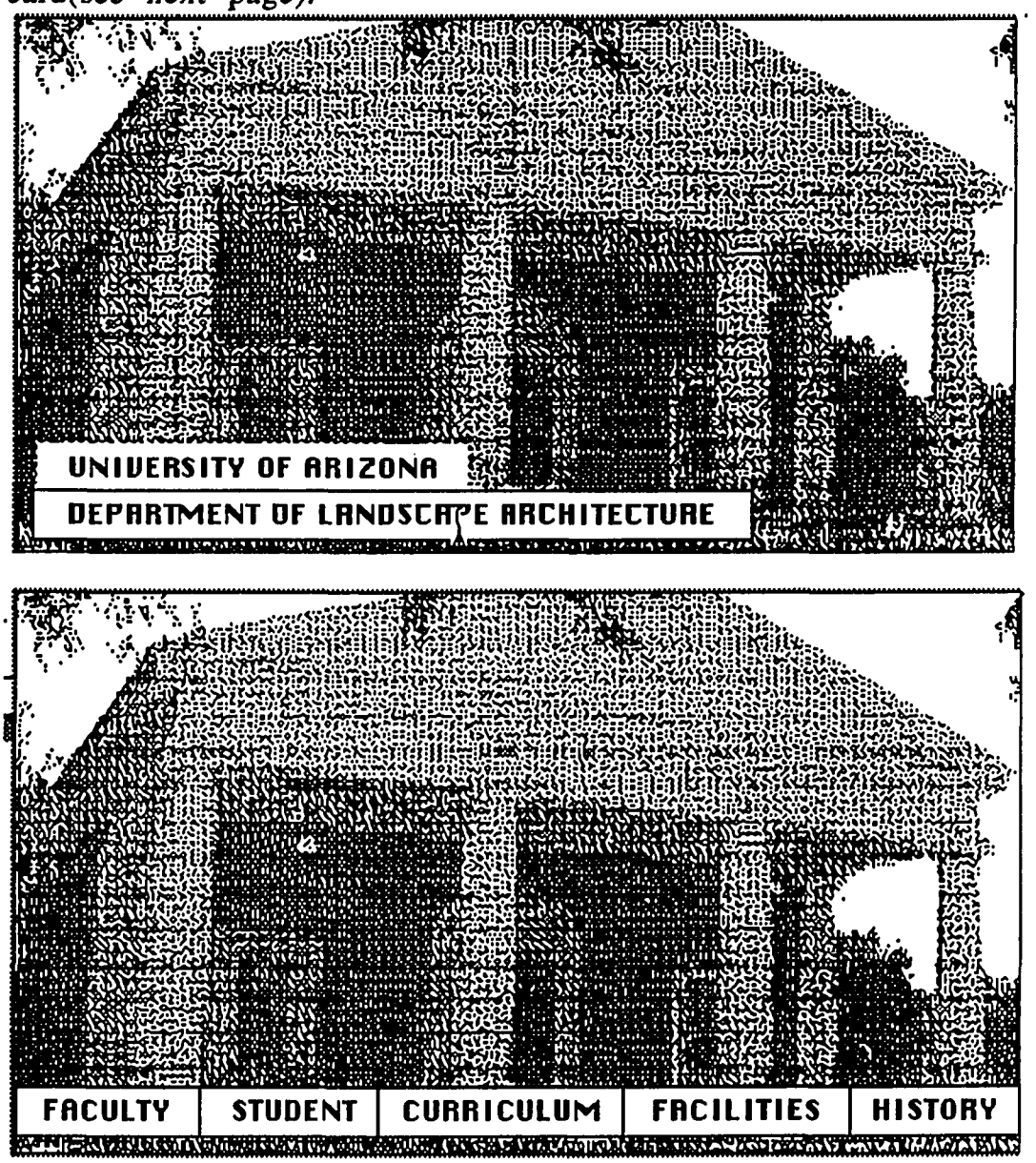
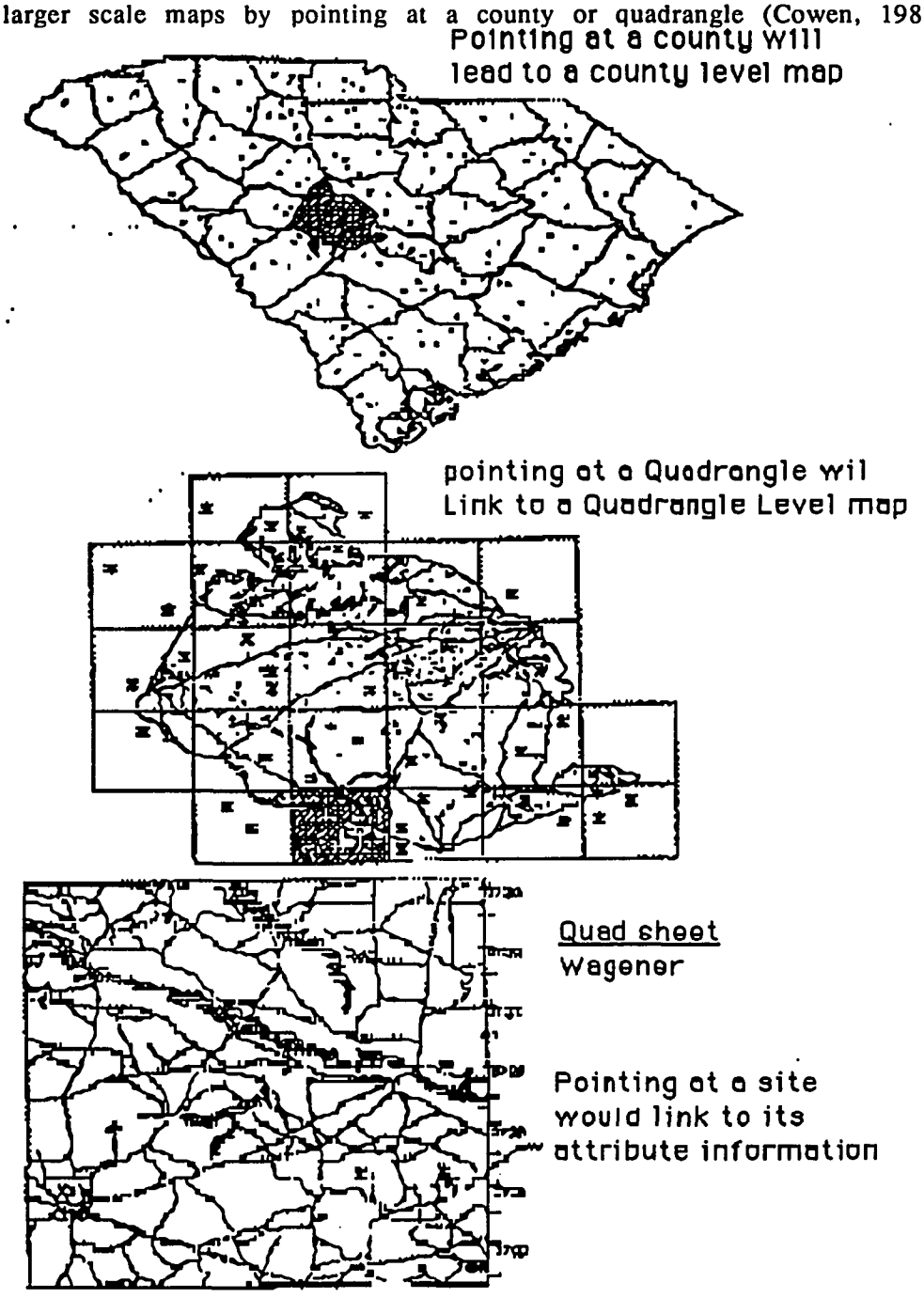


Figure 15. The hierarchy of map images demonstrating ability to "zoom" in to larger scale maps by pointing at a county or quadrangle (Cowen, 1988).



Product 3: Governmental use: zoning maps.

The traditional map system is usually difficult to preserve and retrieve. Computerized maps can use hypertext technology to solve various problems. Maps can be arranged from regional scale to very detailed site scale maps. Cowen used a similar technique in the study of a hierarchical geographic reference system (1988).

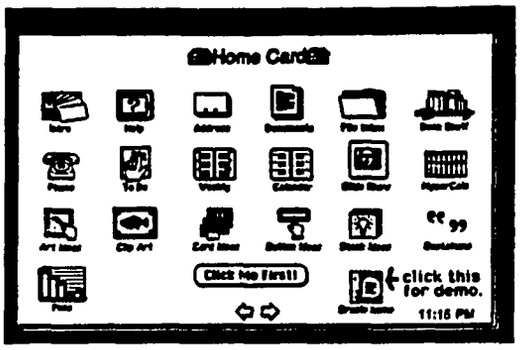
Product 4: Commercial use: construction and site engineering references

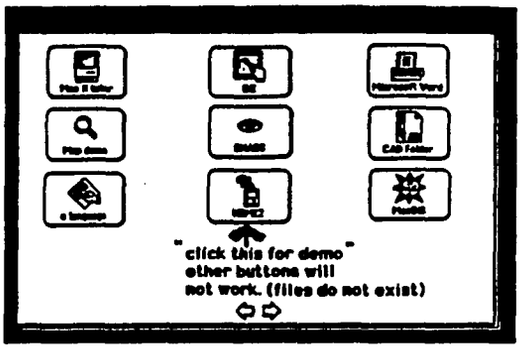
To be frank, landscape architectural services are still limited to the higher income class in our society. The cost of fees for design, and related labor, and construction has prevented many people from using the professional services. However computers have become more and more popular and available to most families. Landscape architects can input professional information (such as basic construction and engineering references) on computer disks which people could buy or use in the library. With the help of user-friendly hypertext technology, unknowledgeable users can reach professional information more easily. At the same time, a list of local landscape architects can be attached to the professional information on the disk, so people can identify a landscape architect for design consultation.

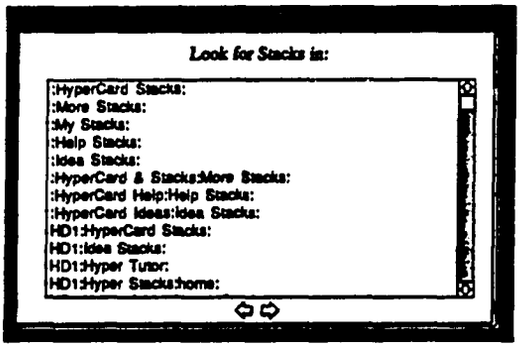
The user-friendly human interface has closed the gap between computer scientists and the rest of the world. To catch up with the transitions in society, advanced computer technology has to be transferred into our professional practice. Landscape architecture has been a labor intensive profession, the greatest cost in a landscape firm is for labor. Computers can help to generate better and more economic products with their speed, memory and editing ability. There is a story about Japanese monks who bought computers to help with administrative and stationary work in order to spend more time studying their religious books. Later the monks found that in order to operate the computer, they spent much time on the computer, and devoted less time to their religious books than before they had computers. There are two possible reasons for this outcome: either the user interface of the monks' computer program was too difficult, or the computer is more interesting than their religious books. Using the computer properly can reduce the labor used in professional practice. As a design profession, it is very important for landscape architects to catch up with available technology. It is the unfriendly user interface of computer packages, lack training, and of integration methods that stops professionals from spending precious time to learn and fully utilize the power of contemporary computer technology. Hypertext technology can help solve the problem of integrating information with professional practice. This thesis is a beginning of integrating computer applications in professional practice. Other issues to be addressed include: how to integrate computer technology in the design

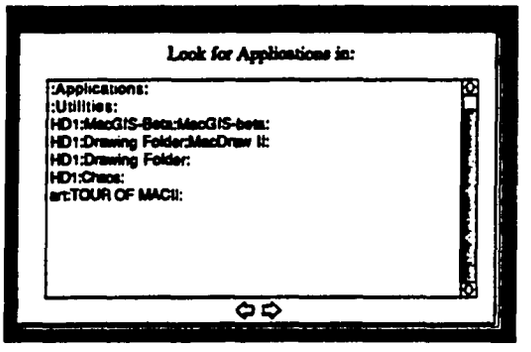
teaching process, and how to integrate the applications into existing courses. There is more integration work to do in the future.

APPENDIX 1
ORACLE STATE PARK
INFORMATION SYSTEM
HOME CARDS


Home Card
Click Me First!
click this for demo.
11:16 PM


"click this for demo"
other buttons will
not work. (files do not exist)


Look for Stacks in:
:HyperCard Stacks:
:More Stacks:
:My Stacks:
:Help Stacks:
:Idea Stacks:
:HyperCard & Stacks:More Stacks:
:HyperCard Help:Help Stacks:
:HyperCard Ideas:Idea Stacks:
HD1:HyperCard Stacks:
HD1:Idea Stacks:
HD1:Hyper Tutor:
HD1:Hyper Stacks:home: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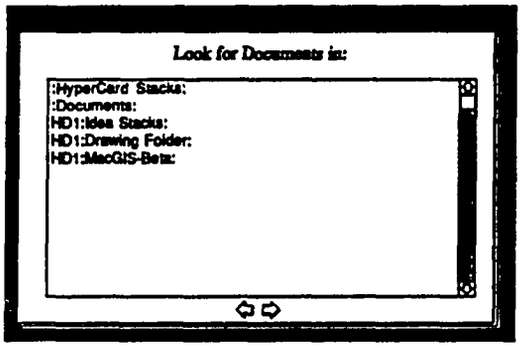
:Applications:
:Utilities:
HD1:MacGIS-Beta:MacGIS-beta:
HD1:Drawing Folder:MacDraw II:
HD1:Drawing Folder:
HD1:Chaos:
art:TOUR OF MACII: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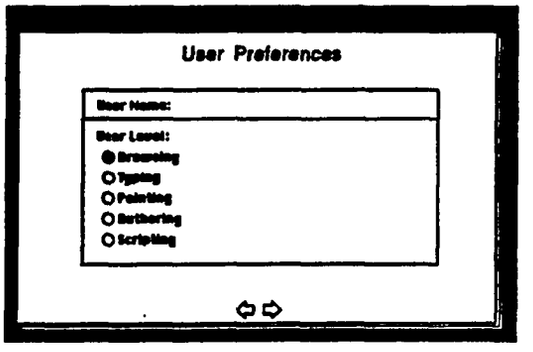
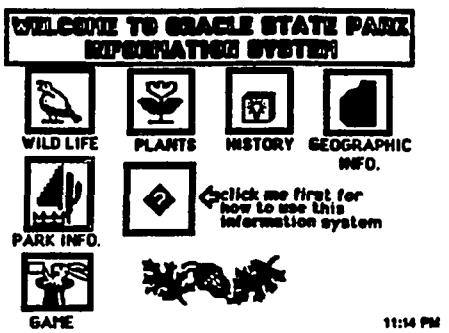
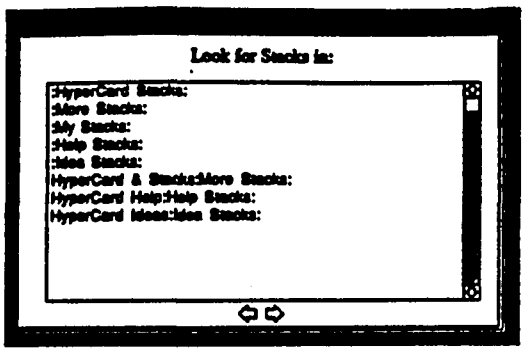
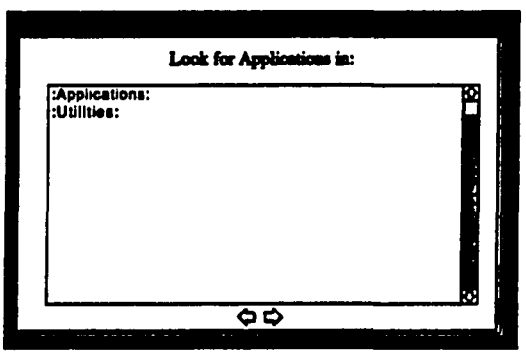
:Documents:
HD1:Idea Stacks:
HD1:Drawing Folder:
HD1:MacGIS-Beta:


User Preferences
User Name:
User Level:
Browsing
Typing
Painting
Authoring
Scripting


WELCOME TO GRACIE STATE PARK
INFORMATION SYSTEM
WILD LIFE
PLANTS
HISTORY
GEOGRAPHIC INFO.
PARK INFO.
click me first for how to use this information system
GAME
11:14 PM


Look for Stacks in:
:HyperCard Stacks:
:More Stacks:
:My Stacks:
:Help Stacks:
:Idea Stacks:
HyperCard & Stacks:More Stacks:
HyperCard Help:Help Stacks:
HyperCard Ideas:Idea Stacks: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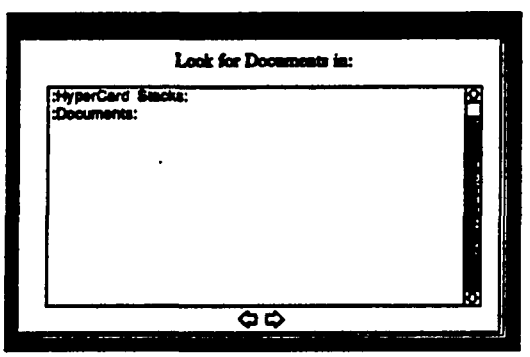
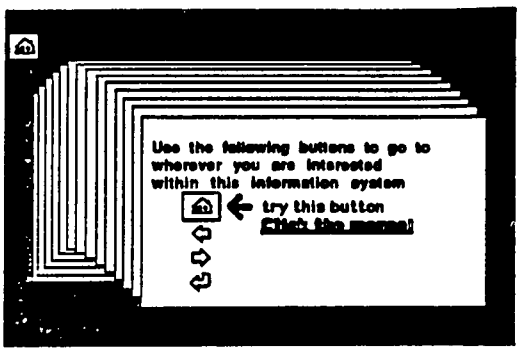
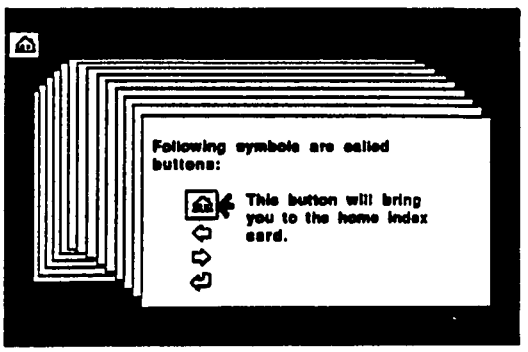
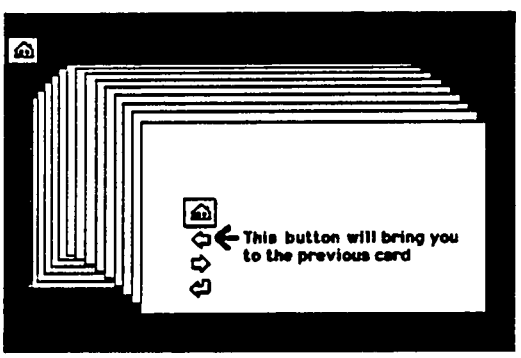
:Applications:
:Utilities:

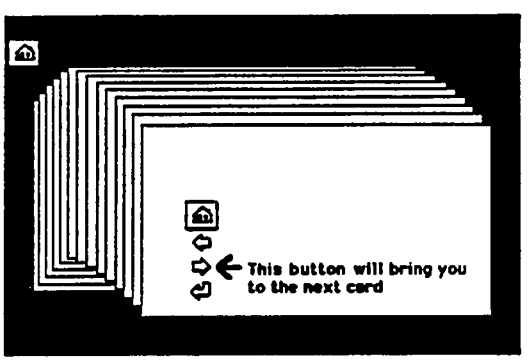

Look for Documents in:
:HyperCard Stacks:
:Documents:

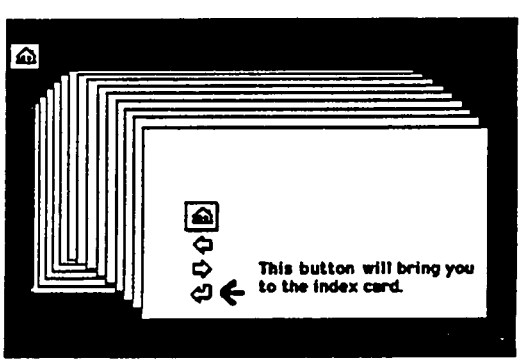
APPENDIX 2
ORACLE STATE PARK
INFORMATION SYSTEM
USER INSTRUCTION

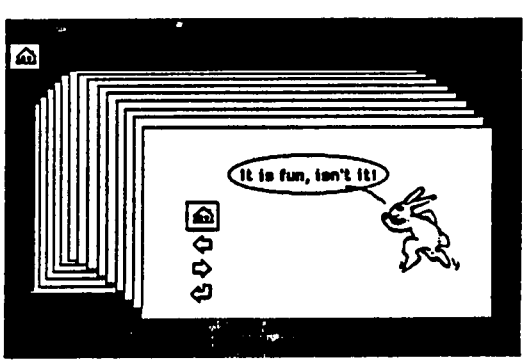

Use the following buttons to go to wherever you are interested within this information system
try this button


Following symbols are called buttons:
This button will bring you to the home index card.

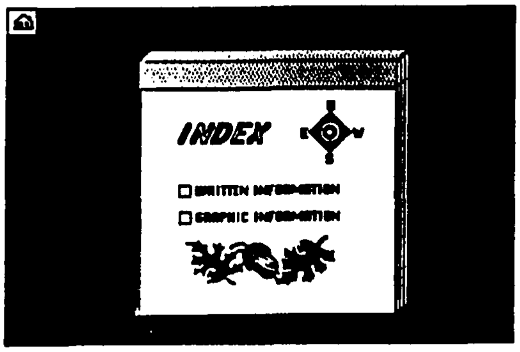

This button will bring you to the previous card

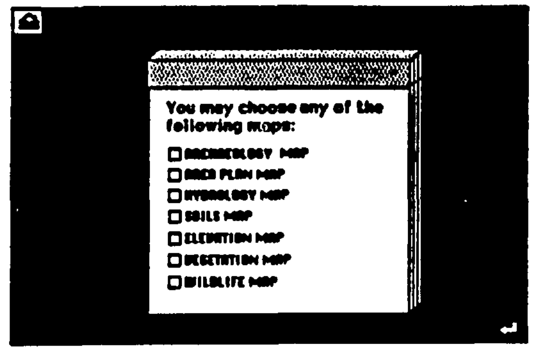

This button will bring you to the next card

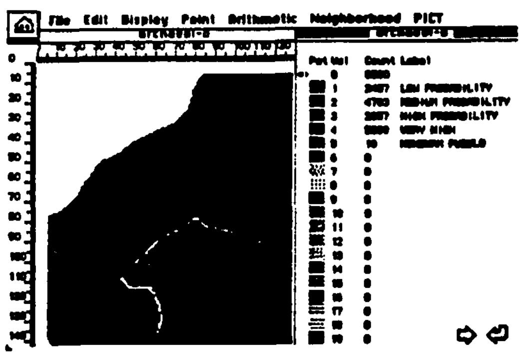

This button will bring you to the index card.

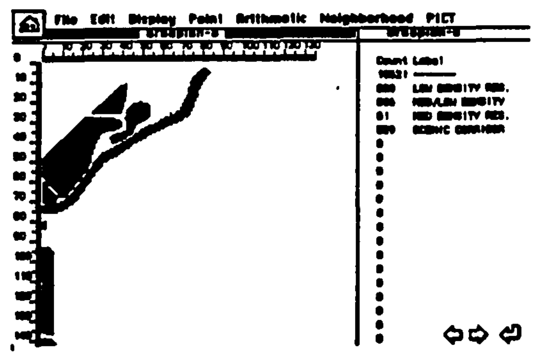

It is fun, isn't it!

APPENDIX 3
ORACLE STATE PARK
GEOGRAHIC INFORMATION


INDEX
WRITTEN INFORMATION
GRAPHIC INFORMATION


You may choose any of the following maps:
ARCHAEOLOGY MAP
AREA PLAN MAP
HYDROLOGY MAP
SOILS MAP
ELEVATION MAP
VEGETATION MAP
WILDLIFE MAP


File Edit Display Point Arithmetic Neighborhood PICT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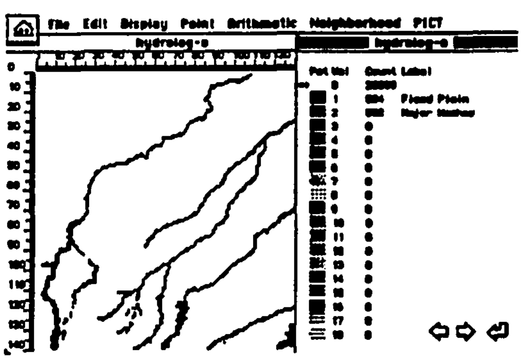
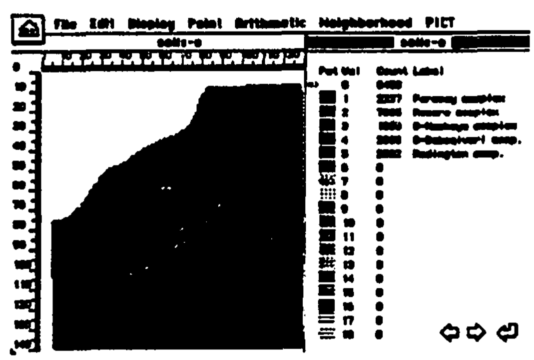
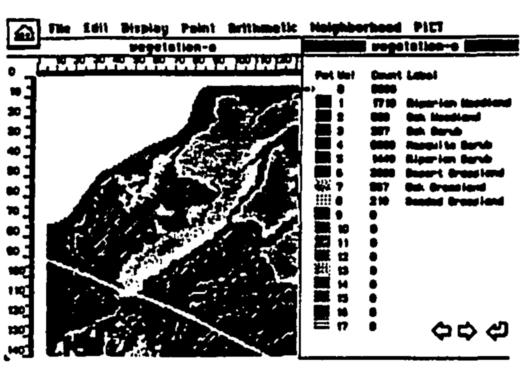

File Edit Display Point Arithmetic Neighborhood PICT
hydrology-a


File Edit Display Point Arithmetic Neighborhood PICT
soils-a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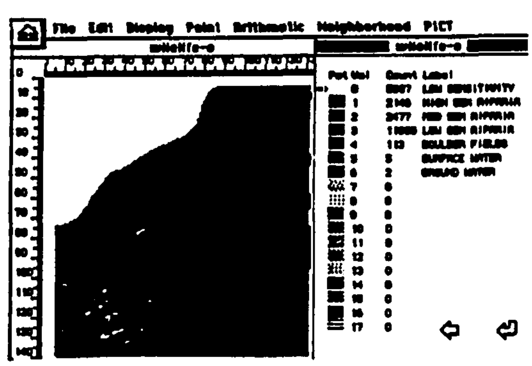
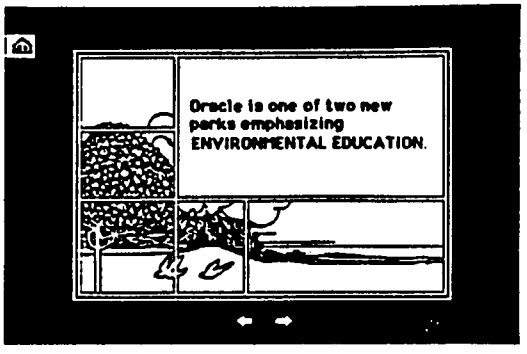
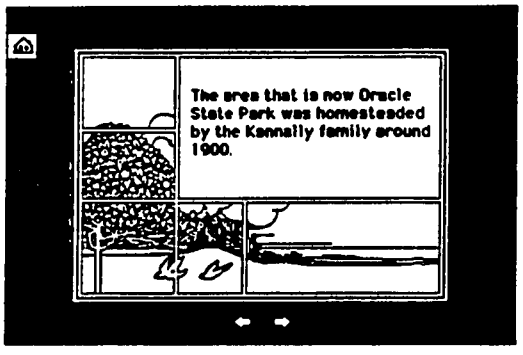
vegetation-a

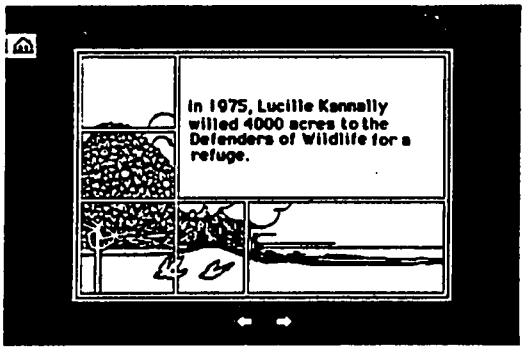

File Edit Display Point Arithmetic Neighborhood PICT
wildlife-a

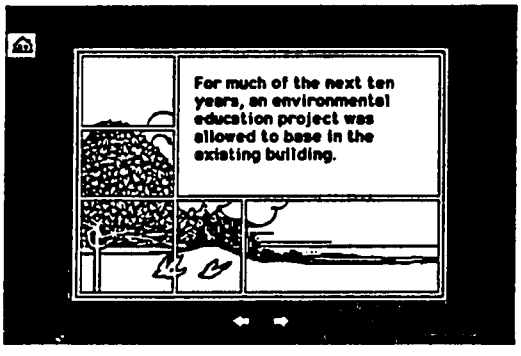
APPENDIX 4
ORACLE STATE PARK
HISTORY INFORMATION

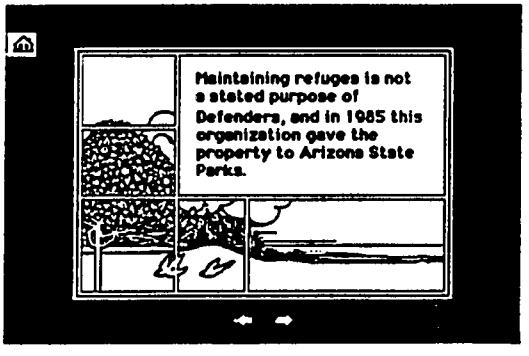

Most state parks in Arizona fall into two groups--- historic sites or recreation sites.

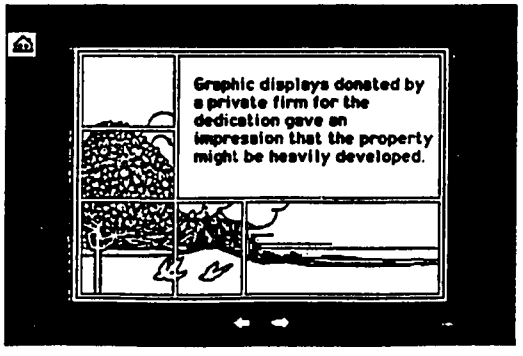

Oracle is one of two new parks emphasizing ENVIRONMENTAL EDUCATION.

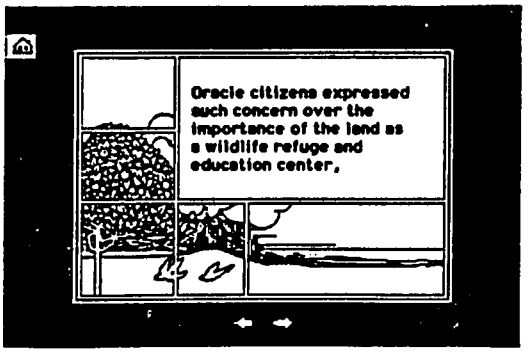

The area that is now Oracle State Park was homesteaded by the Kennally family around 1900.


In 1975, Lucille Kennally willed 4000 acres to the Defenders of Wildlife for a refuge.

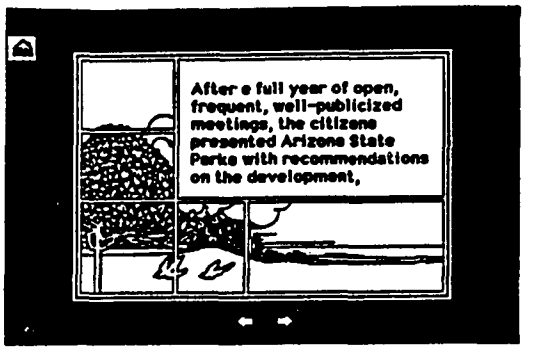

For much of the next ten years, an environmental education project was allowed to base in the existing building.

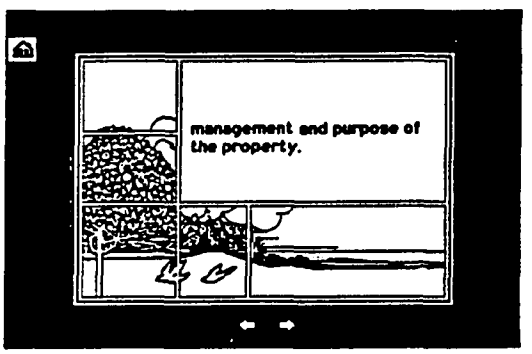

Maintaining refuges is not a stated purpose of Defenders, and in 1985 this organization gave the property to Arizona State Parks.

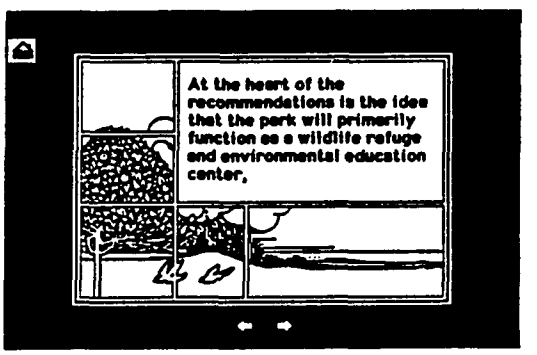

Graphic displays donated by a private firm for the dedication gave an impression that the property might be heavily developed.

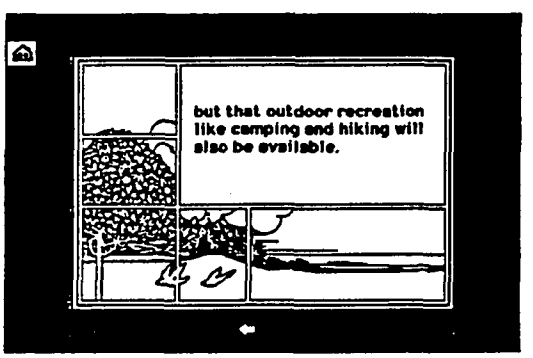

Oracle citizens expressed such concern over the importance of the land as a wildlife refuge and education center.


State Parks invited local residents to join an ad hoc committee and express their concerns.

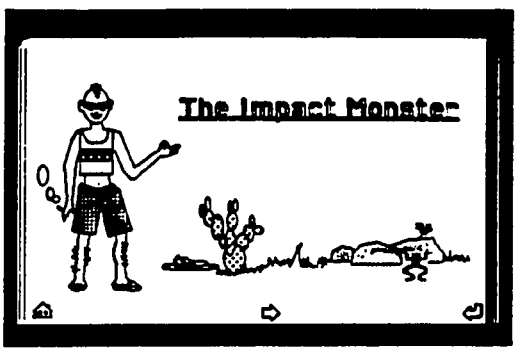

After a full year of open, frequent, well-publicized meetings, the citizens presented Arizona State Parks with recommendations on the development,

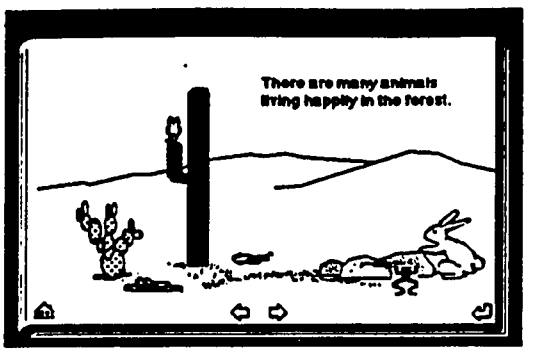

management and purpose of the property.

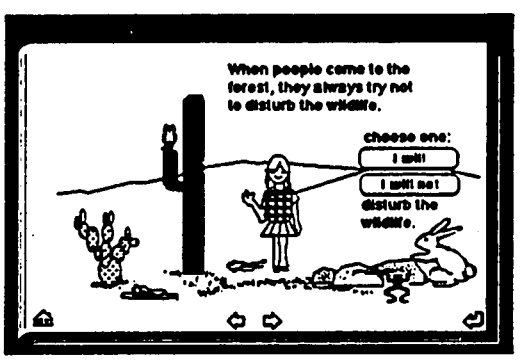

At the heart of the recommendations is the idea that the park will primarily function as a wildlife refuge and environmental education center,

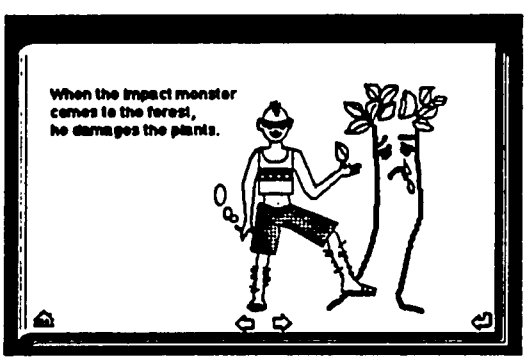

but that outdoor recreation like camping and hiking will also be available.

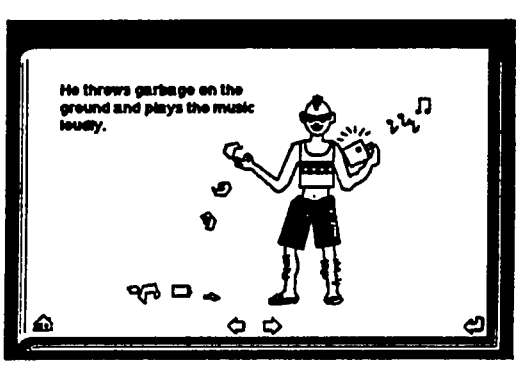
APPENDIX 5
IMAPCT MONSTER GAME

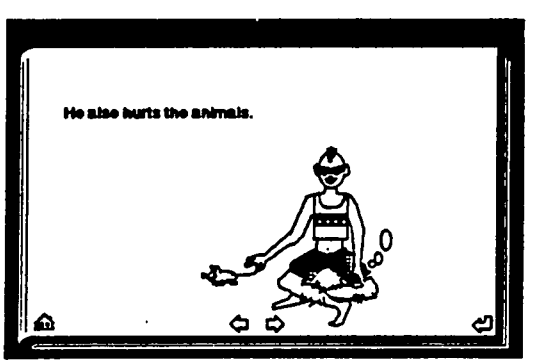

The Impact Monster

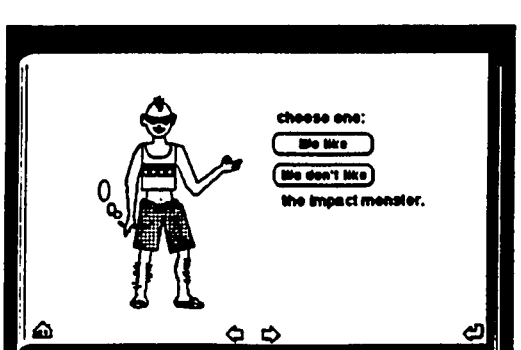

There are many animals
living happily in the forest.

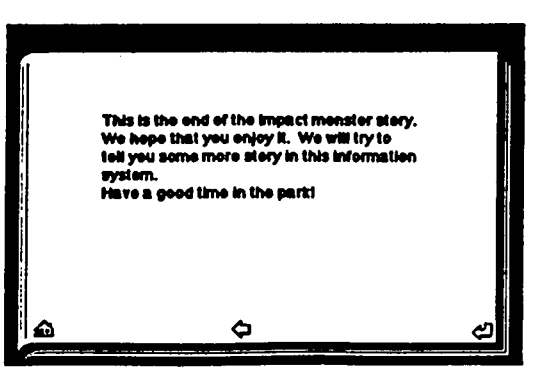

When people come to the
forest, they always try not
to disturb the wildlife.
choose one:
I will
I will not
disturb the
wildlife.

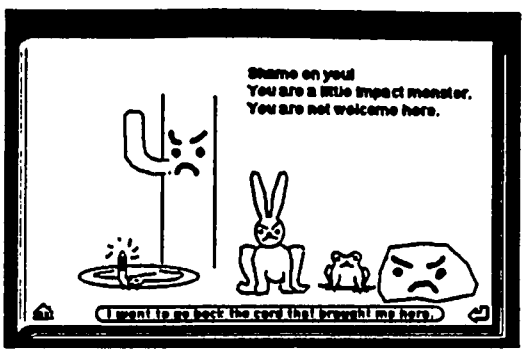

When the impact monster
comes to the forest,
he damages the plants.

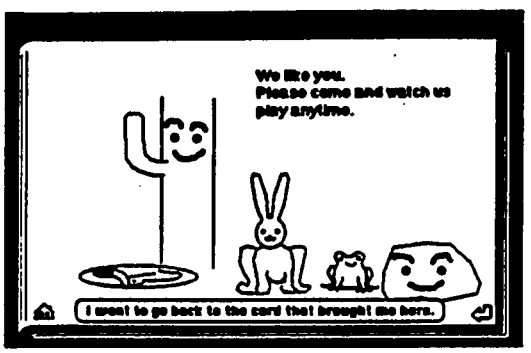

He throws garbage on the
ground and plays the music
loudly.

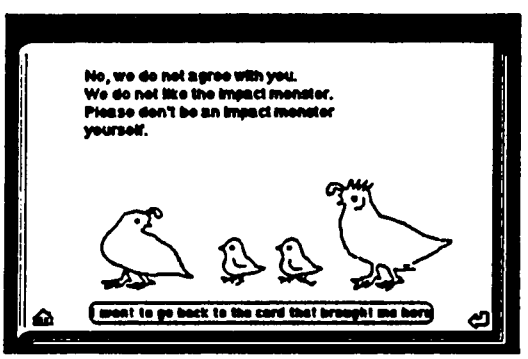

He also hurts the animals.

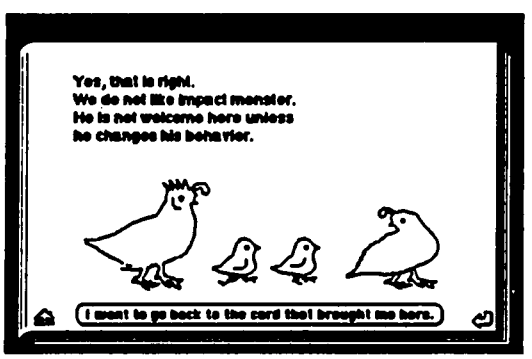

choose one:
We like
We don't like
the impact monster.


This is the end of the impact monster story.
We hope that you enjoy it. We will try to
tell you some more story in this information
system.
Have a good time in the park!

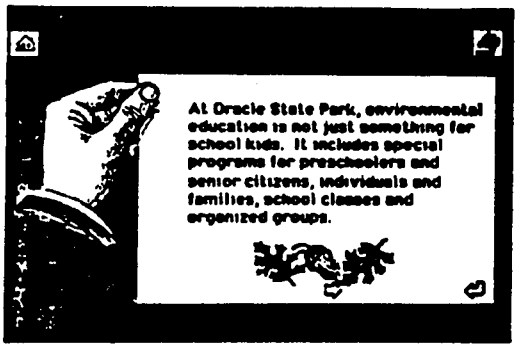

Shame on you!
You are a little impact monster.
You are not welcome here.
I want to go back the card that brought me here.

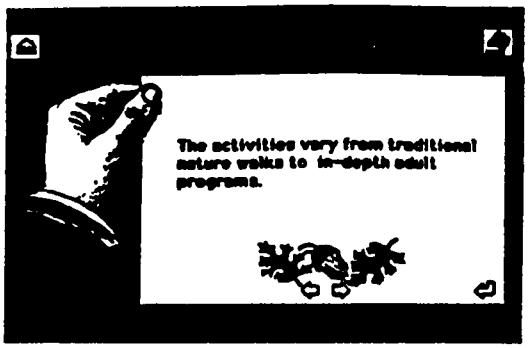

We like you.
Please come and watch us
play anytime.
I want to go back to the card that brought me here.

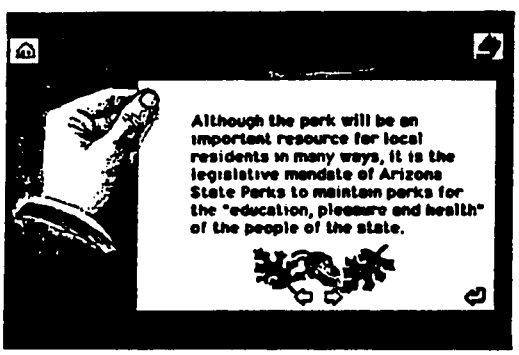

No, we do not agree with you.
We do not like the impact monster.
Please don't be an impact monster
yourself.
I want to go back to the card that brought me here

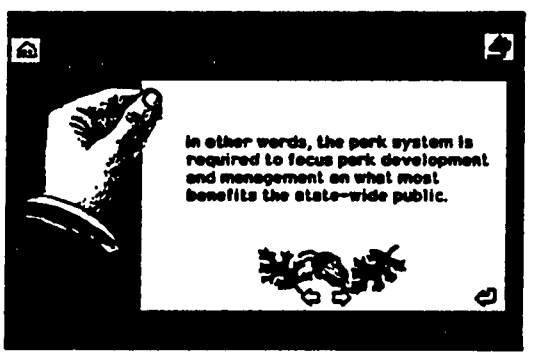

Yes, that is right.
We do not like impact monster.
He is not welcome here unless
he changes his behavior.
I want to go back to the card that brought me here.

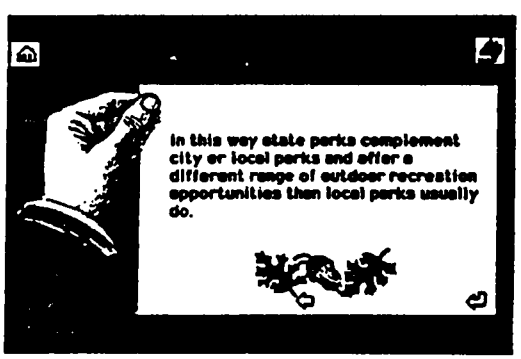
APPENDIX 6
ORACLE STATE PARK
PLANNING INFORMATION


At Oracle State Park, environmental education is not just something for school kids. It includes special programs for preschoolers and senior citizens, individuals and families, school classes and organized groups.

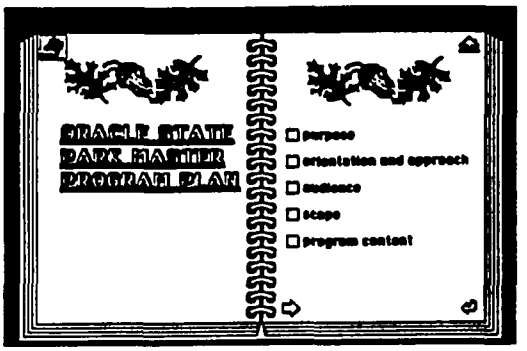

The activities vary from traditional nature walks to in-depth adult programs.

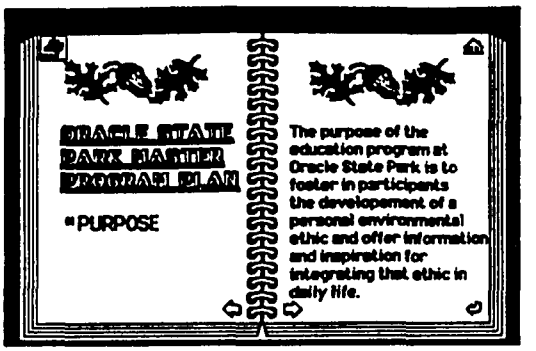

Although the park will be an important resource for local residents in many ways, it is the legislative mandate of Arizona State Parks to maintain parks for the "education, pleasure and health" of the people of the state.

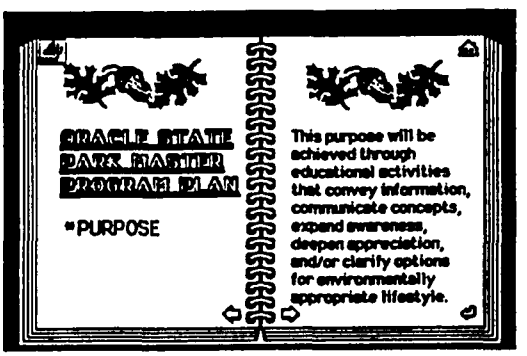

In other words, the park system is required to focus park development and management on what most benefits the state-wide public.

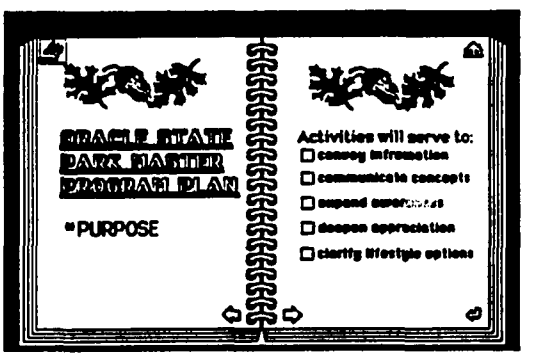

In this way state parks complement city or local parks and offer a different range of outdoor recreation opportunities than local parks usually do.

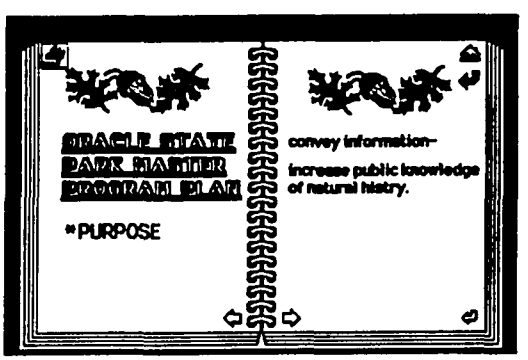
APPENDIX 7
ORACLE STATE PARK
MASTER PLAN INFORMATION

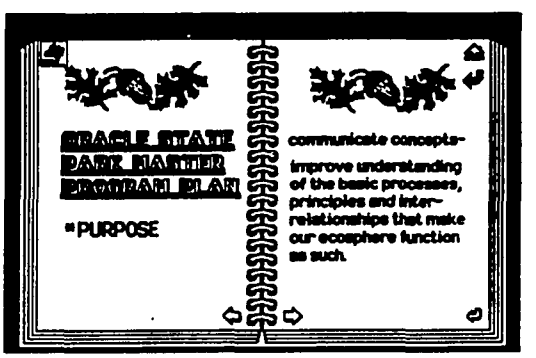

ORACLE STATE PARK MASTER PROGRAM PLAN
purpose
orientation and approach
audience
scope
program content

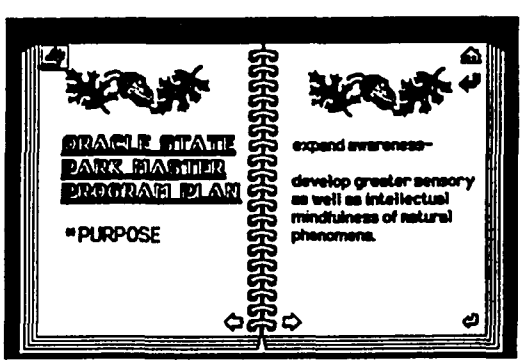

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
The purpose of the education program at Oracle State Park is to foster in participants the development of a personal environmental ethic and offer information and inspiration for integrating that ethic in daily life.

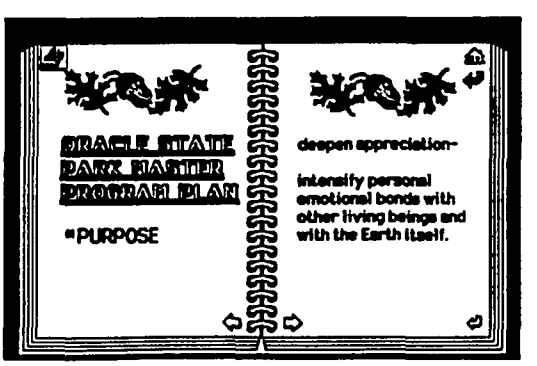

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
This purpose will be achieved through educational activities that convey information, communicate concepts, expand awareness, deepen appreciation, and/or clarify options for environmentally appropriate lifestyle.

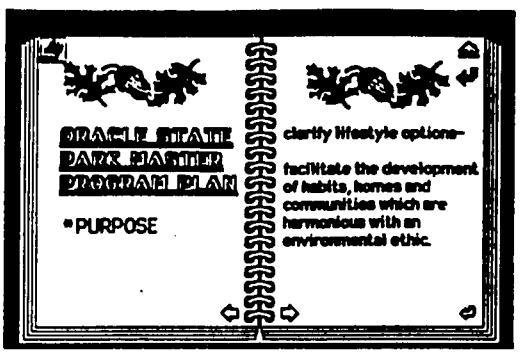

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
Activities will serve to:
convey information
communicate concepts
expand awareness
deepen appreciation
clarify lifestyle options

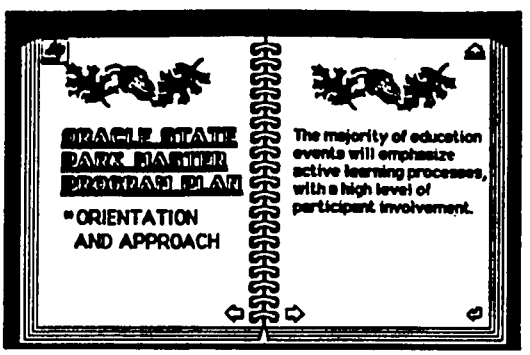

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
convey information-
increase public knowledge of natural history.


ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
communicate concepts-
improve understanding of the basic processes, principles and inter-relationships that make our ecosphere function as such.

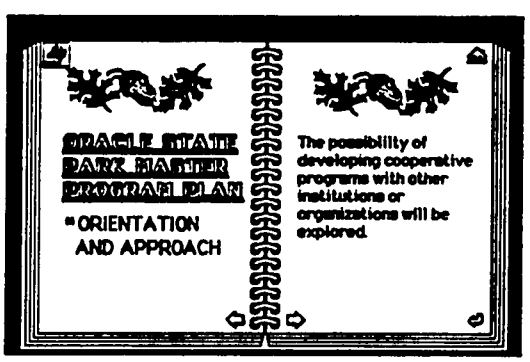

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
expand awareness-
develop greater sensory as well as intellectual mindfulness of natural phenomena.

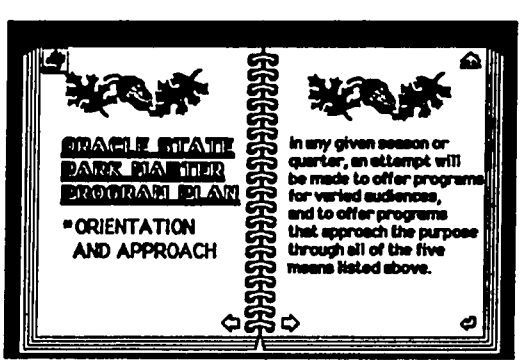

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
deepen appreciation-
intensify personal emotional bonds with other living beings and with the Earth itself.

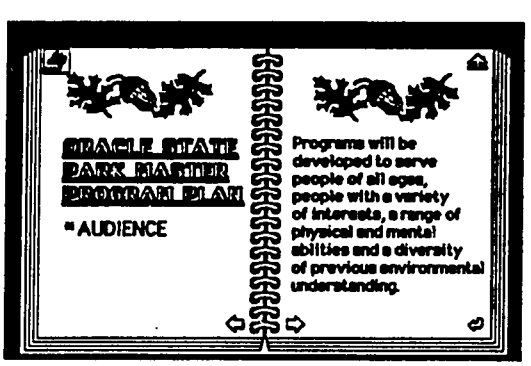

ORACLE STATE PARK MASTER PROGRAM PLAN
*PURPOSE
clarify lifestyle options-
facilitate the development of habits, homes and communities which are harmonious with an environmental ethic.

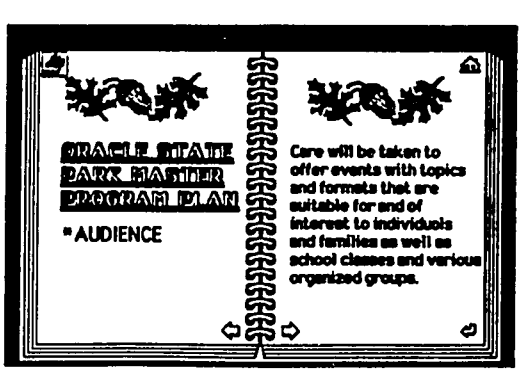

ORACLE STATE PARK MASTER PROGRAM PLAN
*ORIENTATION AND APPROACH
The majority of education events will emphasize active learning processes, with a high level of participant involvement.

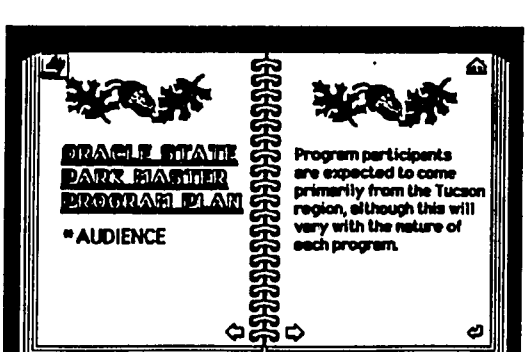

ORACLE STATE PARK MASTER PROGRAM PLAN
*ORIENTATION AND APPROACH
Longer, in-depth courses or program series will play a major role in the total educational scope. Brief, single event learning activities will also be made available.

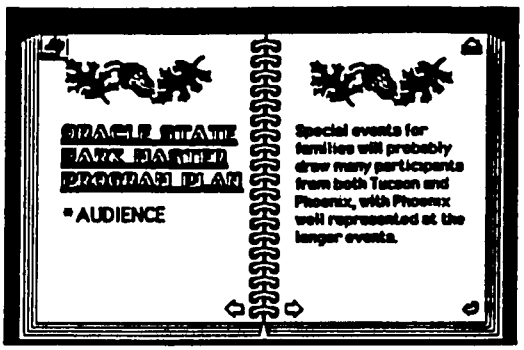

ORACLE STATE PARK MASTER PROGRAM PLAN
*ORIENTATION AND APPROACH
The possibility of developing cooperative programs with other institutions or organizations will be explored.

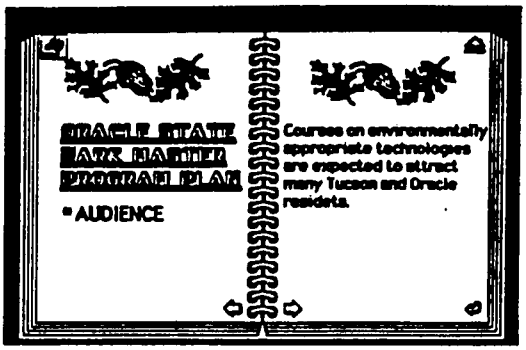

ORACLE STATE PARK MASTER PROGRAM PLAN
*ORIENTATION AND APPROACH
In any given season or quarter, an attempt will be made to offer programs for varied audiences, and to offer programs that approach the purpose through all of the five means listed above.

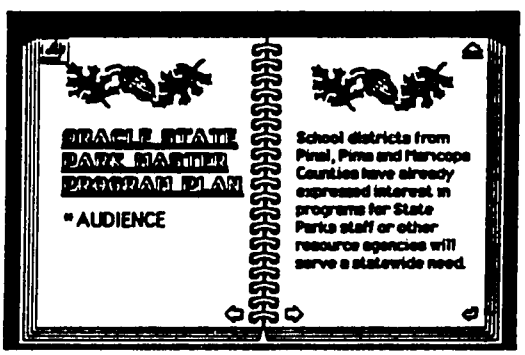

ORACLE STATE PARK MASTER PROGRAM PLAN
*AUDIENCE
Programs will be developed to serve people of all ages, people with a variety of interests, a range of physical and mental abilities and a diversity of previous environmental understanding.

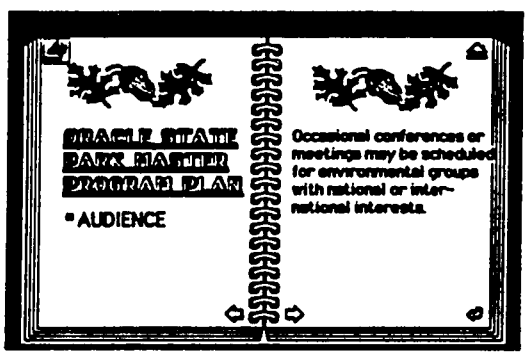

ORACLE STATE PARK MASTER PROGRAM PLAN
*AUDIENCE
Care will be taken to offer events with topics and formats that are suitable for and of interest to individuals and families as well as school classes and various organized groups.

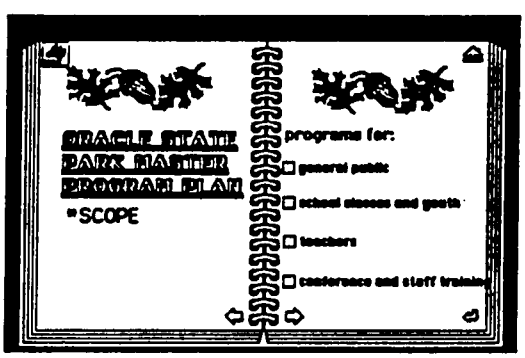

ORACLE STATE PARK MASTER PROGRAM PLAN
*AUDIENCE
Program participants are expected to come primarily from the Tucson region, although this will vary with the nature of each program.

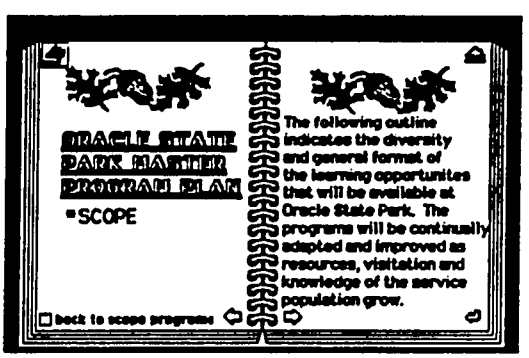

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*AUDIENCE
Special events for families will probably draw many participants from both Tucson and Phoenix, with Phoenix well represented at the longer events.

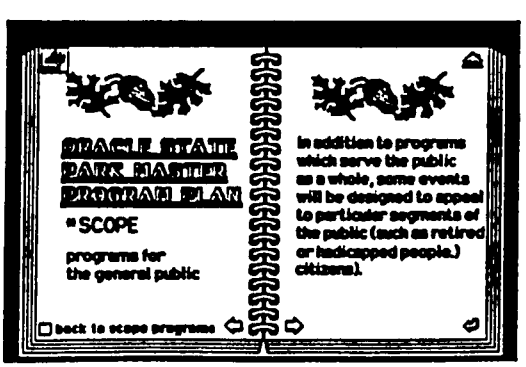

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*AUDIENCE
Courses on environmentally appropriate technologies are expected to attract many Tucson and Oracle residents.

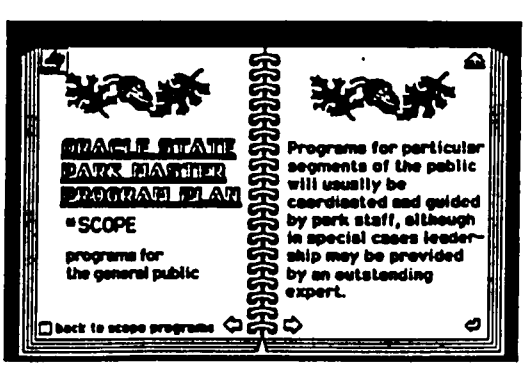

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*AUDIENCE
School districts from Pinal, Pima and Maricopa Counties have already expressed interest in programs for State Parks staff or other resource agencies will serve a statewide need.

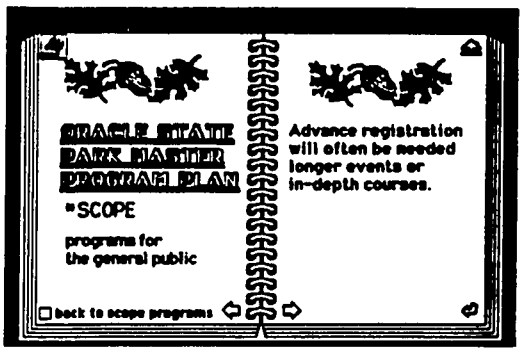

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*AUDIENCE
Occasional conferences or meetings may be scheduled for environmental groups with national or international interests.

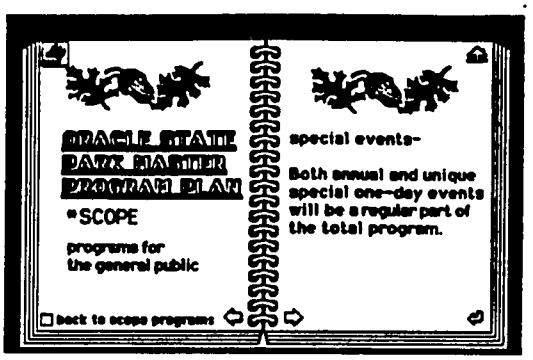

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*SCOPE
programs for:
☐ general public
☐ school classes and youth
☐ teachers
☐ conference and staff training

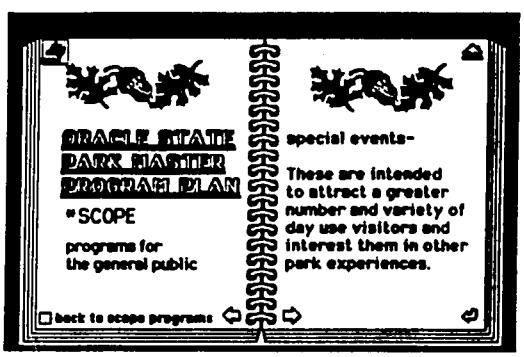

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*SCOPE
The following outline indicates the diversity and general format of the learning opportunities that will be available at Oracle State Park. The programs will be continually adapted and improved as resources, visitation and knowledge of the service population grow.
☐ back to scope programs

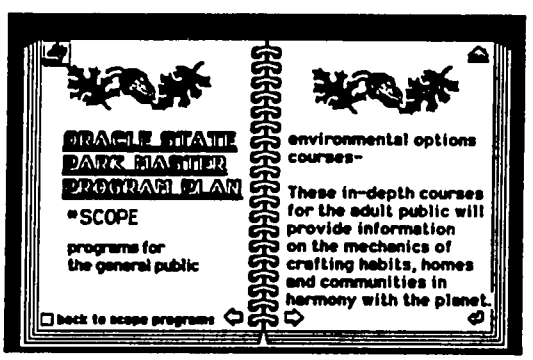

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*SCOPE
programs for
the general public
In addition to programs which serve the public as a whole, some events will be designed to appeal to particular segments of the public (such as retired or handicapped people.) citizens).
☐ back to scope programs

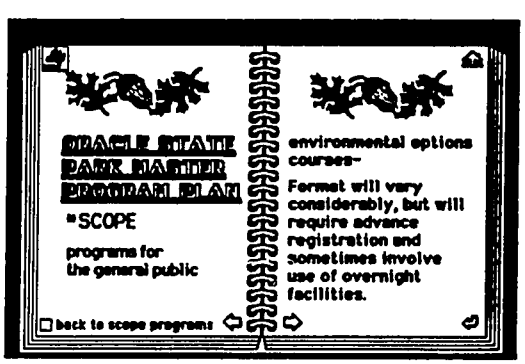

ORACLE STATE
PARK MASTER
PROGRAM PLAN
*SCOPE
programs for
the general public
Programs for particular segments of the public will usually be coordinated and guided by park staff, although in special cases leadership may be provided by an outstanding expert.
☐ back to scope programs

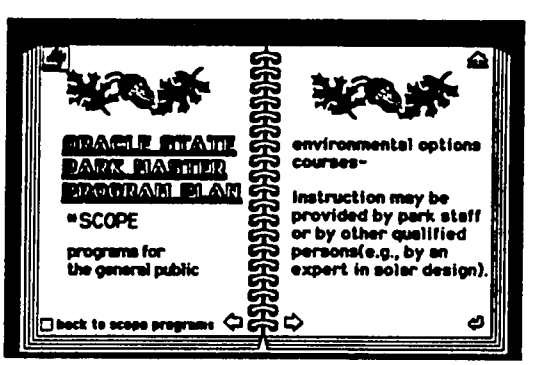

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
Advance registration will often be needed longer events or in-depth courses.

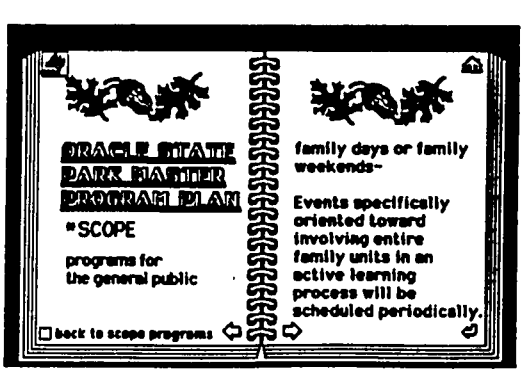

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
special events-
Both annual and unique special one-day events will be a regular part of the total program.

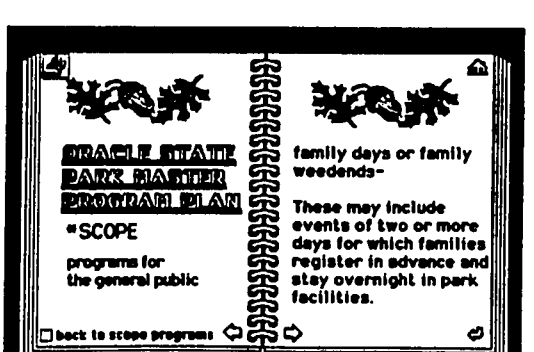

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
special events-
These are intended to attract a greater number and variety of day use visitors and interest them in other park experiences.

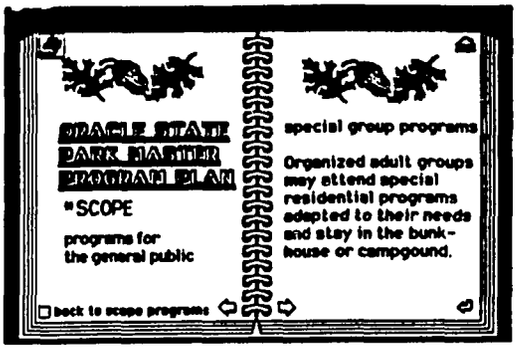

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
environmental options courses-
These in-depth courses for the adult public will provide information on the mechanics of crafting habits, homes and communities in harmony with the planet.

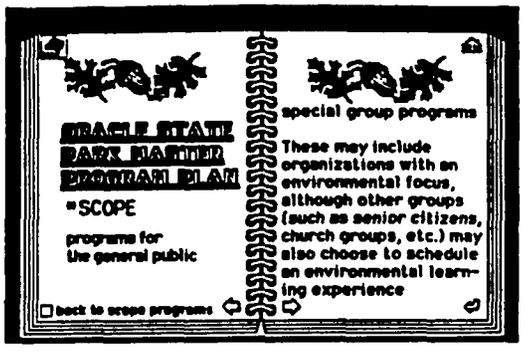

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
environmental options courses-
Format will vary considerably, but will require advance registration and sometimes involve use of overnight facilities.

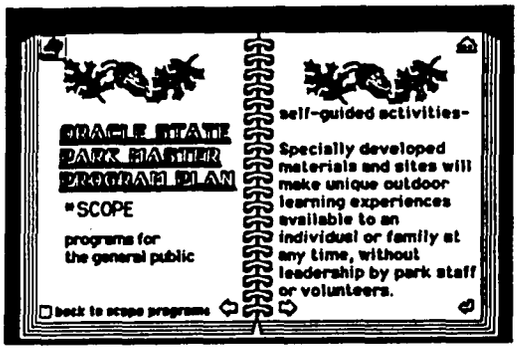

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
environmental options courses-
Instruction may be provided by park staff or by other qualified persons(e.g., by an expert in solar design).

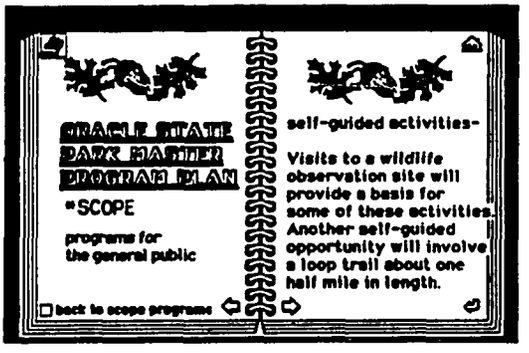

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
family days or family weekends-
Events specifically oriented toward involving entire family units in an active learning process will be scheduled periodically.

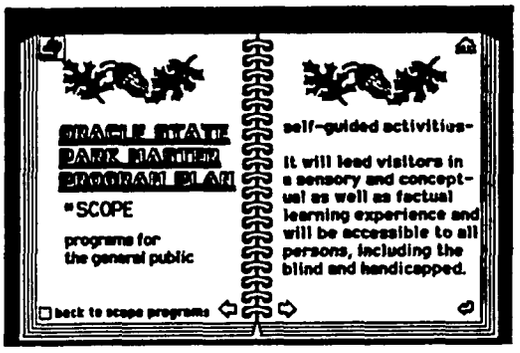

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
back to scope programs
family days or family weedends-
These may include events of two or more days for which families register in advance and stay overnight in park facilities.

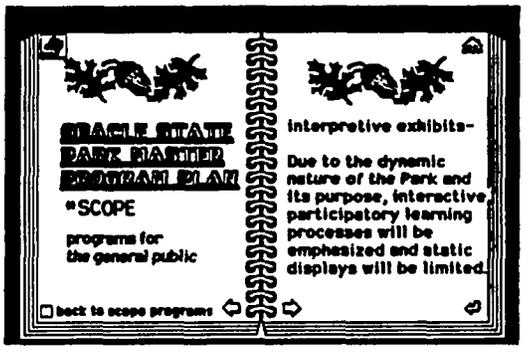

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
special group programs
Organized adult groups may attend special residential programs adapted to their needs and stay in the bunkhouse or campground.
back to scope programs

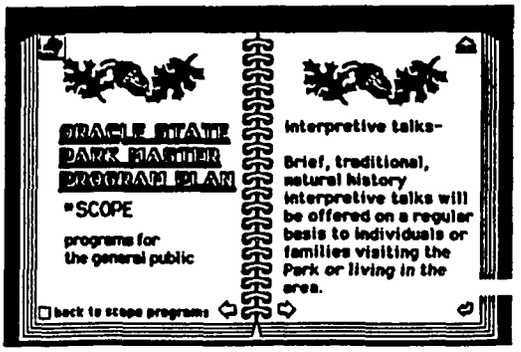

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
special group programs
These may include organizations with an environmental focus, although other groups (such as senior citizens, church groups, etc.) may also choose to schedule an environmental learning experience
back to scope programs

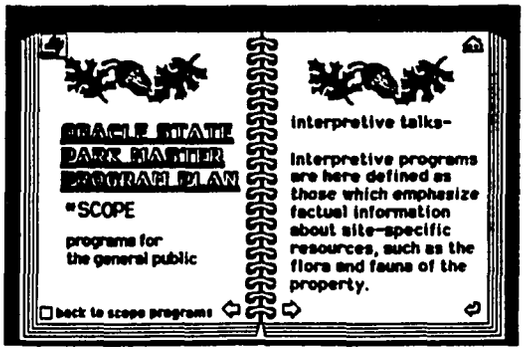

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
self-guided activities-
Specially developed materials and sites will make unique outdoor learning experiences available to an individual or family at any time, without leadership by park staff or volunteers.
back to scope programs

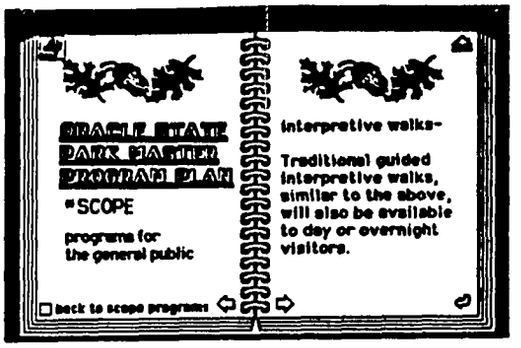

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
self-guided activities-
Visits to a wildlife observation site will provide a basis for some of these activities. Another self-guided opportunity will involve a loop trail about one half mile in length.
back to scope programs

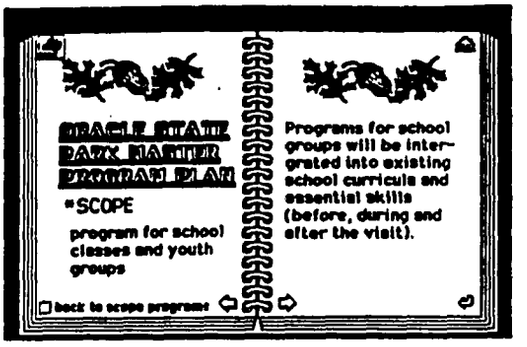

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
self-guided activities-
It will lead visitors in a sensory and conceptual as well as factual learning experience and will be accessible to all persons, including the blind and handicapped.
back to scope programs

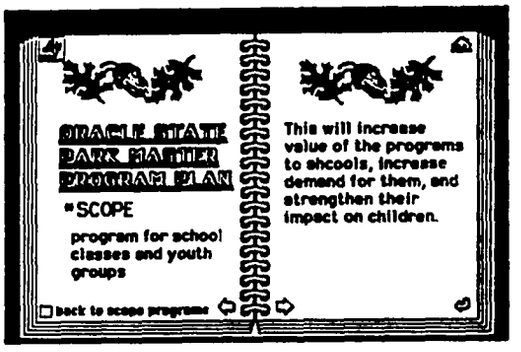

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
interpretive exhibits-
Due to the dynamic nature of the Park and its purpose, interactive, participatory learning processes will be emphasized and static displays will be limited.
back to scope programs

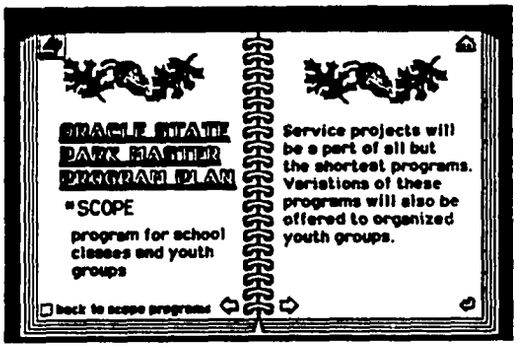

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
interpretive talks-
Brief, traditional, natural history interpretive talks will be offered on a regular basis to individuals or families visiting the Park or living in the area.
back to scope programs

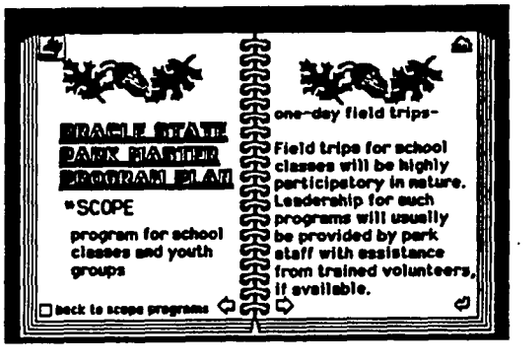

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
interpretive talks-
Interpretive programs are here defined as those which emphasize factual information about site-specific resources, such as the flora and fauna of the property.
back to scope programs

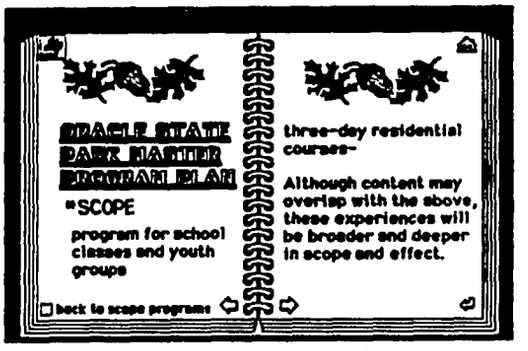

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
programs for the general public
interpretive walks-
Traditional guided interpretive walks, similar to the above, will also be available to day or overnight visitors.
back to scope programs

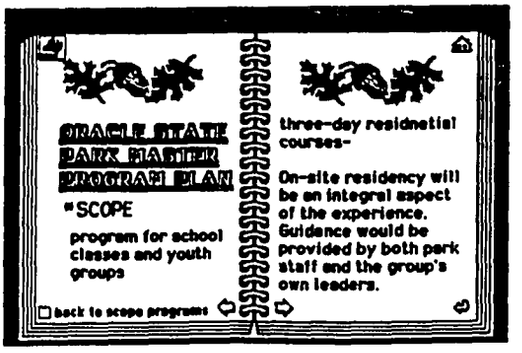

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
Programs for school groups will be integrated into existing school curricula and essential skills (before, during and after the visit).
back to scope programs

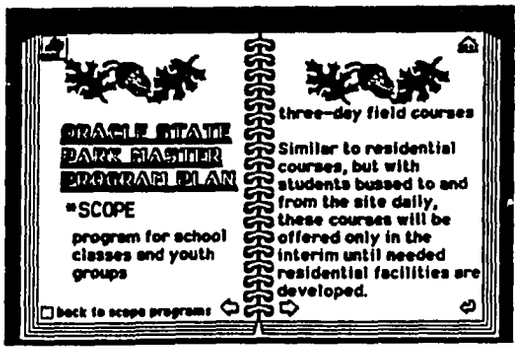

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
This will increase value of the programs to shcools, increase demand for them, and strengthen their impact on children.
back to scope programs

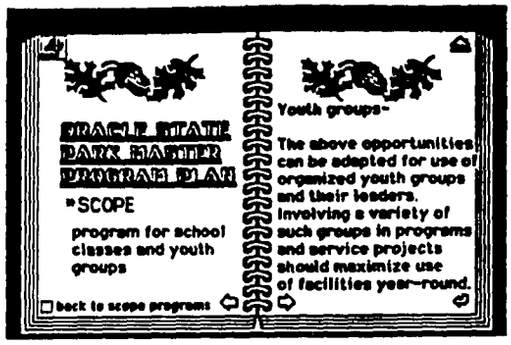

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
Service projects will be a part of all but the shortest programs. Variations of these programs will also be offered to organized youth groups.
back to scope programs

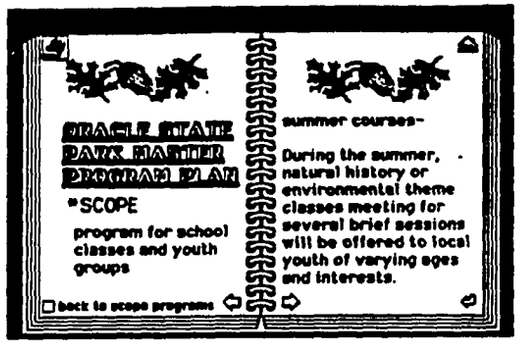

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
one-day field trips-
Field trips for school classes will be highly participatory in nature. Leadership for such programs will usually be provided by park staff with assistance from trained volunteers, if available.
back to scope programs

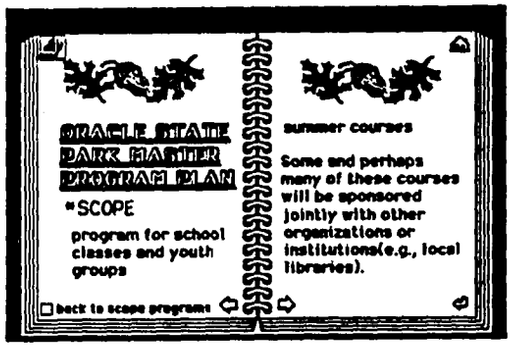

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
three-day residential courses-
Although content may overlap with the above, these experiences will be broader and deeper in scope and effect.
back to scope programs

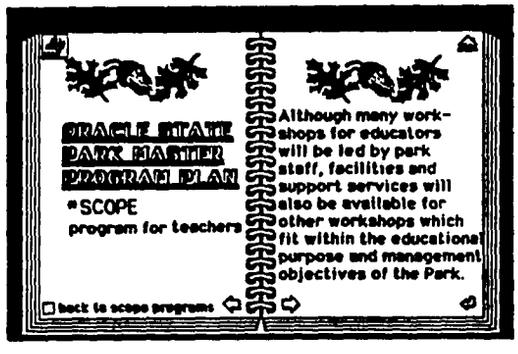

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
three-day residnetial courses-
On-site residency will be an integral aspect of the experience. Guidence would be provided by both park staff and the group's own leaders.
back to scope programs

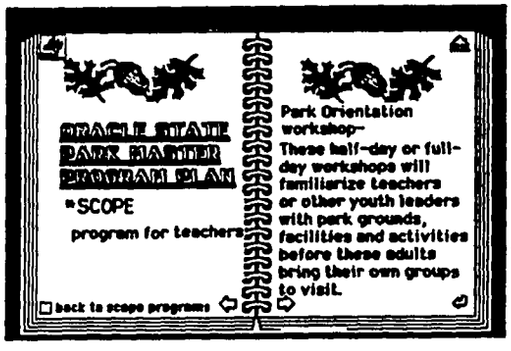

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
three-day field courses
Similar to residential courses, but with students bussed to and from the site daily, these courses will be offered only in the interim until needed residential facilities are developed.
back to scope programs

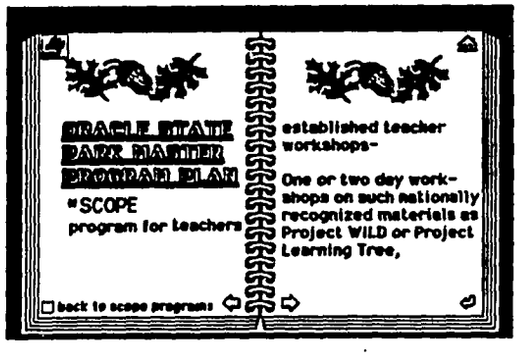

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
Youth groups-
The above opportunities can be adapted for use of organized youth groups and their leaders. Involving a variety of such groups in programs and service projects should maximize use of facilities year-round.
back to scope programs

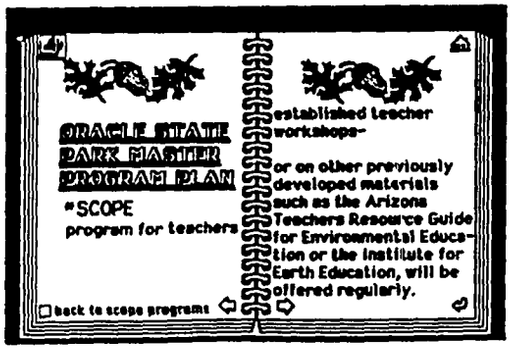

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
summer courses-
During the summer, natural history or environmental theme classes meeting for several brief sessions will be offered to local youth of varying ages and interests.
back to scope programs

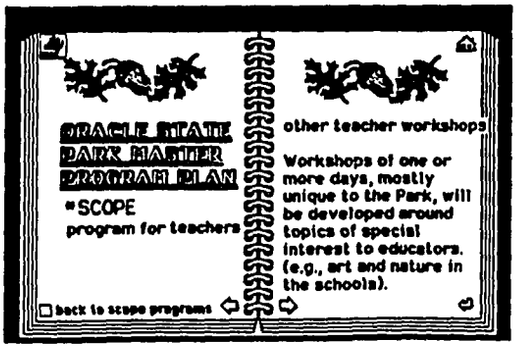

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for school classes and youth groups
summer courses
Some and perhaps many of these courses will be sponsored jointly with other organizations or institutions(e.g., local libraries).
back to scope programs

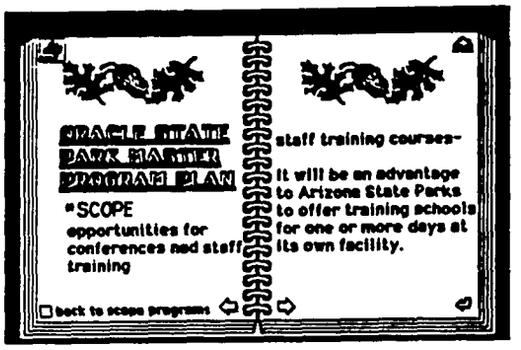

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for teachers
Although many workshops for educators will be led by park staff, facilities and support services will also be available for other workshops which fit within the educational purpose and management objectives of the Park.
back to scope programs

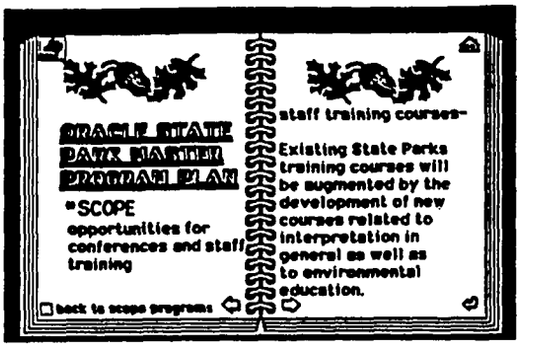

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for teachers
Park Orientation workshop-
These half-day or full-day workshops will familiarize teachers or other youth leaders with park grounds, facilities and activities before these adults bring their own groups to visit.
back to scope programs

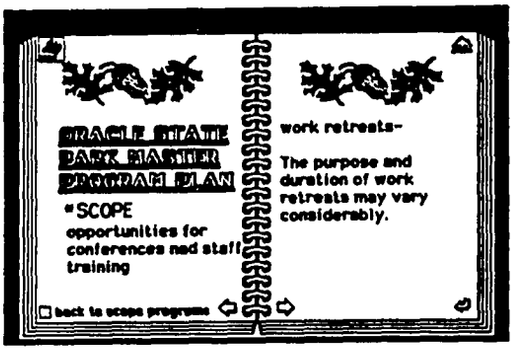

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for teachers
established teacher workshops-
One or two day workshops on such nationally recognized materials as Project WILD or Project Learning Tree,
back to scope programs

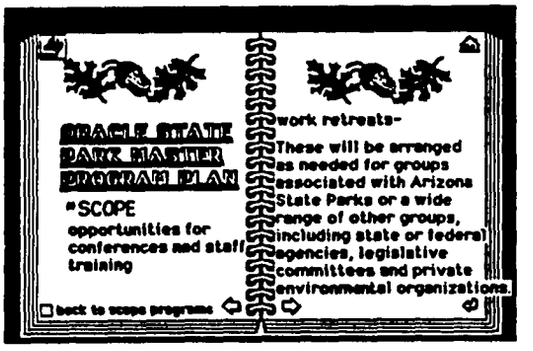

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for teachers
established teacher workshops-
or on other previously developed materials such as the Arizona Teachers Resource Guide for Environmental Education or the Institute for Earth Education, will be offered regularly.
back to scope programs

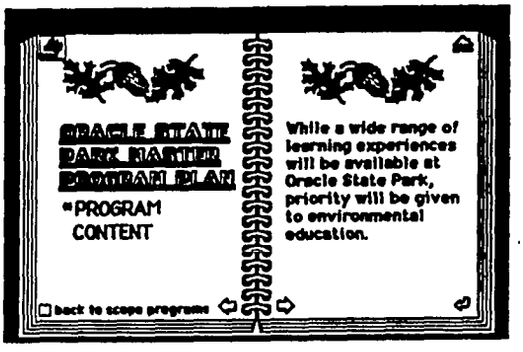

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
program for teachers
other teacher workshops
Workshops of one or more days, mostly unique to the Park, will be developed around topics of special interest to educators. (e.g., art and nature in the schools).
back to scope programs

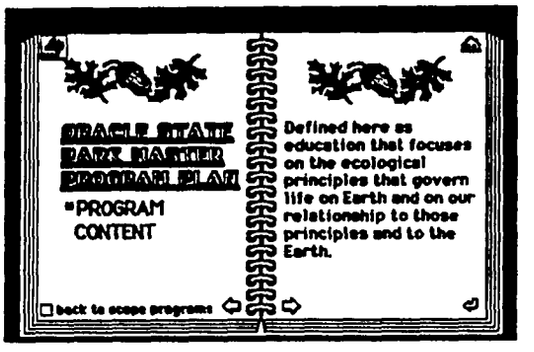

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
opportunities for conferences and staff training
staff training courses-
It will be an advantage to Arizona State Parks to offer training schools for one or more days at its own facility.
back to scope programs

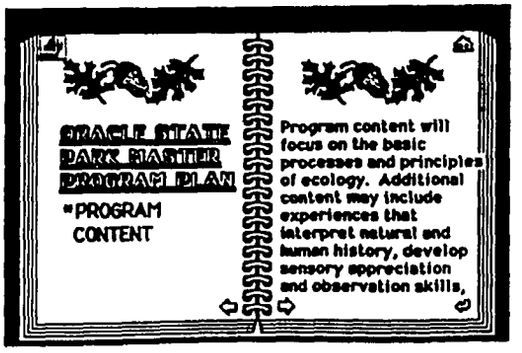

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
opportunities for conferences and staff training
staff training courses-
Existing State Parks training courses will be augmented by the development of new courses related to interpretation in general as well as to environmental education.
back to scope programs

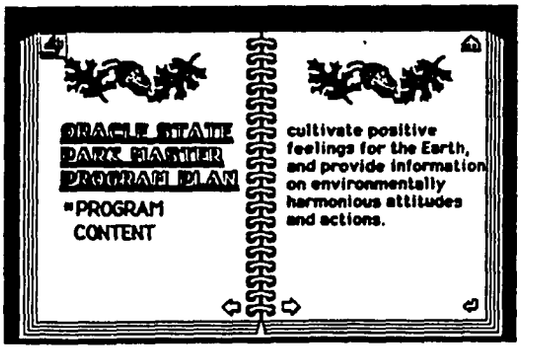

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
opportunities for conferences and staff training
work retreats-
The purpose and duration of work retreats may vary considerably.
back to scope programs

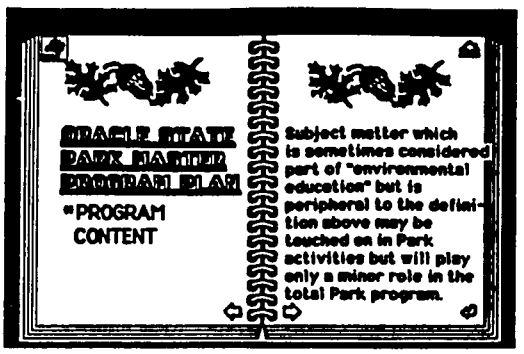

ORACLE STATE PARK MASTER PROGRAM PLAN
*SCOPE
opportunities for conferences and staff training
work retreats-
These will be arranged as needed for groups associated with Arizona State Parks or a wide range of other groups, including state or federal agencies, legislative committees and private environmental organizations.
back to scope programs

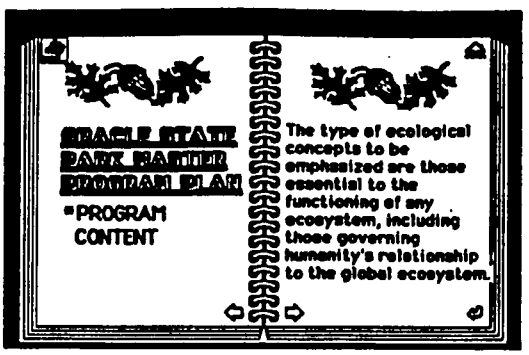

ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
While a wide range of learning experiences will be available at Oracle State Park, priority will be given to environmental education.
back to scope programs

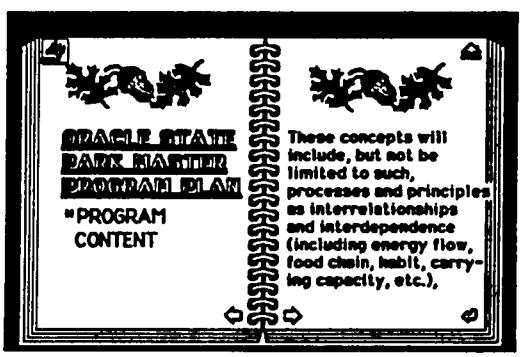

ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
Defined here as education that focuses on the ecological principles that govern life on Earth and on our relationship to those principles and to the Earth.
back to scope programs

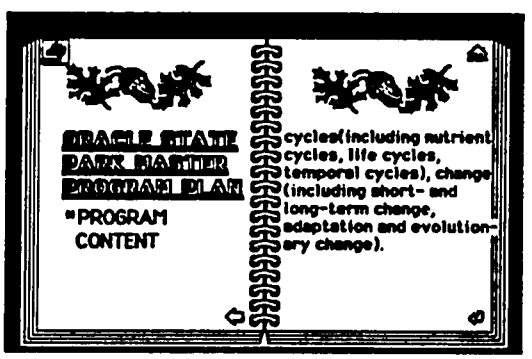

ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
Program content will focus on the basic processes and principles of ecology. Additional content may include experiences that interpret natural and human history, develop sensory appreciation and observation skills,


ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
cultivate positive feelings for the Earth, and provide information on environmentally harmonious attitudes and actions.


ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
Subject matter which is sometimes considered part of "environmental education" but is peripheral to the definition above may be touched on in Park activities but will play only a minor role in the total Park program.


ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
The type of ecological concepts to be emphasized are those essential to the functioning of any ecosystem, including those governing humanity's relationship to the global ecosystem.


ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
These concepts will include, but not be limited to such, processes and principles as interrelationships and interdependence (including energy flow, food chain, habit, carrying capacity, etc.),


ORACLE STATE PARK MASTER PROGRAM PLAN
*PROGRAM CONTENT
cycles(including nutrient cycles, life cycles, temporal cycles), change (including short- and long-term change, adaptation and evolutionary change).

REFERENCE

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