Chapter One: Introduction and Background

Academic libraries have embraced recent developments in information technologies. Computer workstations and training rooms are competing for space with rows of shelves. At the same time, the physical boundaries of libraries are being challenged by the explosion of networked information available on the Internet. It is argued that the physical library is becoming the ‘library without walls’, or the ‘virtual library’ (Holderness, 1992). Libraries are shaping their services in response to changes in technology and at the same time providing the impetus for new developments in technology based on the needs of their users and the shortcomings of the current technology.

The research reported here attempts to place these technological developments in some perspective. It results from a perceived need to investigate new methods for teaching inexperienced academic library users about library-based information technologies and the information seeking process. While the focus of the research is on the development of a multimedia instructional system to teach novice users of an online library catalogue, it approaches the problem through an examination of the characteristics of novice library users and how they interact with library-based information technologies.

The online catalogue, as the library’s central database, is an ideal information technology tool on which to base this research project. The catalogue provides access to a listing of most of the items held in a library’s collection. Increasingly the online library catalogue also provides access to other bibliographic databases, full-text databases and the Internet.
Chapter One: Introduction and Background

It should be noted that the current research is concerned with training in the use of online systems generally available on workstations in libraries or via Telnet from remote locations. It is not concerned with recent developments in World Wide Web-based engines. Ingrid Hsieh-Yee (1996), in a study of undergraduate students at two universities, found online library catalogues to be the most commonly used information channel. Students, teachers, and researchers must learn to use the online catalogue effectively so that they can identify relevant information sources both in their own library and beyond.

The traditional card catalogue has largely been replaced by sophisticated and increasingly complex computer-based online catalogues. Online library catalogues offer many different ways of finding the same information. However, sophistication and complexity do not necessarily imply improvements in usability. Baker (1994, p.64) laments the demise of the card catalogue:

“America’s great libraries are scrapping the card catalogue in favor of the more accessible on-line system, and many librarians are toasting the demise of the musty, dog-eared file card and the bookish image it projects. But are they also destroying their most important — and irreplaceable — contribution to scholarship?”

Baker argues that online catalogues are hard to use, the information on the screen is difficult to read, and doubts whether many people are interested in knowing what a library on the other side of the world has on its shelves.

A review of the literature shows that there is a high failure rate in online library catalogue use. The problems reported tend to fall into a pattern and do not vary significantly from study to study. Titles like ‘When Smart People Fail’ (Peters, 1989), ‘Why are online catalogues hard to use?’ (Borgman, 1986b) express the kind of concerns many information professionals have for the way in which online library catalogues are being used. The problems people experience with online library catalogues are compounded by the fact that there are many different types, each type using a different interface and search software. A recent study by Borgman (1996) confirms that online catalogues continue to be hard to use.
At the same time as libraries have embraced technological change, there has also been a new emphasis on the pedagogical role of the library. Library instruction or bibliographic instruction is the process by which library staff teach library users to identify relevant information sources and to use information technology tools. The renewed interest in library instruction is partly a response to the problems faced by inexperienced library users attempting to use information technologies. Librarians also see a need for library users to be taught how to analyse a need for information and choose the best information sources to satisfy that need.

Traditional methods of library instruction include library tours, small group tutorials, class lectures, computer and electroboard demonstrations, and print instructional materials. More recently, videos and computer-assisted learning packages have also been developed for some products. Sessions are usually based on a particular information technology tool or may be divided into basic or advanced level information skills.

The main limitations of these methods include: the amount of staff time involved in face-to-face teaching; the difficulties in providing suitably qualified staff at all the hours the library is open to run sessions; the lack of hands-on training in demonstration sessions; the usually tight time-frames of the majority of students who are often unwilling to devote more than an hour to library instruction; the dilemma of whether to concentrate on theory or techniques in a one hour session. Attempting to make a session relevant and interesting for a diverse group of students has always been a problem. A more flexible approach to library instruction is required.

People are also accessing information in new ways. Contemporary educational policy promotes the philosophy that everyone should have access to a university education regardless of where they live or their social circumstances. With the increase in computer networking, many users are no longer going to libraries. People are able to access online library catalogues from their homes or offices and then make use of document delivery services. There is a need to investigate alternative methods for teaching information skills to people who have remote access to library-based information technologies.
Current library information technologies fail to incorporate the kind of knowledge and understanding that librarians demonstrate every day in their contact with their users. It is important that new library-based information technologies be developed in consultation with librarians who understand the needs of their users and the difficulties involved in implementing these technologies in an academic library environment. A new kind of instructional system may provide an opportunity to increase the usability of library-based information technologies.

Given the need for a new approach to online library catalogue instruction, the research reported here seeks to identify those areas of online library catalogue use which novice users find problematic. The aim is to “Establish clear views of particular users, their tasks and the environments in which they will be utilizing the technology” (Dillon, 1995, p.209).

An initial user survey (described in Chapter Two) and the researcher’s fifteen years of professional experience in academic libraries suggest that people need help in using online catalogues. People use inappropriate search strategies and are unsure about the information the catalogue provides. Online catalogue users are unaware of many of the advanced software features which greatly improve search capabilities.

Previous research (described in Chapter Two) shows that the use of online library catalogues can be compromised by gaps and mismatches in a user’s conceptual understanding of how a catalogue works. Studies indicate that users need to develop an appropriate mental model of the online library catalogue (Borgman 1986a).

Added to these conceptual gaps are mechanical problems relating to the use of the equipment which provides access to the online catalogue and the information retrieval software which makes it work. Locating items on the library shelves is also an issue for inexperienced users.
Effective use of an online library catalogue requires an understanding of the broader information seeking process. There is a range of information seeking strategies identified by Bates (1989) which includes both manual and technology-based approaches. The inexperienced library user needs to know the scope and limitations of the online catalogue as an information seeking tool.

The current research proposes a structure and user interface for a multimedia instructional system. The proposed structure and user interface are influenced by a number of models of the information seeking process. Dervin’s (Dervin et al., 1982) sense-making theory provides important insight into the way people look for information and how they learn to use library-based information technologies. Belkin’s (1980) ‘anomalous state of knowledge’ approach emphasises the difficulties which people face when using an unfamiliar information system. Kuhlthau (1988) describes the cognitive and affective processes at work when novice users approach using the online library catalogue.

The proposed structure and user interface attempts to provide for different learning styles by operating in three distinct modes:

**Instructional:** teaching the use of online catalogues by addressing the conceptual and mechanical gaps in a user’s understanding of library-based information technologies and the information seeking process.

**Demonstrable:** demonstrating the use of online catalogues by showing the steps involved in a successful literature search.

**Actual:** providing a ‘live’ connection to an online catalogue so that users can put into practice the skills learnt in the other two modes or to identify gaps in their understanding which need to be addressed.
A series of prototypes was constructed and tested beginning with a paper-based representation or storyboard of each screen in the proposed system. Librarians were asked to comment on the overall structure and content of the proposed system. The second prototype was computer-based and including a number of trial interfaces and some screen designs. An example online catalogue simulation was also produced and tested. Several changes were made as a result of the feedback from these tests.

The final prototype, a multimedia instructional system, represents a comprehensive implementation of the proposed structure and user interface. Macromedia Director™ v.4.0.4 is used to integrate elements of text, graphics, video, animation, and sounds to produce a prototype multimedia instructional system. The interface makes use of the familiar metaphor of the library including the physical library, the services it provides and the objects it houses.

The intention of the multimedia instructional system, and this research, is not to produce a final implementation of the proposed system. Rather, it is to provide a high quality prototype that enables the researcher to test user response to a broad range of issues relating to the application of multimedia to the teaching of information access skills.

The prototype multimedia instructional system was tested and evaluated at the University of Western Sydney Nepean Library at the beginning of the 1996 academic year. The planning of the evaluation process raised a number of research questions. How should the system be evaluated? What elements should be evaluated? Which methods should be used? Novice and expert users' opinions of the prototype system are discussed.
The following chapters describe the current research. Chapters Two and Three establish a profile of novice library users and explain how they use online catalogues. Chapter Four presents the proposed structure and user interface for a multimedia system. Chapter Five describes the implementation of the prototype multimedia instructional system. The evaluation methods and the outcomes of the multimedia prototype evaluation process are discussed in Chapter Six. A conclusion and recommendations for further research are presented in Chapter Seven.
Chapter Two: Characteristics of Novice library users

2.1 Summary of Chapter Two

This chapter focuses on the literature dealing with the way in which users interact with library-based information technologies. A particular consideration in the discussion is to examine the characteristics and behaviour of novice users of online library catalogues. The following areas will be investigated:

(i) The characteristics of novice library users, their help-seeking behaviour and learning styles.

(ii) The information seeking process including the cognitive and affective aspects of online library catalogue use.

(iii) The novice library user's need for a conceptual understanding of the operation of the online library catalogue.

Also given particular consideration is the information seeking process itself and the argument that novice library users need to understand this process in order to use the online library catalogue effectively. Using the online library catalogue is only one of a range of information seeking strategies to which novice users need to be introduced.
2.2 The Problem: Novice Library Users

For the purpose of this research, a novice library user is defined as a person who has little or no experience of online library catalogues, or who has some experience with a particular system but must now learn to use a new system. Novice library users may also be people who use an online library catalogue so infrequently that they are unable to remember system details between search sessions. From now on, in the interests of brevity and avoiding repetition, reference to novices should be taken to indicate novice library users except where otherwise specified.

The characteristics of novices which may need to be considered in the design of an instructional programme include:

(i) Novices come from a variety of backgrounds and bring a range of different experiences and skills to the task of finding information.

(ii) Novices may be investigating a number of different subjects simultaneously. This means that the depth of their enquiries will be limited as will be the time they have available to devote to finding information for each subject. Their teachers may provide much of the information they need either in lectures or via the library Reserve Collection. This may negate some of the need for novices to learn how to use the online library catalogue comprehensively.

(iii) Novices are also casual users. Cuff (1980, p. 164) defines a casual user as being “one who uses the terminal only occasionally, spending most of the day doing something different. Such users have little, if any, training in terminal usage”. For this reason there may be a high propensity for mechanical error in usage of the online library catalogue.

(iv) Novices may be unfamiliar with computers and have poor typing and keyboard skills. This may account for many of the problems experienced by users of online library catalogues.
(v) Novices are easily frustrated by computer systems. A catalogue enquiry which produces either no relevant citations or multiple screens of irrelevant citations will increase the anxiety and confusion felt by novices. Anxiety and confusion lead the novice to employ less effective methods of information retrieval, like browsing the library shelves.

An effective instructional programme must take into consideration the difficulties and frustrations experienced by novices.
2.3 Help-seeking Behaviour

Novice users of online library catalogues are generally reluctant to seek help (Keefer and Karabenick, 1993). Novices may have a naive and unrealistic conception of their ability to negotiate an academic library. They may be unaware of the complexity of information retrieval systems and misjudge the amount of time it takes to make a comprehensive and useful search for information. They may also be unprepared to spend the time to learn how to use the library effectively. A period of thirty minutes is regarded by many novices as being an acceptable training period (Borgman, 1986b, p.396).

Keefer and Karabenick (1993, p.66) explain the problem with help seeking in this way:

"... first, in our culture, seeking help is often viewed with disdain, and contrary to an avowed emphasis, even insistence, that people ‘do it themselves’. Second, just the realization that one is incapable of accomplishing a task without ‘outside assistance’ can be a blow to one’s self-esteem. The third major source derives from the potential public disclosure of seeking help with its deprecatory implications — that others will become aware of one’s inadequacies."

It is probable that novices regard library staff as being unapproachable or too busy to be bothered with what appears to them to be a simple online library catalogue enquiry.

Novices with the highest level of need are also those least likely to ask for help. Belkin (1980) argues that many users are unable to frame the questions they want to ask. Librarians know that information desks in academic libraries serve a very small percentage of the student population. In the United Kingdom, Line (1963) found that 39% of undergraduates at the Southampton University were unwilling to ask library staff for help. The University introduced a programme in an attempt to promote the library’s Reference Services. In a follow-up survey Line and Tidmarsh (1966) found that 31% of undergraduates still revealed reluctance to seek help from library staff.
The discussion of help-seeking behaviour in libraries suggests that motivating novice users of online library catalogues to use an instructional programme will be a significant design problem. It is likely that an instructional programme will need to provide a non-threatening environment for novices to learn and practise information skills.\footnote{The text in italics throughout this document indicates key points which will need to be addressed in the proposed structure and user interface (Chapter Four).}
2.4 Learning Styles

In addition to the process of seeking assistance, it is also necessary to consider possible differences in the way novices learn. The work of Kolb (1984; Sadlersmith, 1996; Simon; Werner, 1996) has been largely responsible for the widespread acceptance of the view that instruction must take into account individual learning styles.

Kolb’s experiential learning theory emphasises the role that experience plays in the learning process. Kolb (1984, p. 20) argues for “a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior.” Kolb found that people fall into four basic types of dominant learning styles: convergers, divergers, assimilators, and accommodators. These styles are characterised by preferences for concrete or abstract ways of understanding the world and active or passive ways of interacting with the world.

There have been a number of studies which evaluate the ability of instructional multimedia programmes to account for individual learning styles. Pearson (1994) explored the extent to which students' learning was facilitated by the use of computerised multimedia presentations. Two-thirds of the students surveyed claimed that they learnt more when multimedia was used. The remaining one-third was mostly neutral and evenly distributed across all four of Kolb’s learning styles. In addition, 94% of the students reported that the use of multimedia segments made the class entertaining.

An interactive videodisc study by Carlson (1991) showed that achievement for observational skills increased when learning style matched the mode of instruction. The results of Carlson’s study suggests that individuals with particular learning styles may respond more positively to certain methods of presenting information than they do to other methods. For example, some people may prefer a simulation where they are actively involved in finding out how a system works, whereas others may prefer a demonstration where they are able to observe passively how a system operates.
Kolb’s belief (1984, p.38) that “learning is the process whereby knowledge is created through the transformation of experience” is important when considering how best to design an instructional programme for novice users of online library catalogues. Kolb’s experiential learning theory may be applied to this problem in three ways. Firstly, by incorporating the knowledge of expert users (i.e., librarians) into the system so that novices are able to make use of it, secondly, by developing the programme in such a way as to encourage novices to explore and experience for themselves the tasks involved in the information seeking process, thirdly by providing a range of concrete or abstract and active or passive options as part of the instructional content.

While exploration or discovery learning is seen as being desirable, just how much freedom a user should have to navigate an instructional programme needs to be considered. Green and Gilhooly (1990) investigated the differences in learning strategies adopted by novice users of a computer-based statistics package called MINITAB. They found that novices could be divided into ‘fast’ and ‘slow’ learners. ‘Fast’ learners employed more exploratory and problem-solving strategies while ‘slow’ learners relied more on trial and error and were more repetitive in their use of examples. Their study suggests that an interface which allows complete freedom of navigation may be more appropriate for novices who are ‘fast’ learners than those who are ‘slow’ learners.

There is a danger, with instructional programmes which allow a high degree of user-directed navigation, that ‘slow’ learners will not fully explore the system. An instructional programme may need to provide a balance between a structure which promotes exploration and a structure which provides slow learners with the kind of direction they will need to realise the instructional goals of the system.
2.5 The Information Seeking Process

Three models of the information seeking process proposed by Kuhlthau (1991), Belkin (1980), and Dervin and Dewdney (1986) provide insight into the ways in which novices interact with the online library catalogue. In particular, these models describe the cognitive and affective processes experienced by users involved in a search for information. An evaluation of these models suggests that an instructional programme may need to consider the users' confusion and uncertainty in the early stages of the information seeking process and their individual and different requirements for help during that process.

Kuhlthau (1991) describes information seeking in a six stage model which she calls the 'Information Seeking Process.' Belkin's (1980) 'Anomalous State of Knowledge' suggests that in a search for information, there is a conflict between what users know about the subject or topic and what they need to know to satisfy their information needs. This conflict may result in feelings of anxiety and uncertainty on the part of the user. Dervin and Dewdney (1986) describe information seeking as a process of constructing meaning or 'sense-making.' These models are 'user-centred' in that they address the information retrieval process from the user's point of view rather than the views of developers of library-based information technologies.

According to Kuhlthau (1991, p.361) the information seeking process "is the user's constructive activity of finding meaning from information in order to extend his or her state of knowledge on a particular problem or topic." A search for information is not usually satisfied by a series of online catalogue enquiries or a ten minute reference interview. The information seeking process is one of gradual understanding both of the information need and of the strategies required to satisfy that need.
Kuhlthau (1988) investigated the library search process of high school students about to go to university. The research is particularly relevant to the current topic because it was conducted in an academic library setting and examines the way in which the students go about finding information to complete their assignments. Kuhlthau found a high level of anxiety and lack of understanding of the library system. She also found that anxiety may be an inherent characteristic of the information seeking process itself.

Kuhlthau’s (1991, p.367) six stage model of the information seeking process begins with Stage 1 (Initiation), which is characterised by feelings of uncertainty and general or vague thoughts about the task in hand. Stage 2 (Selection of a topic) is usually followed by feelings of optimism, while Stage 3 (Exploration) of the topic causes confusion, doubt and frustration. Stages 4 & 5 (Formulation and Collection) are characterised by feelings of clarity and confidence and by narrowed and focused thoughts as the user begins to understand more about the topic. Stage 6 (Presentation) is characterised by relief and satisfaction at having completed the task.

It appears that it may be useful to include in an instructional programme, a description of the stages identified by Kuhlthau. If novices are made aware of these stages it may help them to use the online library catalogue more effectively or at least make them feel better about it. Perhaps taking an example essay topic, demonstrating how to find information on the topic, and explaining how people usually feel and think at each stage of the process would be an appropriate way to develop a user-centred instructional programme.
Belkin (1980) based the ‘Anomalous State of Knowledge’ (ASK) model on his investigation of how professional intermediaries work with their clients. He found that most information seekers are unclear about the subject of their search. “The user’s initial difficulty in specifying or even explicitly recognizing and specifying what is necessary to make this better is a common idea...” Belkin (1980, p.136). Belkin’s research is useful in explaining why people have so much trouble in conducting subject enquiries in online library catalogues. Undergraduate students who must find some information for an essay may be in an ‘Anomalous State of Knowledge’ because they often have little or no understanding of the topic they are about to research.

Belkin (1980) argues that information retrieval systems should place as much emphasis on representing the information needs of users as they do in representing the documents or texts they index. Existing information retrieval systems contribute to the user’s ‘Anomalous State of Knowledge’ because they “depend crucially upon exact specification of what is needed to resolve the user’s information problem, and yet, given the hypothesis that information need is non-specifiable, such a system cannot work at theoretically optimal limits” (Belkin, 1980, p.139). An instructional programme may address this problem by providing users with appropriate strategies which will help them to begin to overcome their initial confusion and uncertainty.

Sense-making theory focuses on the cognitive strategies which individuals adopt when confronted with new situations. The development of sense-making theory is closely linked to the research of Brenda Dervin. “Briefly, the approach posits that information seeking and information-using occur when individuals find themselves unable to progress through a particular situation without forming some kind of new ‘sense’ about something” (Dervin & Dewdney, 1986, p.507). Dervin argues that people are not passive processors of information, they actively seek, create and use information to make sense of unfamiliar situations.
Dervin (Dervin & Nilan, 1986, p.21) has developed a model of the sense-making process she calls ‘Situation-Gap-Use’. The term ‘Situation’ refers to the space-time context at which sense is constructed while the ‘Gap’ comprises the stops or barriers to movement. ‘Gap-bridging’ refers to the cognitive or procedural strategies adopted by an individual in addressing the gap. Gap-bridging is characterised by questioning and information gathering. The process of gap-bridging varies depending on the individual and the problem being addressed. Individuals will develop their own understanding of a situation based on their use of the information provided or the answers to questions they have asked. The term ‘Use’ refers to the ways in which the individual uses the strategies learnt or developed during the gap-bridging process.

Dervin has investigated the information needs of library users by:

“asking people to indicate what questions they had in the most important troublesome situation, what strategies they used to get answers, what kind of help they wanted from answers, what barriers they saw as standing between them and getting help, and how the answers helped” (Savolainen, 1993, p.15).

An instructional programme could adopt the principles of sense-making by acting as a ‘gap-bridger.’ The programme could seek to address those questions which are commonly faced by novices involved in a search for information. It may also be important to introduce the key components of online catalogue use in stages. In this way an instructional programme would facilitate the process of construction which occurs when people are confronted with a new learning situation.
A discussion of the work of Kuhlthau (1991), Belkin (1980) and Dervin (Dervin & Dewdney, 1986; Dervin & Nilan, 1986; Dervin et al., 1982; Savolainen, 1992, 1993) indicates that an instructional programme may need to present the online library catalogue in the context of the broader information seeking process. A system which merely describes how to use the online library catalogue may not fully address the information needs of novices. Novices, at the very least, require some understanding of what the online library catalogue can provide and where else they can go to look for information. A *practical application of this idea would be to include a demonstration of a range of alternative information seeking strategies in an instructional programme.*
2.6 Information Seeking Strategies

Bates (1989) proposes a model of information searching based predominantly on manual techniques which she calls 'berrypicking.' The 'berrypicking' analogy emphasises the need for librarians to teach a range of information seeking strategies rather than concentrating on specific information tools. Bates argues that this model is close to the real behaviour of people involved in a search for information.

Bates contends that there is a universe of information available. Users:

"may begin with just one feature of a broader topic, or just one relevant reference, and move through a variety of sources. Each new piece of information they encounter gives them new ideas and directions to follow and consequently, a new conception of the query. At each stage they are not just modifying the search terms used in order to get a better match for a single query. Rather the query itself (as well as the search terms used) is continually shifting, in part or whole." (Bates, 1989, p.410)

The information search evolves as the searcher moves from one berry bush to another, picking what is regarded as being the best fruit. The online library catalogue is an important tool for finding information but there are also a number of other 'berrypicking' strategies which are useful and which more closely follow the 'natural' ways in which people gather information. It is important for novices to understand both the scope and limitations of the online library catalogue, and, perhaps more critically, the existence of other approaches to finding information.

Bates identifies a number of berrypicking strategies which complement the use of the online library catalogue (Bates, 1989, p.412). These include:

- Footnote chasing — following up references found in works which have already been read.

- Citation searching — using a citation index to identify new authors from those who have referred to works which have already been read.
• Journal run — searching through print copies of known journal titles to find relevant articles.

• Area scanning or browsing — searching library shelves in an area where other useful works have been found.

• Indexing and abstracting services — searching bibliographic databases.

• Author searching — looking for other works published by an author who is an authority in the area.

Other 'berrypicking' strategies not mentioned by Bates but which may be useful to novices are:

• Searching on similar call numbers.

• Following up recommendations from teachers and colleagues.

• Searching for keywords in titles.

• Looking for items published by co-authors.

• Using the indexes and contents pages of books which broadly survey a particular subject area.

• Using items held in the Reference Collection to define terms and provide background reading.

The 'berrypicking' analogy suggests that the information seeking process is web-like, with a single information source leading to multiple information sources whose relevance must be assessed and evaluated. An instructional programme may improve a novice's understanding of the information seeking process by adopting this web-like structure. An instructional programme would further promote a holistic approach to teaching information skills by including a description of the information seeking techniques identified by Bates and others.
2.7 Mental Models

A mental model is the user's "knowledge of how the system works, what its components are, how they are related, what the internal processes are, and how they affect the components" (Carroll & Olson, 1988, p.47). Norman (1983) argues that the mental models adopted by users of information systems are often inappropriate because they are inaccurate, incomplete and sometimes superstitious. Norman (1983) suggests that designers can help people to use information systems more effectively by providing them with a sound conceptual framework on which to base their mental model. The conceptual framework provided by a designer is known as a conceptual model.

Several studies examine the role of the user's mental model of an online library catalogue in contributing to search results. These studies argue that users must have an appropriate mental model of an information system in order to be able to use the system to its full potential. They promote the thesis that some of the problems which people experience in using the online catalogue result from a poor understanding of how the system operates. They argue that if a user was provided with training based on what they regard as an appropriate conceptual model of the online catalogue, those problems would be reduced.

Christine L. Borgman (1986a) explored the effect on search success of providing users with a particular conceptual model of an online library catalogue. She took two separate groups of undergraduate students and trained one group using a conceptual model based on a card catalogue analogy and the other using a step-by-step procedure which was based on the mechanics of the system.

Borgman hypothesised that those trained using the conceptual model would be able to describe and understand the structure and operation of the online catalogue in terms of that model and would be better able to search the online catalogue. Those users trained with the procedural instructions would be able to perform simple tasks but not be able to complete more complex tasks because they would not develop an appropriate mental model of the system based on Borgman's conceptual model.
Borgman found that subjects from both groups were largely unable to describe the online catalogue in terms of her conceptual model. Borgman acknowledged the methodological difficulties involved in eliciting a person's mental model. She argued that some people may be unable to articulate their mental models. However, Borgman did find that those subjects who received the conceptual model training "performed better on complex tasks that required extrapolation from the basic operations of the system" (Borgman, 1986a, p.47).

Given that online library catalogues have now almost completely replaced card catalogues in libraries, the card catalogue may no longer be the best analogy on which to base a conceptual model of the online catalogue. Personal computers are now widespread in both the home and the office. Many novices may be familiar with the operation of simple database software. A model which offers an explanation based on a card file but which allows novices to build on their understanding by describing the operation of a simple electronic database is likely to be a more appropriate representation of an online library catalogue.

According to Borgman "perhaps the most important finding from this experiment is not the mental models result but the likelihood of individual differences in the ability to use this particular technology" (Borgman, 1986a, p.61). Subjects who were enrolled in maths, science and computing courses scored higher in the benchmark tests than subjects enrolled in social sciences and humanities courses. This finding supports the discussion, earlier in this chapter, of the need for technologies to support individual differences and learning styles.

Huthwaite (1993) has investigated the use of visual representations of the subject-access component of online library catalogues and the resulting effect on search success. She has developed two training packages, one which includes a conceptual model of an online catalogue, the other based on a set of step-by-step instructions. The conceptual model training package is paper-based and includes a set of diagrams demonstrating online catalogue file structure and search functions.
Huthwaite has tested the conceptual model training package on undergraduates at the Queensland University of Technology. Although the results of the research have not yet been published, personal communication (Huthwaite, 1995) suggests that there has been little difference between the performance of the model and non-model groups. An instructional programme which employs dynamic simulation rather than the static diagrams used by Huthwaite, has the potential to produce results which show a clearer distinction between model-based and procedural training.

Dimitroff (1992) also investigated the relationship between a user’s mental model of a bibliographic retrieval system and search outcome. The system used in her study was the University of Michigan’s MIRLYN. According to Dimitroff, an appropriate mental model of the MIRLYN system included eight components:

(i) the contents of the database — the fact that it covers a limited range of years and an indication of the scope and types of material it indexes, etc.

(ii) the interactive nature of the system — the fact that a workstation or terminal in the library is connected to a mainframe computer which receives and sends information.

(iii) the availability of more than one database — many online catalogues provide access to more than one database using a common interface.

(iv) knowledge of multiple fields within records — every item listed in a database has a bibliographic record which includes a number of fields of information.

(v) knowledge of multiple indexes and/or inverted indexes — some online catalogue enquiry options search indexed fields and require search terms to be entered in a certain format.
(vi) Boolean search capability — Search terms may be linked by the use of the Boolean operators AND, OR and NOT. Boolean searching allows the user to be more specific about the scope of a search.

(vii) keyword search capability — many online catalogues allow free-text keyword searching using multiple terms. Keyword searching may also be restricted to specific fields.

(viii) use of a controlled vocabulary — enquiries on a particular subject generally involve using Library of Congress Subject Headings. The controlled vocabulary involves using a thesaurus and understanding system prompts which refer a user to a correct or a related subject heading.

In contrast to Borgman and Huthwaite, Dimitroff's subjects were not provided with training. The subjects were required to have at least one experience using the online catalogue so that they would have a mental model of the system which could be tested. Interviews were conducted to assess the completeness of each subject's mental model based on the 8 components described above. Dimitroff (1992, p.147) found that only 6.3% of subjects were able to describe a complete mental model (8 components) but 25.4% had good mental models (6 or 7 components). Another 25.4% had incomplete mental models (4 or 5 components) and 42% had poor mental models (fewer than 4 components).

Post-interview tests showed that although users may not have been able to articulate a complete mental model based on the components described above, they were able to perform simple database enquiries adequately. Dimitroff hypothesised that there may have been enough information provided by the system to explain the basics of its operation thus negating the need for users to have what she would regard as a complete mental model.
Subject searching proved to be more problematic. The most frequent type of error was the use of too few search terms in an enquiry on a particular subject. The use of incorrect subject headings was the second most frequent error. Dimitroff (1992, p.148) found that “the mental model possessed by most subjects was inaccurate or nonexistent with regard to the subject-access component of the system.”

It may be unrealistic to expect novices to be able to describe the online catalogue according to Dimitroff’s eight stage model. In particular, the idea of all library users being required to understand about the existence of indexed or inverted files and being able to conduct Boolean searches is questionable. A basic understanding of the content, database structure, and an explanation of the differences between the various search options would seem to be a more appropriate instructional goal for training novices.

The information skills session described by Geffert (1995) provides a more balanced view of the conceptual understanding of the online library catalogue required by novices. According to Geffert, effective online library catalogue instruction will include three fundamental concepts: catalogues consist of a number of records; records consist of fields; electronic searching is nothing more than looking for a given term in a given field. He calls this strategy “demythologizing online catalogs” (Geffert, 1995, p. 27).

The St. Olaf College library instruction sessions conducted by Geffert and his colleagues stress that every enquiry, no matter how complex, does nothing more than tell the computer where to look and what terms to find. According to Geffert these concepts are transferable because “librarians provide students with a logical structure that can be applied to virtually any electronic index or catalog” (Geffert, 1995, p. 33).

Geffert’s three fundamental concepts may be usefully incorporated in an instructional programme by including a section which simulates and demonstrates the operation of an online catalogue. The online catalogue could be compared to searching a card file or to the basic structure and operation of an electronic database.
Chapter Two: Characteristics of Novice Library Users

The work of Borgman, Dimitroff and Huthwaite suggests that the subject-access component of online searching may require some emphasis in an instructional programme. There have been many online catalogue case studies reported in the literature which identify this as a major problem area. The effectiveness of subject enquiries performed by novices may be improved by an explanation of the concepts involved in controlled vocabulary and keyword searching.

While Borgman, Huthwaite, and Dimitroff argue that a conceptual understanding of the operation of the online catalogue may help improve search results, there are some doubts about the effectiveness of model-based training. These doubts relate mainly to the difficulties of determining the precise nature of an appropriate conceptual model and the recognition that a user's mental model can be a "messy, sloppy, incomplete, and indistinct" structure (Norman 1983, p. 16).

There is also some evidence to suggest that while a mental model may enhance a user's initial understanding of a system, this understanding may be incomplete and require constant modification based on the user's subsequent experience of the system (Sebrechts and Marsh, 1989). If an instructional programme presents a conceptual model of the online catalogue it must also provide the learning strategies which will allow novices to revise and develop their understanding of the system over time. However, it is apparent that there is no direct relationship between the mental model concept and Kolb's typology of learning styles. Linking these strands formally is recognised as a major research undertaking and considered beyond the scope of this work.
2.8 Review of Chapter Two

This chapter has examined the characteristics and behaviour of novice users of online library catalogues. The aim has been to come to some understanding of the requirements for an effective programme to instruct novice users of online library catalogues. Novices may be reluctant to engage in training programmes and to seek help. Novices also learn in different ways. An effective instructional programme will need to motivate novices and provide a number of different learning strategies.

Novices require a conceptual framework on which to base their use of the online catalogue. Providing a balance between instruction which demonstrates how to use an online catalogue, and which teaches the concepts involved in information retrieval, may provide the basis for effective online catalogue instruction.

Novices approach a search for information in a state of confusion and anxiety. They may be unsure of how an online catalogue works and how information is organised in a library. Teaching the use of library-based information technologies in the broader context of the information seeking process is likely to result in a more user-centred instructional programme.
Chapter Three: Online Library Catalogues

3.1 Summary of Chapter Three

This chapter reports on an initial survey conducted as part of this research project to provide qualitative information about the instructional needs of users of online library catalogues. The emphasis is on investigating how novices interact with an online catalogue and what their requirements might be for an effective instructional programme.

The results of this survey are analysed and compared with the findings of similar user studies reported elsewhere in the literature. The results of the current survey identify those mechanical and conceptual aspects of online catalogue use which may need to be addressed in library instruction.
3.2 The Online Library Catalogue Survey

An initial online library catalogue usage survey was conducted as part of this research project. The survey was used as a means of gathering qualitative information to be used in the design of an instructional programme for novice users of online library catalogues. The survey was conducted at the University of Western Sydney Nepean during the first semester of the academic year in April 1995. The Library had recently implemented the online catalogue developed by Data Research Associates (DRA). The majority of the people surveyed were novice users of the new system.

The aims of the survey were:

(i) To investigate how novice users of academic libraries interact with online catalogues and to determine the questions they most often ask about the system.

(ii) To examine those areas of online catalogue usage which people find difficult. These problems may be mechanical and relate to operational aspects of the equipment and software, or be conceptual and relate to gaps or mismatches in people's understanding of the information seeking process.

(iii) To identify online catalogue features or search options which are being under-utilised. With further explanation and instruction these features may improve the efficiency and effectiveness of online catalogue searching.

(iv) To list specific training or assistance needs for use in designing an instructional programme for novice users of online library catalogues.

There is a significant body of research regarding the use of online library catalogues. The greater proportion of this research has been undertaken in the form of user surveys, observations and interviews. Transaction logging (a method of electronically recording search sessions) has also been used. The results of the current survey are compared and contrasted with the findings of other relevant studies reported in the literature.
3.3 Methodology

Seventy (70) subjects were interviewed. The subjects were chosen at random from people using the online catalogue in the University of Western Sydney Nepean libraries who volunteered to be interviewed. The majority were undergraduate students undertaking degrees in the social sciences and humanities. The subjects were either inexperienced users of online library catalogues or first-time users of the DRA system. Only one third of the subjects stated that they had received any formal online catalogue training.

The survey involved short interviews with online catalogue users who agreed to participate in the study. Other librarians, not directly involved in the research, conducted the interviews at the University of Western Sydney Nepean libraries. The librarians asked a number of questions relating to the user’s present and past experiences with online catalogues (see Appendix One). The questions were open rather than multiple choice. The librarians were asked to probe for useful feedback if an inadequate response to a particular question was given.

The responses were recorded on a questionnaire and later analysed. The intention of the survey was to provide qualitative results rather than statistically significant correlations. Basic statistical information is given, however, to indicate the general range of responses.
Basic statistical information about the results of the survey is presented using the following format:

<table>
<thead>
<tr>
<th>Response</th>
<th>Number of occurrences</th>
<th>% of subjects</th>
</tr>
</thead>
</table>

In questions where a range of options are presented, a subject may choose more than one option.

In questions where subjects were able to choose more than one option, the total number of occurrences may be greater than 70.

The number of occurrences is expressed as a percentage of the total number of subjects (n=70), i.e., the number of respondents choosing any particular option is expressed as a proportion of the total number of respondents. The maximum percentage for a particular response is 100. The sum of the percentages for a particular question may be greater than 100 where the total number of occurrences is greater than the total number of subjects. An alternative may have been to express the responses as a percentage of the total number of occurrences rather than of the number of respondents. However, the researcher was primarily interested in the frequency with which subjects chose particular courses of action.
3.4 Analysis

Current search

Question 1
What are you looking for?

<table>
<thead>
<tr>
<th>Specific item</th>
<th>30</th>
<th>43%</th>
<th>Subject</th>
<th>40</th>
<th>57%</th>
</tr>
</thead>
</table>

There is a debate in the literature regarding the frequency of specific item searching compared to subject searching. Two studies conducted at University libraries in the United States illustrate this debate. Wallace (1993) argued that subject searching is twice that of any other type. Kilgour (1995) claimed that author/title searches comprise the majority of online catalogue searches.

The results obtained by other user studies may be explained by a range of factors:

- The nature of the user population varies from study to study. For example, a study whose subjects are primarily from science and engineering backgrounds may produce different results from a study whose subjects are primarily from social sciences and humanities backgrounds.

- Results may vary according to the type of library in which the survey is conducted. The way in which people search for information at a public library is different from the way in which students look for information in academic libraries.

- There are many different online catalogue systems in use in libraries. Each system provides a unique set of features and operations. People may adopt different approaches using these systems.
• Results may vary according to the time of year a survey is conducted. Undergraduate students are primarily engaged in locating references at the beginning of a semester, and researching essay topics towards the end of a semester.

• The design of the user study and the method of collecting the information will influence the results. In a study which relies on an analysis of a transaction log, an author search may appear to be an attempt to find a known item. If the person who made that search was interviewed, they may say that they were looking for information on a subject and that a particular author who writes about that subject was recommended to them.

Although not statistically significant, the results from the current survey support the suggestion that more online library catalogue users are looking for information on a subject than for a particular item. This finding adds support to the view that an instructional programme for novices of online catalogues should place some emphasis on the processes involved in finding information on a particular subject.
Chapter Three: Online Library Catalogues

Question 2
What options will you use from the online catalogue to find this information?

<table>
<thead>
<tr>
<th>Option</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>28</td>
<td>40%</td>
</tr>
<tr>
<td>Title</td>
<td>29</td>
<td>41%</td>
</tr>
<tr>
<td>Subject</td>
<td>23</td>
<td>33%</td>
</tr>
<tr>
<td>Author keyword</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Title keyword</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Subject keyword</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Keywords</td>
<td>7</td>
<td>10%</td>
</tr>
<tr>
<td>Expert keyword</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Numeric</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

This question required people to indicate which catalogue search options they would choose to satisfy their current information need. The options in the table above are in the order in which they appear on the catalogue’s pull-down Find Menu. Author, Title and Subject are term indexed or phrase indexed and require search terms to be entered in a specific order. Author, Title and Subject keyword looks for the occurrence of search terms or words in a particular field. Keyword is a free-text search across a range of fields. Expert keyword allows the user to link search terms using Boolean operators. Numeric searches refer only to those fields which contain numeric information (e.g. call number and ISBN). Respondents were able to choose more than one option.

Author, Title and Subject searches make up 80% of all search options used by the 70 respondents. This result may be explained by a number of factors:

- Users may be confining their searching to the three basic options they used in the Library’s previous online catalogue system. Multiple keyword searching was not available in the previous system.

- Users may not be aware of the other options available to them or may be unable to use those options.

- Users do not understand what ‘keyword’ means.
• Users aren’t selecting search options beyond the first three options listed on the Find menu.

Zink’s (1991) study of the WolfPAC online catalogue found that 80% of searches were either author, title or subject. Keyword-in-title searches accounted for only 2% of all searches. Ballard (1994) reported that keyword searching at Adelphi University never went higher than 5%. Six months after Ballard’s study was completed, the search menu was changed to list Keyword as the first option. As a result, Ballard found that keyword searching rose to 14%.

Keyword searching is regarded by librarians as an important alternative strategy for finding information on a subject. Zink (1991) suggested that many of the problems searchers encounter would be alleviated if they used keyword searching more and the standard card catalogue access points of author, title and subject less. Respondents in the current survey showed a low rate of preference for keyword searching.

Those respondents who said that they were looking for a specific item (n=30) chose the following options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
<th>Percentage</th>
<th>Option</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>19</td>
<td>63%</td>
<td>Subject keyword</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Title</td>
<td>16</td>
<td>53%</td>
<td>Keywords</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Subject</td>
<td>0</td>
<td>0%</td>
<td>Expert keyword</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Author keyword</td>
<td>0</td>
<td>0%</td>
<td>Numeric</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Title keyword</td>
<td>2</td>
<td>7%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Those respondents who said that they were looking for a subject (n=40) chose the following options:

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
<th>Percentage</th>
<th>Option</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>9</td>
<td>23%</td>
<td>Subject keyword</td>
<td>8</td>
<td>20%</td>
</tr>
<tr>
<td>Title</td>
<td>13</td>
<td>33%</td>
<td>Keywords</td>
<td>6</td>
<td>15%</td>
</tr>
<tr>
<td>Subject</td>
<td>23</td>
<td>58%</td>
<td>Expert keyword</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Author keyword</td>
<td>0</td>
<td>0%</td>
<td>Numeric</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Title keyword</td>
<td>1</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter Three: Online Library Catalogues

There was a much greater variation in the range of options used to find material on a subject. Respondents who said they were looking for information on a subject chose the author or title (22) options nearly as often as they did subject (23). This variation may in part be due to people searching for material by an author who writes in the subject area they are researching. Personal experience also suggests that students often attempt to find information on a subject by using the Title option. This behaviour is reinforced by the fact that the user nearly always receives a list of titles as a result of such a search. However, this kind of enquiry will only be effective if there is an item listed in the online catalogue whose title begins with the search terms used. It would appear that novices may not understand the differences between the various search options provided by online catalogues.

The literature describes in detail the problems people have with subject searching in online catalogues. Larson (1991) reported a failure rate of 48.6% while Hunter (1991) found that 62% of subject searches were unsuccessful. This may be because people are unaware that a subject search involves using the controlled vocabulary of the Library of Congress Subject Headings. Alternatively, they may have problems identifying appropriate Library of Congress subject headings for their particular topic of investigation. Formulating subject searches and interpreting the search results are also reported as being problematic.
Question 3
Have you considered using alternative search options?

<table>
<thead>
<tr>
<th>Author</th>
<th>5</th>
<th>7%</th>
<th>Subject keyword</th>
<th>9</th>
<th>13%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>6</td>
<td>9%</td>
<td>Keywords</td>
<td>15</td>
<td>21%</td>
</tr>
<tr>
<td>Subject</td>
<td>11</td>
<td>16%</td>
<td>Expert keyword</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Author keyword</td>
<td>2</td>
<td>3%</td>
<td>Numeric</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Title keyword</td>
<td>3</td>
<td>4%</td>
<td>Choose database</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>None</td>
<td>31</td>
<td>44%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This question was intended to further explore the respondents' understanding of the full range of search options available on the Find menu. The respondents were asked to indicate if they would use any other options as an alternative to the options they listed in question two.

In the current survey 44% of respondents said that they had not considered using search options additional to the ones they chose in Question 2. It may be that users give up after trying one search option or they are unaware of the other options available to them. This argument is supported in the literature which reports that people are generally unwilling to refine search strategies or to try alternative search options (Cherry et al., 1994).

Users may finish their enquiries once they have found something on their topic. This does not necessarily mean that they have found everything of interest in the Library on their topic or that they have identified the most relevant items for their enquiry.

The range of search options available in online catalogues in fact provides many different ways of finding the same items. Effective use of the online catalogue requires careful consideration of the most appropriate search strategy and, particularly with subject searching, the use of a number of different search options.
Training

Question 4
How did you learn to use the online catalogue?

<table>
<thead>
<tr>
<th></th>
<th>50</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self taught</td>
<td>50</td>
<td>71%</td>
</tr>
<tr>
<td>Friend</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Training session</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>Librarian</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>No response</td>
<td>4</td>
<td>6%</td>
</tr>
</tbody>
</table>

The current survey results suggest that most of the respondents had no formal online catalogue training. A typical response was that an understanding of how to use the online catalogue was a result of 'trial and error.' A study by Green and Gilhooly (1990) found that 'slow' learners of a computer system employed trial and error learning strategies while 'fast' learners (as discussed in Chapter Two) used strategies based on exploration and problem solving. An instructional programme may help slow learners by encouraging the use of more appropriate learning strategies.

The University of Western Sydney Nepean Libraries provide online catalogue instruction through information skills sessions, appointments with reference librarians and the availability of printed guides. Borgman (1986b, p. 396) argued for the development of alternative instructional strategies by stating:

"We need to experiment with ways of making training more palatable, both online and offline. It may be necessary to make systems more self-instructional, either through embedding computer-assisted instruction or other user-feedback techniques in systems or by setting up offline training simulators that would alleviate some of the system load."

Given this argument, it may be appropriate to design an instructional programme which allows a 'live connection' to an online catalogue so that users have an opportunity to experience the information seeking process first-hand as well as learning from the instructional components of the system.
Question 5
Have you used the help screens?
Did they help you to use the online catalogue?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>13</td>
<td>19%</td>
</tr>
<tr>
<td>No</td>
<td>53</td>
<td>76%</td>
</tr>
<tr>
<td>No response</td>
<td>4</td>
<td>6%</td>
</tr>
</tbody>
</table>

Respondents seemed generally unwilling to use the online help screens. Of the 13 respondents who had used the help screens, only 8 (62%) had found them useful. Cherry et al. (1994) reported that the messages provided by help screens in online library catalogues are not particularly helpful.

The DRA online library catalogue was originally designed to run on terminals rather than personal computers. As a result, there are references to function keys that don’t appear on the personal computer keyboards installed in some Library locations. Instructions to press the ‘Next’ or ‘Previous’ keys (PageDown and PageUp) to scroll through a list make very little sense to the user of a keyboard lacking such keys. Hsieh-Yee (1996) found that 60% of the undergraduate students she surveyed learned how to use the online catalogue via on-screen instructions. Janosky, Smith and Hildreth (1986) report on the negative effect incorrect or inappropriate system prompts have on the user’s understanding of the system.
Question 6

Have you had any catalogue training?

<table>
<thead>
<tr>
<th>Yes</th>
<th>23</th>
<th>33%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>44</td>
<td>63%</td>
</tr>
<tr>
<td>No response</td>
<td>3</td>
<td>4%</td>
</tr>
</tbody>
</table>

Despite the University of Western Sydney Nepean Library offering twice daily, one hour information skills sessions, most of the survey respondents had not received instruction for the DRA online catalogue. Fifteen of the respondents who had received some instruction were trained to use the Library’s previous online catalogue or another library’s system. Of the 23 respondents who had received some training, 19 indicated that the training had been useful.

There is a tendency amongst members of the information science profession to blame poor usage of online catalogues on system design and, in particular, difficult user interfaces (Crawford, 1992). While it may be true that some online catalogues are not easy to use, it must also be true that some users lack the required knowledge and experience to conduct effective catalogue enquiries.

Nielsen and Baker (1987) found that users who received some bibliographic instruction tend to get better results from online catalogue searches than those who receive no instruction.
Problems

Question 7
If you can’t find something using the catalogue, what do you do?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask a librarian</td>
<td>21</td>
<td>30%</td>
</tr>
<tr>
<td>Ask at the Information desk</td>
<td>13</td>
<td>19%</td>
</tr>
<tr>
<td>Ask at the Circulation desk</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Ask a friend</td>
<td>7</td>
<td>10%</td>
</tr>
<tr>
<td>Ask a lecturer</td>
<td>6</td>
<td>9%</td>
</tr>
<tr>
<td>Browse the shelves</td>
<td>6</td>
<td>9%</td>
</tr>
<tr>
<td>Use the online help screens</td>
<td>6</td>
<td>9%</td>
</tr>
<tr>
<td>Try other catalogue search options</td>
<td>5</td>
<td>7%</td>
</tr>
<tr>
<td>Give up looking</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>Go to another library</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>Assume the item is not held</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Look for an alternative title</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Use the catalogue help sheet</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Check the Reserve collection lists</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Use a periodical index</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Assume that the user is at fault</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

This question sought to identify the help-seeking strategies of the user population. Forty two responses involved seeking help from library staff either at a service point or through more informal contact. This survey found little evidence of the psychological barrier between library staff and students reported by Keefer and Karabenik (1993).

The vast majority of responses involved seeking help from other people. This may have been from library staff, friends or lecturers. The remaining responses involved a wide range of strategies which represent useful, alternative ways of finding information in a library.
**Question 8**

Which catalogue features or options would you like more information about?

<table>
<thead>
<tr>
<th>Feature</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose database *</td>
<td>19</td>
<td>27%</td>
</tr>
<tr>
<td>Related titles search *</td>
<td>19</td>
<td>27%</td>
</tr>
<tr>
<td>Expert keyword search *</td>
<td>18</td>
<td>26%</td>
</tr>
<tr>
<td>Keywords *</td>
<td>17</td>
<td>24%</td>
</tr>
<tr>
<td>Limit search</td>
<td>16</td>
<td>23%</td>
</tr>
<tr>
<td>None</td>
<td>15</td>
<td>21%</td>
</tr>
<tr>
<td>Options menu</td>
<td>12</td>
<td>18%</td>
</tr>
<tr>
<td>Numeric search *</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>Author keyword search *</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Title keyword search *</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Subject keyword search *</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>All options</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>Subject search *</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>Restore previous search</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Backup to previous screen</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Keyboard operation</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Author search *</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Full record display</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Liblink database</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Subject headings</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Title search *</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Viewing network holdings</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

* Find Menu options

The Find Menu options other than the basic search functions of Author, Title and Subject scored highly in this question. The further down a search option appears in the Find Menu, the higher the response rate. For example, Choose Database is the last option on the Find menu and it attracted one of the highest response rates. This supports the view that many users are unsure of what some online catalogue options mean.
The Related Titles and Choose database options received the highest number of responses. The Related Titles option allows the user to search on any of the subject headings assigned to a particular title as well as the authors and alternative titles. Hildreth (1982) identifies this type of software feature as being an important way of improving subject access in online catalogues.

Truncating terms to broaden search results is another way of improving subject access in online catalogue searching. Truncation was not mentioned by respondents in this survey. There are many software features which are not immediately apparent to the user but which may improve the efficiency of online catalogue searches.
Question 9  
What information displayed by the catalogue don’t you understand?

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>34</td>
<td>49%</td>
<td>Circulation status</td>
<td>2</td>
</tr>
<tr>
<td>Monograph</td>
<td>22</td>
<td>31%</td>
<td>Copy details</td>
<td>2</td>
</tr>
<tr>
<td>Call no. prefixes</td>
<td>18</td>
<td>26%</td>
<td>Library locations</td>
<td>2</td>
</tr>
<tr>
<td>Serial</td>
<td>3</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Around 50% of respondents reported that there was no information displayed by the online catalogue which they did not understand. The question may have provided more useful feedback if the respondents had been given a list of the display elements of the online catalogue. They could then have been asked to indicate which elements they did not understand.

The other responses to this question relate almost exclusively to library technical terms and cataloguing conventions. The high number of questions about call number prefixes suggests that library instruction may need to include an explanation of how library materials are classified and shelved.
Question 10
What problems have you experienced in using the online catalogue?

<table>
<thead>
<tr>
<th>Problem</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>21</td>
<td>30%</td>
</tr>
<tr>
<td>Scrolling/next and previous screen</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>Moving around the screens</td>
<td>10</td>
<td>14%</td>
</tr>
<tr>
<td>Establishing the date due</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Going back a step</td>
<td>7</td>
<td>10%</td>
</tr>
<tr>
<td>Subject searching</td>
<td>6</td>
<td>9%</td>
</tr>
<tr>
<td>Number of titles in a hitlist not displayed</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>Starting a new search</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Difference between subject and keyword searching</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Finding journal titles</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Prefer old catalogue</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Using the Return/enter key</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Indexing inconsistencies</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Editing typing</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Equipment failures</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Need more catalogues</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Item not located at this library</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Printing</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Removing windows obscuring the screen</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

In discussing user problems, Borgman (1986b, p.394) distinguishes between Mechanical and Conceptual aspects of online catalogue use. Mechanical aspects involve “the ability to use the system features at a threshold level” while conceptual aspects determine the user’s “ability to exploit the system.”
Chapter Three: Online Library Catalogues

The responses to this question may be classified mainly as Mechanical aspects of online catalogue use. The most frequent mechanical problems relate to:

- Using the keyboard to interact with the online catalogue.
- Moving between online catalogue screens.
- Scrolling through citation or index lists.
- Selecting search options from the online catalogue menus.
- Entering search terms.
- Establishing the circulation status of an item.

Yee (1991) summarises twenty one (21) user problems with online catalogues reported in the literature. Incorrect spelling of search terms is one of the most common mistakes made by users. Dickson (1984) and Taylor (1984) found that 15% of errors in title searches could be attributed to typographical errors or misspelling. These kinds of errors have been recorded through transaction logging rather than by survey.

The respondents identified few problems which Borgman would regard as being Conceptual. As has already been discussed in Chapter One, a conceptual understanding of the online catalogue includes a knowledge of the operation of the subject searching components of the system. In the current survey there were only eight responses indicating problems with subject searching. However, the wide range of search options chosen by people attempting to find something on a subject, suggests that there may be others who are not making effective use of the subject enquiry components of the online catalogue.

It may be that the lack of understanding of these concepts means that the respondents were unable to articulate their problems in terms of a conceptual understanding of the system and the information seeking process.
Success

Question 11
How would you rate your success in using the catalogue?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Always successful</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>Mostly successful</td>
<td>50</td>
<td>71%</td>
</tr>
<tr>
<td>Can never find anything</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>No response</td>
<td>5</td>
<td>7%</td>
</tr>
</tbody>
</table>

The great majority of respondents indicated that they were ‘mostly successful’ in using the online catalogue. These responses suggest that many users are not completely satisfied with their use of the online catalogue. The 71% ‘mostly successful’ response rate seems to conflict with the answers to earlier questions where respondents stated that they had few problems in using the online catalogue and understood the information it provides. It may have been helpful to attempt to identify the reasons why people felt they were not always successful.
General comments

Question 12
Do you have any general comments?

General comments were made by about 50% of respondents. These relate mainly to the level of user satisfaction. Many people commented that they would become more proficient catalogue users as their experience with the system increased. Matthews and Lawrence (1984) argued that the most important factors in user-perceived success were frequency of use of the online catalogue, and some initial training and assistance.

The results of the current survey suggest that the most immediate need of many of the respondents is some basic training. There were a number of general comments about the need for improved or alternative methods of library instruction. One respondent wanted hands-on training included in information skills sessions and commented that there was too much information to assimilate at one time. Improved screen instructions were also seen as being highly desirable.

Snelson (1993, p.76) argued that an important component of user satisfaction with the online catalogue is the time it takes to complete a search. The results of the current survey support that argument, with many respondents commenting positively on the quick response time of the new online catalogue compared to the old.
Chapter Four: Proposed Structure and User Interface

4.1 Summary of Chapter Four

This chapter describes the proposed structure and user interface for a prototype multimedia system to instruct novice users of online library catalogues. The proposed structure and user interface are based on the previous discussion of the characteristics of novices and how they approach using the online catalogue and are informed by the findings of the online catalogue usage survey.

Particular consideration has been given to the need for a structure which accounts for different learning styles, the heterogeneous nature of novices, and their individual requirements for help during the information seeking process. Of paramount concern is the need to develop an interface that is compelling, and motivates the novice to explore the training content of the multimedia system.
4.2 Structure

The proposed structure for a multimedia instructional system represents a synthesis of the results obtained from the online catalogue user survey and the ideas expressed in the discussion of the characteristics and behaviour of novices and the nature of the information seeking process described in the previous two chapters.

![Diagram of instructional structure]

**Figure 4.1. Proposed structure**

The model shown in Figure 4.1 illustrates how the system will operate in three distinct modes:

(i) **Instructional mode:** where novices can acquire the knowledge and skills which will enable them to use the online library catalogue effectively. The Instructional mode will allow novices to actively participate in their own training.

(ii) **Demonstrable mode:** where novices can learn how to use the online library catalogue by viewing relevant and successful catalogue enquiries. The Demonstrable mode will allow novices to learn passively about the online catalogue and the information seeking process.
(iii) Actual mode: where novices will have access to a 'live' connection to an online catalogue. The Actual mode reflects a need for 'hands-on' training. An NCSA Telnet™ connection to the DRA online library catalogue will provide users with the opportunity to practise what they have seen or learnt in the first two levels of the system. Access to a 'live' connection to an online catalogue will allow novices to extend and modify their understanding of the system based on their experience of the previous two modes, or to identify gaps in their understanding which need to be addressed.

It is proposed that by operating in these three modes, a multimedia instructional system will provide for a broad range of individual learning styles and personal characteristics of novices. This reflects the theory of individual learning styles proposed by Kolb (1984).
The Instructional and Demonstrable modes address three areas of online catalogue use:

(i) *The Conceptual area* reflects the novice’s need to understand what an online library catalogue is and how it works. This area is based primarily on the issues raised in the discussion of how novices interact with library-based information technologies presented in Chapter Two: Characteristics of Novice Library Users. It seeks to provide the novice with a conceptual framework for understanding the operation of the online catalogue and the information seeking process. Some emphasis is placed on the processes involved in identifying information on a particular subject as this is generally held to be a problem for novices.

(ii) *The Mechanical area* reflects the novice’s need to learn online library catalogue search options and software features. This area is based primarily on the results of the analysis of the online catalogue usage survey presented in Chapter Three: Online Library Catalogues. It seeks to introduce the novice user to those system operations which are essential for effective use of the online catalogue.

(iii) *The Locational area* reflects the novice’s need to understand how information is organised in a library. This area is based primarily on the issues raised in the discussion presented in Chapter Three. The Locational area seeks to train users to find items which they have identified in the online library catalogue. It provides the guidance and help which novices may need to identify information sources in their own library system and at other libraries.

The following 3 sections provide a detailed description of the information covered in the Conceptual, Mechanical, and Locational areas.
4.3 Conceptual Area

The Conceptual area is theoretical and the information it provides may be applied to the use of any online catalogue system. The Conceptual area includes the following sections:

(i) What is an online catalogue? — the purpose, scope and content of the database.

(ii) How does an online catalogue work? — using the analogy of a card file and building on that model with a description of the basic structure and search functions of an electronic database.

(iii) How do you find a particular item? — using the online catalogue to find a known item.

(iv) How do you find information on a particular subject? — using the online catalogue to find items on a specific topic.

(v) Finding items on a reading list — understanding a bibliographic citation, and finding items on a reading list, are key learning tasks for novices.

(vi) Researching an essay topic — interpreting an essay question and writing a list of keywords or concepts are key learning tasks for novices.

(vii) Other information seeking strategies — an explanation of the ‘berrypicking’ strategies identified by Bates (1989).

(viii) The information seeking process — a presentation of the model developed by Kuhlthau (1988) including a description of the cognitive and affective aspects of online catalogue use. Both this and the previous section (vii) attempt to place the use of the online catalogue in the broader context of the information seeking process.
Sections (i-iv) are presented as a series of questions. These sections are designed to answer the questions novices may ask about the online catalogue and the information seeking process. In this way, they embody the sense-making theory of Dervin (1989) discussed in Chapter Two. There is also a recognition that novices may be in an 'Anomalous State of Knowledge' (Belkin, 1980) and require some direction in their learning.

Sections (v-viii) place the use of an online library catalogue in the context of the information seeking process. They deal with the novice's need to understand the online catalogue's place in that process and the other avenues available for finding information.
4.4 Mechanical area

In contrast to the Conceptual area, the Mechanical area is primarily practical in nature. The Mechanical area concentrates on how to use a particular online catalogue system. It is based on the online catalogue developed by Data Research Associates (DRA) used at the University of Western Sydney Nepean Library. The information is presented in stages so that novices may gradually build on their understanding of the online catalogue. The Mechanical area includes the following sections:

(i) Using the computer keyboard and demonstrating important system commands.

(ii) Explaining and demonstrating the basic search options.

(iii) Describing the information displayed in the online catalogue screens.

(iv) Other system features which are regarded as being important for an effective use of the online catalogue.

(v) A description of the main mistakes made by users of online catalogues and tips and tricks to help improve searching of the online catalogue.

The Mechanical area seeks to address those usage problems revealed by the survey described in Chapter Three: Online Library Catalogues. These problems include: operating the keyboard; software functions; search options; and screen displays.
4.5 Locational area

The information presented in the Locational area demonstrates how to find items in a library. Having to learn how to use library-based information technologies is something many novices would prefer to avoid. The primary goal is to locate those library items which will help them to satisfy a particular information need. Crawford (1992) argues that:

"Most users in most libraries, most of the time, want to spend as little time as possible at the online catalog. They use it to get to the collection — to the books actually on the shelves in that particular location at that time" (p.65).

Hsieh-Yee (1996, p.168)) found that only 46% of the undergraduates she surveyed reported success in finding what they needed. The main reasons for failing to locate material were "holdings failure" (88%) and "items not on the shelf" (69%). It is possible that the students had difficulties locating the items because they were not fully aware of how items in the library are classified and shelved.

The Locational area addresses the novice's need to understand how information is organised in a library. The Locational area is based on the organisation of information at the libraries of the University of Western Sydney Nepean. The Locational area will include the following sections:

(i) A description of the libraries of the University of Western Sydney Nepean.

(ii) A description of the various collections at the libraries of the University of Western Sydney Nepean.

(iii) How to find an item when you know its call number.

(iv) How to find out what the circulation status of an item is.

(v) Finding information at other libraries

(vi) How to get help in using the online catalogue
The Locational area completes the novice's instruction on the information seeking process.
4.6 An Appropriate User Interface

The proposed structure for a multimedia system seeks to provide a user-centred guide to the online library catalogue and the information seeking process. While there can be no definitive solution to the problem of implementing an appropriate interface for a multimedia system to instruct novice users of an online library catalogue, the current research suggests that the design considerations described below may be significant.

The user interface should be structured in such a way as to allow novices to select the learning mode they would prefer to work in. Each mode approaches the task of instructing the novice in a different way. The novice should be able to move from one mode to another or from one style of instruction to another. For example, a novice may choose to start by using the ‘Actual’ online catalogue and then move to the ‘Instructional’ mode if specific help is required or vice versa.

The interface must encourage the user to explore the system. If a multimedia instructional system can provide a non-threatening environment for novices to learn and practice information skills, it may have more impact than other more traditional methods of library instruction. It is probable that there will be less emotional cost to the novice in accessing a multimedia instructional system than in consulting a librarian or attending an information skills session. By encouraging the novice user to explore the system, the interface is also demonstrating the investigative nature of the information seeking process itself.

An exploratory user interface may increase the potential for discovery learning. However, there is a danger with instructional programmes which allow a high degree of user-directed navigation that ‘slow’ learners will not fully explore the system. It has already been argued in Chapter Two that an instructional programme may need to provide a balance between a structure which promotes exploration and a structure which provides ‘slow’ learners with the kind of direction they will need to realise the instructional goals of the system.
Therefore, while the user interface should allow the novice to explore the information space, it may be necessary to include a conceptual map which provides an outline to the areas and sections of the multimedia system. This may be in the form of an ‘index’ with a hierarchical or linear structure that allows the user to choose from any of the topics listed.

The familiar idea of a library as a repository of information and librarians as people who disseminate information may provide the basis for an appropriate interface metaphor. Many commercially produced software packages include a ‘library’ where users can go and search for information. The functions and services of libraries are being used to represent the complex processes which take place inside computers. In a historical account of art libraries, Ford (1994, p. 13) describes how “the library has been appropriated here because it is a familiar object that can be used to describe something that is unfamiliar and essentially unrepresentable.”

The responses to Question 7 of the online catalogue usage survey reported in Chapter Three, suggest that library users prefer to seek help from other people. The vast majority of responses involved asking library staff, friends or lecturers for help. Brenda Laurel (1990; Laurel et al., 1991) has written about the value of incorporating interface agents or guides in the design of multimedia systems.

Laurel argues that interface guides can assist the user by providing information about how the system works or by offering an alternative view to the information already present in other media formats. It may be that novice users of online library catalogues would respond positively to the use of library staff as interface guides in a multimedia system. ‘Humanising’ the process of learning how to use the online library catalogue may result in a successful interface implementation.

Given the characteristics of novices described in Chapter Two, a multimedia instructional system must provide a user interface which is both engaging and compelling. The design of a user interface can address a reluctance to seek help and training by capturing a novice’s imagination and attention.
This may best be accomplished by the inclusion of photo-realistic graphics, video clips and sound. It is proposed that dynamic animations will provide the necessary reinforcement to motivate the novice to make use of the multimedia system. A ‘live’ connection to an online catalogue should also increase the multimedia system’s sense of immediacy and reality. In selecting interface design elements, the aim will be to take the text-based online catalogue screens and build a rich and interesting instructional environment.

An appropriate user interface will also need to actively engage the novice in the learning process. The game-play used so effectively in many current CD-ROM programmes will appeal to some novices. Again, this raises the notion of tapping into pre-existing competencies and familiar situations. The multimedia system may be able to take advantage of this game-playing expertise through an appropriate interface implementation.

It is acknowledged that this game-playing user interface style may not suit all novice users. Some people may not believe that learning takes place through play. These novice users may prefer the more traditional approach to user interface described earlier in the discussion of a conceptual map or ‘index.’ The prototype multimedia system will incorporate a range of interface styles so that their strengths and weaknesses can be tested and the opinions of novice users gauged.

The user interface must be easy to use. The main aim of the multimedia system is to teach the online catalogue interface. The novice should not be burdened by having to negotiate a complicated help system interface. An appropriate user interface will be easy to learn, easy to use, and easy to remember.

The work of Kuhlthau (1991), Belkin (1980) and Dervin (Dervin & Dewdney, 1986; Dervin & Nilan, 1986; Dervin et al., 1982; Savolainen, 1992, 1993) attests to the difficulties which novices have in the initial stages of a search for information. The user interface for a multimedia system should not compound the novice’s feelings of anxiety and confusion by being inherently difficult to use. The interface should be consistent and predictable so that the novice user can confidently explore the information the multimedia system contains.
In summary, the following design elements are considered to contribute to a successful interface implementation for a multimedia system to instruct novice users of an online library catalogue:

- Structure — allow the novice to move from one mode to another.

- Navigation — invite the novice to explore and discover the information contained in the multimedia system.

- Structural map — show the novice the links between the various sections of the multimedia system.

- Metaphor — use the physical library and the services provided by libraries as interface metaphors. Create, in the minds of novice users, an impression of the library as a useful and necessary place to visit.

- Agents — guide the novice through the multimedia system by using interface agents.

- Motivation — make the multimedia system compelling and engaging. Capture the novice's interest by including graphics, sound, video, animation and movement.

- Game-playing — make use of current interface design strategies which promote learning through play to actively engage the novice.

- Ease of use — overcome the novice’s anxiety and confusion by implementing an interface which is intuitive.
PLEASE NOTE

The greatest amount of care has been taken while scanning the following pages. The best possible results have been obtained.
Chapter Five: Implementation of the Multimedia System

5.1 Summary of Chapter Five

This chapter describes the implementation of a multimedia system to instruct novice users of an online library catalogue according to the design considerations described in Chapter Four. It should be stressed that this is a prototype implementation sufficient only to test the primary concerns of the current research.

The production techniques, including the software and hardware used, are detailed. The structure of the prototype and the relationship between the individual modules are illustrated. The chapter also explains the various interface design elements used in the prototype modules. A range of interface styles were used to enable a comparison between them.

The link between the proposed structure and user interface described in the previous chapter and the implementation of the prototype modules is established.
Chapter Five: Implementation of the Multimedia System

5.2 Production Techniques

The prototype multimedia instructional system was produced using the authoring program, Macromedia Director™ v4.0.4. Most of the production was done using a Centris 660AV Macintosh. The aim was to create a prototype which would be capable of running on any Macintosh model of mid-range performance. It was also considered appropriate that the prototype be produced using equipment and software which is generally available to librarians who may want to incorporate this method of instruction as part of their information skills programmes.

The prototype was designed to run using 256 colours. The prototype has a single 8 bit custom palette. It was decided that working in 256 colours would enable the prototype to run at optimal speed and performance on the target platform. Macromedia Director movies are also restricted to 256 colours when running on an IBM compatible personal computer. Using a custom palette means that the transitions between sections of the prototype appear relatively seamless. Many libraries may also not have computers which are capable of displaying more than 256 colours.

Most of the photographic images were created using a High 8 video camera and the video digitising card installed in the Centris 660AV. The images were manipulated using Adobe Photoshop™ v3.0.4. The other graphics were either created using Adobe Photoshop or digitised using a flatbed scanner and imported into Photoshop.

The prototype includes a number of large photographic files or panoramas which were produced by making a 360 degree sweep with a video camera and then capturing and joining single frames together. The process of matching one picture to another proved difficult as a video camera does not compensate for changes in perspective in the same way as the human eye and so the panoramas still have visible joins in the prototype. It may be that QuickTime VR™ would have provided a more suitable format for these panoramas. Quicktime VR was not available to the researcher at the time of the implementation of this prototype.
The prototype incorporates a range of sound effects. These are used to provide feedback to the user about system operations and to make the prototype more entertaining. The sound effects play when the user clicks on or rolls over certain screen elements.

Voice-overs were recorded on the Centris 660AV using SoundEdit Pro™ v.1.0.5. The voice-overs were added to QuickTime™ movies to create the interface agents or guides. The aim of the guides is to help 'humanise' the prototype and provide the user with a link between the various sections of a particular prototype module.

The QuickTime movies were produced using Adobe Premiere™ v.4.0. The QuickTime movies are small and have a low frame rate. As a general rule, image quality has been reduced in the interests of creating a responsive interface.

Much of the movement and interactivity has been built into the prototype using the Macromedia Director programming language called Lingo. Lingo scripts were written to control the movement of objects on the screen and to respond to user initiated events such as mouse clicks. Lingo greatly increases the designer's ability to make the program work in a specific way.

The online catalogue simulations were created by taking screen snap-shots of actual searches and linking them together using Lingo scripts. CameraMan™ was used to make the screen snap-shots. The advantage CameraMan has over other methods of screen capture is that it was possible to adjust the size of the capture to the size of the catalogue window. This meant that the images did not have to be cropped or re-sized before importing into Macromedia Director.
The screens of text and scrolling text boxes were generated within Macromedia Director. Text created using Macromedia Director is not anti-aliased but has the advantage of being easy to edit. Anti-aliasing is a process by which text is blended with its background image so as to appear smoother when displayed. Text which has not been anti-aliased will appear jagged and not integrated with the background. By generating text from within Macromedia Director, any mistakes or changes required as a result of an evaluation of the prototype could be quickly corrected.

The text in some graphics and headings has been anti-aliased in Adobe Photoshop because these were major headings which required higher quality and were unlikely to change. The Helvetica font was used for the text created in Macromedia Director. Helvetica is a standard font and should be available on most Macintosh computers.

Hypertext 'hot spots' have been used to link information in some sections of the prototype. It was envisaged that the prototype would have many more hypertext links. However, it was decided that the process of jumping from one module to another would confuse the user. The idea of multiple hypertext links was abandoned in favour of the branching structure described in the next section of this chapter. Hypertext links in the prototype occur within modules and not between modules.

The prototype multimedia system uses NCSA Telnet to connect to the DRA (Data Research Associates) online library catalogue. NCSA Telnet is a software program which allows remote connection to another computer via the Internet. NCSA Telnet is the standard program of its kind used on the target platform. The user connects to the online catalogue by clicking on the 'Use the online catalogue' button which then launches the NCSA Telnet application. A copy of NCSA Telnet has been included in the prototype files. The computer on which the prototype is installed must have an active Internet connection.
5.3 Structural Elements

The prototype makes use of the library as an interface metaphor. The prototype is divided into a number of modules which are based on the physical library area or a library function. The prototype opens in the Foyer and the user is able to select from one of four instructional modules. The instructional modules are:

- Information Desk (INFO)
- Reference Interview (REF)
- Shelves (SHELF)
- Catalogue Workstations (CAT)

The user may also choose to view the index or make a 'live' connection to an online catalogue.

Figure 5.1 shows the modules and the possibilities for branching between each module.

![Diagram](image)

*Figure 5.1. Prototype structure*

The following sections of this chapter describe the structural elements of each module in some detail.
5.4 Foyer

![Figure 5.2. Foyer](image)

The prototype system opens in the Library Foyer. The standard cursor is replaced by the picture of a hand. The hand is controlled by moving the mouse. The hand changes depending on which area of the screen it is over. The hand represents an attempt to make the process of searching the prototype system as life-like as possible.

The Foyer picture is a 360 degree panorama of the Information desk area in the Ward Library at the University of Western Sydney Nepean. Approximately 10 separate pictures were captured and joined together to form the panorama.
The Foyer panorama can be scrolled laterally by moving the hand to the far left or right of the screen. The hand changes to an arrow when the cursor is over the scrolling area. A Lingo script was written to control this movement. The intention is to allow the user to ‘explore’ the library by moving the mouse.
Access to the instructional modules of the prototype system is provided via the library staff or guides who appear in the Foyer panorama. If the user moves the hand over a guide, the guide turns, a brief voice over is played, and the user is asked to click on the mouse to go to the instructional module which that guide represents. A text description of the area is also displayed at the top of the screen. This was done to provide for the needs of users who may be hearing impaired.

The guides are people who work in the Ward Library at the University of Western Nepean. The guides were selected to provide some diversity in gender and ethnic representation. The pictures of the guides overlay the Foyer panorama. A Lingo script was written so that the pictures of the guides move with the panorama as it scrolls left or right.
The prototype screens are as uncluttered of buttons and controls as possible. The navigation buttons and system instructions only appear when the user moves the hand over the Information symbol at the bottom left of the screen. It was decided that this would make the interface easier to use and enable the user to concentrate on the instructional content of each screen. The user, in attempting to understand the purpose of the buttons and controls, would not be distracted from the instructional task.
Clicking on the 'Use the Online Catalogue' button will open a live connection to the University of Western Sydney Nepean online catalogue. The NCSA Telnet™ application is included as part of the prototype files. A Lingo script was written to allow the system to open the appropriate NCSA Telnet file. By clicking anywhere outside the NCSA Telnet window, the user is returned to the multimedia instructional system.

Consideration was given to developing a way of having the NCSA Telnet window open within Macromedia Director™ v.4.04. However, the work needed to provide this functionality was found to be beyond the scope of this research. The current method of connecting to an online catalogue is not seen as being ideal because the user is forced to toggle between two active windows on the desktop. This problem may be solved by future developments in the way in which Macromedia Director interacts with external applications.

The 'Use the Online Catalogue' button is also available from the opening screens of the four main areas of the prototype system. The 'live' connection module implements the 'Actual' mode of the prototype system.
Clicking on the 'View the Index' button will take the user to the index screen. The four instructional modules are displayed in boxes. A text description for each section of a module appears inside the relevant box. Rolling the hand over a box moves that box to the centre of the screen. The user is able to go to a particular section of a module by clicking on its text description.

The 'View the Index' button is also available from the opening screens of the four main areas of the prototype system. The index module implements the requirement to provide a structural map of the prototype system.
Clicking on the 'Quit' button will allow the user to exit the prototype system. The 'Quit' button is also available from the opening screens of the four instructional modules of the prototype system. The user is also able to quit the prototype from any screen by pressing the Command and 'Q' keys.
5.5 Information Desk

The Information Desk module implements the Mechanical area in the Instructional Mode of the proposed structure (see Figure 4.1).

![Information Desk: Main screen](image)

*Figure 5.9. Information Desk: Main screen*

The main screen of the Information Desk module includes five text balloons moving in a circular path. Each balloon provides a link to a different section of the module.

The use of moving menus is an attempt to actively involve and engage the user. The interface implementation seeks to provide a dynamic and interesting alternative to the hierarchical, single line menus used in some other multimedia instructional systems.

Rolling the hand over a balloon stops the balloon’s motion and brings the text into focus. The other balloons will continue to circle. A Lingo script was written to control the movement of the balloons.
Chapter Five: Implementation of the Multimedia System

Clicking on the Information symbol at the bottom-left of the main screen will display some brief user instructions and make the navigation buttons visible.

![Information Desk Buttons and instructions](image)

Figure 5.10. Information Desk Buttons and instructions

The navigation buttons which are available in the main screen for each of the four instructional modules of the prototype system are:

- 'Use the Online Catalogue' — opens a 'live' NCSA Telnet connection to an online catalogue.

- 'Go to the Foyer' — takes the user back to the Foyer so that an alternative module may be selected.

- 'Use the Index' — takes the user to the index or conceptual map of the prototype.

- 'Quit' — enables the user to exit the prototype.
Clicking on a balloon will take the user to the corresponding section of the Information Desk module. Instruction in this module is primarily through the use of online catalogue simulations.

The screen elements which usually appear in each section of the Information Desk module are:

- **Guide** — the guide is a QuickTime™ movie which plays when the user moves the cursor over it. The QuickTime movie was created using a short, looping segment of video and a voice over. The guide provides information and instructions to the user.

- **Simulation** — the simulations were created by taking screen snap-shots of example searches using the University of Western Sydney Nepean online catalogue. The online catalogue screens are linked using Lingo scripts.

- **Text** — a scrolling text box provides additional information about the mechanical aspects of online catalogue use.
• 'Returns button' — clicking the 'Returns button' takes the user back to the main screen of the Information Desk module. This button makes use of the familiar action of returning items to a library via a book chute.
5.6 Reference Interview

The Reference Interview module implements the Conceptual area in the Instructional Mode of the proposed structure (see Figure 5.1).

![Figure 5.12. Reference Interview: Main screen](image)

The main screen of the Reference Interview module includes four text bars which move horizontally and vertically across the screen. Each text bar provides a link to a different section of the module. Rolling the hand over a text bar stops all movement on the screen and brings the text into focus. The movement of the text bars is controlled using the standard animation effects available in Macromedia Director™ rather than by Lingo scripting.

Clicking on the Information symbol in the centre of the screen will display some brief user instructions and make the navigation buttons visible.
Clicking on a text bar will take the user to the corresponding section of the Reference Interview module. Instruction in this module is primarily text-based. The information presented in text format is illustrated by a series of animations.

![Reference Interview: Information screen](image)

*Figure 5.13. Reference Interview: Information screen*

The screen elements which usually appear in each section of the Reference Interview module are:

- **Guide** — the guide is a QuickTime™ movie and was created as previously described.

- **Text** — there are a number of screens of text. The user is able to move from one screen to another by clicking on the arrows at the top-right of the screen.

- **Animation** — the animations demonstrate a particular concept relating to searching the online catalogue. In Figure 5.13 the animation requires the user to click on the drawers of the filing cabinet to see how an online catalogue works.

- **‘Returns button’** — clicking the ‘Returns button’ takes the user back to the main screen of the Reference Interview module.
5.7 Catalogue Workstations

The Catalogue Workstations module implements the Conceptual and Mechanical areas in the Demonstrable Mode of the proposed structure (see Figure 5.1).

Figure 5.14. Catalogue Workstations: Main screen

The main screen of the Catalogue Workstations module includes four books moving in a circular path. Each book provides a link to a different section of the module. Rolling the hand over a book stops all motion on the screen. The book will open to reveal a text-based description of that section of the module. A Lingo script was written to control the movement of the books.

Clicking on the Information symbol at the bottom-left of the screen will display some brief user instructions and make the navigation buttons visible.
Clicking on a book will take the user to the corresponding section of the Catalogue Workstations module. Instruction in this module is primarily through the use of animations of the information seeking process and step-through demonstrations of online catalogue searches.

![Figure 5.15. Catalogue Workstations: Animation screen](image)

The screen elements which usually appear in the sections of the Catalogue Workstations module that include animations are:

- **Guide** — The guide is a QuickTime™ movie and was created as previously described.

- **Animation** — the animations demonstrate a particular concept relating to the information seeking process. In Figure 5.15, the animation requires the user to click on a card to move it to the front of the display.

- **‘Returns button’** — clicking the ‘Returns button’ takes the user back to the main screen of the Catalogue Workstations module.
The screen elements that usually appear in the step-through demonstration sections of the Catalogue Workstations module are:

- **Guide** — the guide is a QuickTime™ movie and was created as previously described.

- **Demonstration searches** — the demonstrations were created by taking screen snap-shots of example searches using the University of Western Sydney Nepean online catalogue. The user is able to move from one screen to another by clicking on the arrows at the middle-left of the screen.

- **'Returns button'** — clicking the 'Returns button' takes the user back to the main screen of the Catalogue Workstations module.
5.8 Shelves

The Shelves module implements the Locational area in the Instructional and Demonstrable Modes of the proposed structure (see Figure 5.1).

![Image of shelves]

*Figure 5.17. Shelves: Main screen*

The main screen of the Shelves module includes a 360 degree panorama of the general collection at the Ward Library of the University of Western Sydney Nepean. The part of the panorama appearing on the screen can be changed by clicking at the far left or right of the picture. The hand changes to an arrow when the cursor is over the clickable area. A Lingo script was written to control the movement of the panorama.

A three-dimensional cube flies across the screen. A different coloured cube appears when the user changes the display of the panorama. Each cube provides a link to a different section of the module. Rolling the hand over a cube stops all motion on the screen. A Lingo script was written to control the movement of the cubes.

Moving the hand onto the Information symbol at the bottom-left of the screen will display some brief user instructions and make the navigation buttons visible.
Clicking on a cube will take the user to a particular section of the Shelves module.

![Image of shelves and computers](image)

*Figure 5.18. Shelves: Information screen*

The screen elements which usually appear in the sections of the Shelves module are:

- **Guide** — the guide is a QuickTime™ movie and was created as previously described.

- **Panoramas** — the panoramas are scenes of the various libraries and collections at the University of Western Sydney Nepean. The user is able to change the display of the panorama by clicking at the far left or right of the picture.

- **Text** — a scrollable text box provides additional information about how to locate library items. The text display may also change when the user clicks on the panorama.

- **‘Returns button’** — clicking the ‘Returns button’ takes the user back to the main screen of the Shelves module.
Chapter Six: Testing and Evaluation of the Multimedia System

6.1 Summary Of Chapter Six

This chapter describes the methods used to test and evaluate the prototype multimedia instructional system. The results of this testing and evaluation are reported and analysed. The formative evaluation strategies used included the preparation of a paper-based model to test the proposed structure and content of the system, and the implementation of a number of trial user interfaces. The prototype multimedia instructional system was evaluated using a technique known as Instructional Product Verification and Revision (IPVR) (Thiagarajan, 1978). This process involved the prototype system being reviewed by expert librarians, and multimedia producers, as well as learners or novice users of online library catalogues.
6.2 Evaluation of a Paper-based Prototype and Trial User Interfaces

Prototype testing and evaluation was conducted throughout this research project. This type of testing is known as formative evaluation. Formative evaluation is defined as "the systematic collection of information for the purpose of informing decisions to design and improve the instructional product" (Flagg, 1990). Formative evaluations allow the designer to test assumptions and make modifications throughout the planning and production phases of an instructional system.

Northrup (1995) suggests that multimedia systems should be tested in stages. She argues that rapid prototyping is the most effective method for testing design approaches. Rapid prototyping involves the testing of a range of structures and user interfaces for a multimedia system prior to full-scale production. The current research makes use of this technique by beginning testing and evaluation during the planning stage and continuing this process throughout the production of the prototype multimedia instructional system.

A paper-based prototype was developed early in the planning stage of the design. The paper-based prototype incorporated the information derived from the assessment of the needs and behaviour of novice users of online catalogues as described in Chapters Two and Three. The information was used to develop a trial structure for the proposed system. The purpose of the paper-based prototype was to test and evaluate the proposed structure and content of the multimedia instructional system.
The paper-based prototype consisted of five modules developed using a virtual library metaphor. Each module addressed a different aspect of online catalogue use. The modules were:

- The Information desk
- The online catalogue area
- An interview with a Reference Librarian
- The shelves
- Using the ‘actual’ catalogue

The modules consisted of a series of pages which represented the various screens of information to be included in the prototype multimedia instructional system. The pages illustrated the proposed text or script; the navigation aids; menu options; and a description of the media elements which would be present in each screen. An example page is shown in Appendix Two.

The second formative evaluation strategy was to implement and test a range of user interfaces. The trial user interfaces incorporated the information derived from an assessment of the needs and behaviour of novice users of online catalogues described in Chapters Two and Three. In particular it was seen that the prototype user interface would need to be compelling and allow the user to actively explore the information provided by the system.

Both the paper-based prototype and trial user interfaces were shown to two separate groups of expert librarians and to a multimedia expert. The expert reviewers were asked to make comments about the proposed structure, content and operation of the prototype system.
Chapter Six: Testing and Evaluation of the Multimedia System

The following issues relating to the paper-based prototype and trial user interfaces raised by the expert reviewers, were addressed during the production phase of the multimedia prototype:

**Paper-based Prototype**

(i) The librarians were concerned about how much use new students would make of this kind of instructional system. This comment reflects the discussion of user motivation described in Chapter Two.

(ii) Some topics were thought to be inappropriate for a particular module. e.g. 'Information Seeking Strategies' should be moved from the 'Reference interview' area to the 'Catalogue Workstations' area.

(iii) The question of when to provide an explanation of a particular online catalogue concept or function was discussed. e.g. Should 'Circulation Status' be covered in the 'Information Desk' area or the 'Shelves' area? This problem could be managed through the use of hypertext links to related information.

(iv) The librarians noted a failure to standardise library-related terms in some sections of the paper-based prototype. e.g. a decision needed to made on whether to use the term serial or journal.

(v) The librarians suggested that there should be an index which would give the user an overview of the information content of the programme.

(vi) The experts pointed out areas where the information presented needed revision. A review of the information content was made to incorporate the experts' recommendations.
(vii) It was thought that the topic headings used in the paper-based prototype did not provide a clear enough indication of the information contained in that section. The revision of the information content also included the use of more meaningful headings for individual topics.

**Trial User Interfaces**

(i) Some of the experts found the ‘Foyer’ interface difficult to navigate and were unsure of how the programme operated. It was decided that the ‘Foyer’ interface required some instructions for the user on how to navigate the space. The multimedia prototype includes an information button and text instructions for the user.

(ii) The trial interfaces used icons as navigation buttons. One expert remarked that they had spent too much time trying to decide what the buttons meant rather than concentrating on the information content of the programme. The navigation buttons in the multimedia prototype are hidden. They are textual rather than iconic.

(iii) The multimedia expert suggested that the designer should move away from the familiar ‘point and click’ interface. The ‘Foyer’ interface, which allows the user to explore a navigable space, and the moving menus of the multimedia prototype, represent an attempt to implement an exploratory interface.

(iv) The trial interfaces included cursor changes using black and white bitmaps. The multimedia expert suggested that replacing the standard cursor with a series of photographic images may add to the prototype’s appeal.

The above comments relating to the paper-based prototype and the trial user interfaces were incorporated in the multimedia prototype described in Chapter Five. The following section discusses the testing and evaluation of the multimedia prototype.
6.3 Evaluation of the Multimedia Prototype

A Human Ethics Review Committee application was submitted as part of the research process. This is required of all researchers at the University of Western Sydney Nepean who are conducting research involving human participants. Human ethics approval was received from the Committee based on the methodology described in the following sections of this chapter.

The evaluation of the multimedia prototype involved two main approaches: expert review of the multimedia instructional system and one-on-one interviews with novice users of online library catalogues who were exposed to the system. These evaluations were run concurrently. This kind of evaluation has been referred to as Instructional Product Verification and Revision (IPVR). Based on the work of Thiagarajan (1978), IPVR is “related to but not precisely the same as formative evaluation, proactive evaluation, developmental testing, learner verification and testing, piloting, and prerelease testing”. IPVR is only one of many possible approaches to evaluation and is different in that it involves two types of verification. The opinions of experts with a range of competencies are sought, and the product is also reviewed by learners who would be prospective users of the system.

Piette and Smith (1991) used IPVR to evaluate a HyperCard™ library instruction programme. They felt that this form of evaluation would allow them to concentrate on testing their design during development. They argued that a hypermedia programme “which involves many levels of design and planning, would require thorough examination and evaluation as it was developed” (Piette and Smith, 1991, p. 91). The reviewers selected by Piette and Smith were content and media experts, and persons with some understanding of their target audience.

The focus of the multimedia prototype evaluation was on the strengths and weaknesses of the prototype as an instructional system and as a test of the validity of the proposed structure and user interface for such a system described in Chapter Four. It was also intended to provide information about possible enhancements and further investigations.
6.4 Expert Review

Five librarians and five multimedia producers were selected to conduct the expert review. The Librarians were employed in the Library at the University of Western Sydney Nepean and the multimedia producers were either staff members or students of the Department of Design Studies at Nepean.

It was envisaged that the librarians would comment on the structure and information content of the system, the appropriateness of the design for novice users of online library catalogues, and the instructional value of the multimedia prototype.

It was envisaged that the multimedia producers would provide feedback on the graphic design elements of the multimedia prototype and the user interface. They would also assess how well the multimedia prototype worked and comment on specific design issues such as interactivity.

Both groups of experts were asked to use the multimedia prototype individually and make comments on their particular area of expertise. They were asked to make suggestions about possible improvements to the design. Any general comments about the nature of the multimedia prototype were also sought. The designer transcribed the experts’ responses as they reviewed the prototype.
6.4.1 Multimedia producers

Those areas where the multimedia experts thought there was some scope for improvement are described below:

Access to the online catalogue

The response time of the online catalogue accessed via the multimedia prototype is slow. This may be the result of having two applications open at one time (i.e. Macromedia Director™ 4.04 and NCSA Telnet™). It was suggested that the programming could be changed so the Director movie is paused rather than looping in a frame. This would allow NCSA Telnet to use more of the computer's memory and improve the response time of the online catalogue.

Graphics

The majority of criticisms here related to the appearance and style of graphical elements such as backgrounds, buttons, images and text. It should be noted that the designer is not a graphic artist. The graphics are regarded as being acceptable for the purposes of a prototype. Future implementations of the prototype should consider the inclusion of a graphic artist in the design team.

Specific comments relating to the graphics include:

i) The backgrounds are too complicated. The patterns used in the backgrounds and foregrounds conflict. The multimedia experts expressed a preference for backgrounds with a flat, lighter colour e.g. green.
ii) Some of the text is difficult to read. This problem relates partly to a decision to use the text features of Macromedia Director™ 4.04 rather than a software program which creates anti-aliased text. This was done so that any changes required as a result of the evaluation could be implemented easily. More consideration could have been given to the choice of font used, the colour and size of the text. This would then be closer to accepted practice on the World-Wide Web and other hypertext documents.

iii) The colour of hypertext links is not standard. One colour should be used and the text highlighted by making it bold or underlined.

iv) The navigation buttons in some menus are not easily recognisable. The buttons could be made more obvious by changing their physical appearance or by changing the way in which the user accesses them.

**Information design**

i) The multimedia prototype needs an introductory or ‘splash’ screen to provide the user with an overview of how it works and its purpose. This was not seen as an essential component of the prototype because, as part of the evaluation process, the designer was briefing the participants on those aspects of its use. The designer was also present during the interviews with users to provide assistance or clarification if necessary.

ii) Some sections of the multimedia prototype may be too complicated for novice users. In particular, the section ‘Other information seeking strategies’ was seen as being more applicable to advanced users. The reviewers suggested that the multimedia prototype needed to provide more information about the level and content of each topic.
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The multimedia prototype encourages the user to explore an information space but future implementations need to consider the user’s requirement for some direction in that exploration.

Interface
The multimedia experts identified a number of inconsistencies relating to the user interface. These may in part be explained by a decision during the production phase to implement a range of different user interfaces in order to test for user preferences and attitudes.

i) The text scrollbars do not operate according to accepted Macintosh human-interface guidelines. The designer’s intention was to allow the user to access the text by rolling over the scrollbar rather than having to hold down the mouse. This obviously created confusion for those people who were used to operating scrollbars in a different way.

The scrollbars scroll too quickly making it difficult to read a passage of text. This could be improved by changing the programming of the scrollbars or by devising an alternative method of displaying the text, e.g. a ‘pop-up’ window which displays a complete section of text.

ii) The cursor ‘hand’ is not effective. The experts found that the images used were too photo-realistic and that what appeared to be a dismembered hand moving around the screen may not be appropriate. The designer’s intention was to make the programme seem as ‘life-like’ as possible.

The hand could be replaced by a more appropriate image or the standard cursor used. Making the standard cursor appear invisible and programming an image to follow the cursor does slow down the system’s response rate.
iii) The moving menus are hard to control. The floating book menu was preferred to the balloons menu because when the cursor rolls over a book everything on the screen stops. The book menu was seen as being easier to read. An alternative would be to replace the moving menus with a less dynamic interface. One suggestion was a bookcase with books that could be removed and opened to reveal a topic.

iv) The multimedia prototype doesn’t indicate to users which topics they have completed. The items in the moving menu should change colour or shape once they have been selected. A map or plan would allow the user to check their position and progress in the programme.

v) The navigation buttons are only available on the menu screens. This seems to be in conflict with the exploratory nature of the interface. Future implementations should allow the user access to the navigation buttons on any screen.

**Simulations and Demonstrations**

i) Once having started an online catalogue simulation, the user is unable to exit until the simulation has been completed. A solution would be to provide a keystroke or button which allows the user to exit a simulation at any time.

ii) The ‘Information desk’ simulations are hierarchical, yet the user is not informed of this hierarchy. The menu should be changed so that the topics are numbered or to incorporate a mechanism which requires the user to view the topics in the appropriate order.

iii) The contrast between the interfaces used in the online catalogue simulations and the demonstrations is confusing. It is not immediately obvious how to view the demonstrations. The interface and screen layouts used for the demonstrations need to be re-designed.
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Sounds
i) Some of the sound effects (eg. gunshots, explosions) are inappropriate and should be changed. The sound effects were used to simulate the game-playing atmosphere of popular CD-ROM titles.

ii) The sound quality of the voice-overs is poor. They were recorded using a standard Macintosh microphone. The quality produced by this microphone was seen as being sufficient for a prototype.

Although the multimedia experts concentrated on areas requiring improvement, they nonetheless identified a number of strengths:

Graphics
i) The letterbox format of the ‘Foyer’ is graphically appealing.

ii) The animations in some sections are well constructed and help to explain information access concepts and the functions of the online catalogue.

Interface
i) The interactivity with objects (eg. the object grab in ‘What is an online catalogue’ and the filing cabinet in ‘How does an online catalogue work’) is engaging.

ii) The metaphor of the Library and the use of the people in the Library as guides is appropriate.

iii) The concept of being able to explore the library would appeal to students.
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Programming

i) The level of programming is advanced and adds a great deal of functionality to the multimedia prototype. This comment is important in that it justifies the time spent on learning advanced programming techniques. The interactivity of the multimedia prototype is greatly enhanced by the use of these techniques.

ii) The multimedia prototype responds quickly to user actions. This was achieved by observing the memory management techniques recommended by the producers of Macromedia Director™ 4.04.
6.4.2 Librarians

Five librarians from the University of Western Sydney Nepean were selected to comprehensively review the multimedia prototype. They were asked to evaluate the information content of the system although their responses raise other issues relating to the instructional design.

The librarians agreed that the multimedia prototype would be an extremely useful instructional package for inexperienced library users. A typical response was that the multimedia prototype was extensive and covered most of the material a novice would need to know, or experience, to become a proficient online catalogue user.

The points below summarise those aspects of the multimedia prototype on which the librarians commented positively:

\[ i) \quad \text{Engagement} \]

The librarians were particularly interested in the way the multimedia prototype involved the user in the learning process. The 'hands-on' approach to learning is difficult to provide in the one hour group sessions normally available to novices.

\[ ii) \quad \text{Use of Library staff} \]

The guides used in the multimedia prototype were library staff from the Penrith Campus of the University of Western Sydney Nepean. Staff from the Westmead Campus Library commented that it would be appropriate to have a Westmead version using Westmead staff. The attraction of using people as interface agents was mentioned by all three groups of reviewers.
iii) Inclusion of expert knowledge
The ‘Tips and tricks’ topic was appreciated by the librarians. It was agreed that the inclusion of this expert knowledge would help improve online catalogue use.

iv) Theoretical approach
The librarians approved of the theoretical framework underpinning the multimedia prototype. The proposed structure presented in Chapter Four was deemed appropriate and could be applied to the teaching of other information systems or information access skills.

v) Graphics
The graphics were seen by the librarians as contributing to the user’s motivation and interest in the instructional programme. The animations provided an alternative method of illustrating difficult information retrieval concepts. For example, the ‘filing cabinet’ animation which demonstrates the operation of the online catalogue was described by several librarians as being useful.

vi) Scripting and text
The librarians stated that the information content was readily accessible and comprehensive. The passages of text were carefully worded and avoided ambiguities. Excessive use of acronyms and terminology had been avoided. The type-face used was seen as being clean, clear and of a good size.

vii) Information Seeking Process
The topic ‘The information seeking process’ was criticised by the novice reviewers as being interesting but not very practical (see Section 6.5 below). However two librarians regarded it as being essential for people beginning a search for information. They also found that the information presented was visually stimulating, clear and concise.

While the comments made by the librarians suggest that the information content was comprehensive and appropriate for novices, the following inclusions were recommended:
i) Many novices have difficulties interpreting some error messages provided by the catalogue software or by the computer system. It may help them to have a list or a troubleshooting guide so that they can interpret these messages.

ii) The example searches should include demonstrations of how to search for corporate authors.

iii) The topic ‘How to find items on a reading list’ should include an example of how to find an individual chapter in a book.

iv) One librarian indicated that there should be more information about moving between screens and in particular removing windows.

v) The availability of a glossary would help to clarify any unfamiliar acronyms or terminology used.

The majority of comments made by the librarians were extremely positive, however they did raise a number of concerns. The issues reported below parallel some of the criticisms made by the multimedia producers:

i) **Currency of information**

The librarians emphasised the importance of ensuring that the information presented in an instructional system is current. Library-based information systems are continually being updated and streamlined to meet the needs of users. For example, the term ‘monograph’ on the DRA online catalogue holdings screens had recently been changed to ‘book’. This was done as result of the huge number of enquiries from students who didn’t know what a monograph was. It was acknowledged that while multimedia systems can be changed, it would involve additional work and costs.
ii) **Extent and level of information**
The librarians were concerned that there was too much information. They suggested that it may be better to identify those areas which are essential for learning how to use the online catalogue and those areas where the user may like to seek further information. The idea of allowing the user to ‘dig deeper’ was expressed.

iii) **Programme overview**
The librarians suggested that the user needed to be given an overview of the system. The overview should answer the following questions: “Where will the programme take me?”; “Where will the end be and how far through the programme am I?”. The need for a system overview reinforces the comments made by the multimedia producers in the expert review.

The librarians also emphasised the need for users to know how the information in one area of the programme relates to another. In addition, the user should be able to access related information in other areas of the programme.

iv) **Reference appointment area**
The librarians argued that the information presented in this area needed to be simplified. There were too many screens of text and not enough graphics. This was an issue also raised in the novice review (Section 6.5). The text screens could be summarised with the animations appearing on the first or second screens. Any in-depth explanations could be presented in the following screens.

v) **Moving menus**
The moving menus were criticised by the librarians, multimedia producers and novices. The difficulties involved in selecting a topic and being able to identify which topics had been investigated were common objections. The librarians suggested that the user should be able to choose the speed of the moving menus or be offered the alternative of a static menu.
vi) **Panoramas**
While the librarians appreciated the rotating views of the libraries, they wanted more people to be depicted in the scenes. They argued that this would make the libraries seem more user-friendly. Additional people, such as students, might be used to provide ‘hot tips’, indicate key sections, etc.

vii) **Index**
The index was described as being difficult to navigate. The librarians suggested that each section of the index needed a topic heading to indicate to the user what information it covered. The user should also be able to return to the index after selecting a topic.

viii) **User instructions**
The librarians identified a number of areas where instructions to the user could be improved:

- When the user chooses the ‘actual’ online catalogue, there is no information provided about how to login or what the login details are. This could be displayed on an intermediary screen before the NCSA Telnet™ session is opened.

- The librarians requested the navigation buttons and an information button be available on every screen.

- The user instructions for the online catalogue demonstrations in the ‘Catalogue workstations’ area are inadequate. The process of moving through the demonstrations needs to be made more obvious to the user.

As stated earlier, the prototype multimedia system uses a range of different interfaces and screens with the intention of testing user reaction to different options. While the range of options provided valuable feedback, it did lead to inconsistencies in interface design. The inconsistencies in this area, identified by the expert reviewers, would be avoided in a final implementation.
6.5 Novice Review

The principal purpose of this area of the evaluation was to test novice library user reactions and attitudes to the multimedia prototype. Twenty such students at the University of Western Sydney Nepean were interviewed after using the system. This was seen as a reasonable sample given that the interviews would be conducted in some depth. The interviews were conducted in the period May-June 1996 to coincide with the expert review.

The participants were students who made enquiries at University of Western Sydney Nepean Libraries about using the online catalogue. They were given an information sheet explaining the multimedia prototype. Those students who volunteered to review the multimedia prototype were interviewed by the researcher.

The interviews involved the students being provided with a brief description and demonstration of the multimedia prototype. The researcher then asked the students to spend approximately one hour reviewing the four main modules of the prototype.

Some students chose to make notes while they were using the multimedia prototype. The participants were asked to complete an evaluation form at the conclusion of the interview. A copy of the form is included in Appendix Three.

The evaluation form was used to record specific information about the students. This included their course of study, age, gender, and experience with computers. It was thought that these last two factors may have some influence on the students' opinions and use of the multimedia prototype. However the diversity of responses meant that no conclusions of statistical significance could be determined. The evaluation form addressed three main areas relating to the students' reactions and attitudes to the multimedia prototype:

i) Attitudes to the multimedia prototype

ii) Perceived instructional value of the multimedia prototype

iii) General comments about the multimedia prototype
6.5.1 Attitudes to the multimedia prototype

This area of the review was intended to provide information about the novices’ perceptions of specific aspects of the multimedia prototype. The participants were asked to rate their opinions of the prototype relating to the areas of: engagement; use of media elements; user interface; information content; learning styles.

Basic statistical information about the results of this part of the novice evaluation is presented in the following tables.

1. Was the system easy to understand?

<table>
<thead>
<tr>
<th>Difficult</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
<td></td>
<td></td>
<td>3</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

*Mean score 4.25*

The participants found that the multimedia prototype was easy to understand. However, there were some general comments made which suggest that some of the students required more comprehensive or improved instructions on how to operate or navigate the system. These comments are discussed in Section 6.5.3 of the novice review.

2. Did you find it easy to move around the screens?

<table>
<thead>
<tr>
<th>Difficult</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
<td></td>
<td></td>
<td>1</td>
<td>3</td>
<td>10</td>
<td>6</td>
</tr>
</tbody>
</table>

*Mean score 4.05*

The participants found that it was easy to move around the multimedia prototype screens. Once again, as described in the previous question, some of the general comments relating to user instructions are relevant.
One student indicated that he had an arthritic hand which made it difficult for him to use a mouse and even more difficult to select topics from the moving menus. The student preferred to use arrow keys rather than a mouse. Consideration should be given in future versions of the multimedia prototype to people with similar disabilities.

3. **Was the information presented useful?**

<table>
<thead>
<tr>
<th>No use</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Very useful</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
<td>3</td>
<td>8</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mean score 4.30*

The participants found that the information provided by the multimedia prototype was useful. Some of the responses in the open-ended questions relate to information which the participants found was not relevant. These comments are discussed in Section 6.5.2 (Question 2) of the novice review.

4. **Did the way in which the information was presented suit the way you like to learn?**

<table>
<thead>
<tr>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Consistently</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mean score 3.45*

The mean score and range of response for this question is lower than for the other questions in this section of the novice review. One participant stated that they would prefer personal assistance rather than using a computer program. Another participant (who was in the 50+ age bracket) described his low score as being a ‘dinosaur response’.
To an extent, the distribution of responses for this question reflects the discussion in Chapter Two relating to learning styles and the individual characteristics of novices. Novices will approach the task of learning about an online library catalogue using a range of instructional methods.

5. What was your opinion of the various media elements used? (this includes the graphics, sound, video, text, etc.)

<table>
<thead>
<tr>
<th>Poor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mean score 4.45*

The mean score for this question contrasts with the comments made by the multimedia producers described in the expert review (Section 6.4). The multimedia producers criticised the style and quality of the media elements used, while the novices rated those aspects of the prototype as being superior, giving one of the highest mean scores of all questions. This may be explained by the multimedia producers’ exposure to high quality graphics and the student’s lack of experience with instructional programmes which rely heavily on those elements.

6. Did the use of these media elements add to the learning experience?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Consistently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mean score 4.00*

The majority of students indicated that the media elements present in the multimedia prototype did add to their learning experience. Some of the responses to the open-ended questions in Section 6.5.2 of the novice review explain why individual students found that the use of media elements enhanced their learning.
Other responses to the open-ended questions in Section 6.5.2 suggest that some of the students found the moving menus, and other graphical elements, interfered with their understanding of the information content of the programme. This may account for the responses to this question which are at the lower end of the scale of mean scores provided.

7. Do you think the system would help people who don’t know much about libraries?

<table>
<thead>
<tr>
<th>Of no use</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Very helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>1</td>
<td>9</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean score 4.45

This question elicited responses that were concentrated at the high end of the scale. While some of the students found that the multimedia prototype did not suit their learning styles (see question 4), they did agree that the multimedia prototype would be useful for novice library users. Some of the general comments in section 6.5.3 of the novice review support this argument.

8. How would you rate the prototype as an instructional programme?

<table>
<thead>
<tr>
<th>Poor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>2</td>
<td>10</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean score 4.30

The multimedia prototype was rated highly by the students as an instructional programme. General comments made in Section 6.5.3 of the novice review indicate that some of the students would like to see a similar programme being made available to all new students both in the libraries and the university computer laboratories.
Chapter Six: Testing and Evaluation of the Multimedia System

9. Would you use this system or a similar system again?

<table>
<thead>
<tr>
<th>Never</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Consistently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean score 4.00

No respondent indicated that they would never use the system again. Fifteen of the twenty respondents expected to return to use the system at least frequently. One explanation for the two low scores is that the students had now comprehensively reviewed the system and would therefore not need to use it again. This argument is supported by one student who commented that he would not use the system again because he now knew how to use the online catalogue.
6.5.2 Instructional value of the multimedia prototype

This area of the novice review was designed to elicit qualitative information relating to the students’ use of the multimedia prototype. The students’ perceptions of the instructional value of the multimedia prototype were sought. The questions in this section of the evaluation form were open-ended to facilitate detailed rather than yes/no answers.

Below is a summary of the issues raised in each question of this section of the novice review.

1. Which areas of the prototype system did you find most useful and why?

The online catalogue simulations were mentioned frequently as being very useful. The students found that they were able to learn how to use the online catalogue by conducting example searches step-by-step.

The guides were regarded as an effective interface device. The students liked the concept of being guided through the programme by library staff members. One student commented that he didn’t like having to read instructions. He preferred the way in which user instructions were spoken by the guides.

The ‘Tips and tricks’ and ‘How to research an essay question’ topics were also popular. These topics were of interest to students who had some library experience and wanted to extend their knowledge of the online catalogue.

One student commented that the way in which the user was able to move through the information content was innovative. The student found that because the multimedia prototype presented information in a variety of ways, it was rarely boring and never static.
2. Which areas of the prototype multimedia system did you find least useful and why?

Six responses to this question relate to the topic 'The information seeking process'. Some students found this information interesting but not very practical. A student commented that the information didn't teach him anything new. He stated that the process was familiar because all students go through it at one stage or another.

This suggests that future implementations of the multimedia prototype will need to indicate to students which information is relevant for beginners and which information may be more appropriate for people wishing to extend their knowledge of the online catalogue. This issue was also raised by the multimedia producers and the librarians.

A number of user interface problems were identified in this question. Two students found the scrolling text boxes difficult to control. Four responses related to the moving menus where some students had problems selecting topics. The students were also unable to distinguish which topics they had already selected and which topics remained to be reviewed. These user interface issues compare closely with the opinions expressed by the multimedia producers and librarians in the expert review (Section 6.4).

The 'Shelves' area was criticised for being too general by some students. The students would have preferred a map or plan of the libraries rather than the changing panoramas. One student thought an interactive tour of the libraries showing all the important resources would have been useful.
3. In what ways has this instructional system enhanced your understanding of the online catalogue?

The majority of responses to this question indicate that the students, through using the multimedia prototype, now had an enhanced understanding of the online catalogue. The areas where the students claimed their knowledge had improved include:

- finding information on a subject
- knowing about catalogue features
- being aware of different library collections
- locating material at other libraries
- being able to look for the same material in a number of different ways
- knowing some tips and tricks which would improve online catalogue use

Four responses to this question related to the process of finding information on a subject. The students had learnt about subject headings, keywords and other search strategies. One student stated that the multimedia prototype had certainly helped her understand how to locate books, retrieve the information she needed, and how to find materials for essays.

The number of responses relating to the skills involved in finding information on a subject, reflects the discussion in Chapters Two and Three relating to novices' lack of understanding of the subject-access components of online library catalogues. These skills were given special emphasis in the multimedia prototype.
Chapter Six: Testing and Evaluation of the Multimedia System

4. Do you feel that you will now be able to use the online catalogue effectively? What information do you still require?

The students maintained that they knew more about using the online catalogue and the information seeking process after reviewing the multimedia prototype. One student commented that she would now be able to use the online catalogue without any further information. Another student stated that he may need personal help at certain times and would also benefit from using the multimedia prototype again.

The areas where the students required more information include:

- conducting complex searches
- limiting searches by media, date, etc.
- finding audio visual materials
- finding material in the Reserve Collection
- information about other databases
- learning about the Internet
- identifying relevant subject headings

Some of these areas were specifically excluded from the multimedia prototype because they were either regarded as being too complex for novices or beyond the intended scope of the instructional content of the programme. The system was not intended to replace other methods of library instruction, but rather to relieve library staff of some of the more mundane queries so that they could spend more time assisting users in other areas of concern.

It is interesting to note that while some respondents found certain topics too complex, other respondents claimed that certain topics were not explained in sufficient depth. It is difficult to develop an instructional system which suits the information needs of all prospective users.
5. What did the instructional programme teach you about finding items which you know about or which appear on a reading list?

Five respondents left this question blank. The question was designed to elicit what the students had learnt about locating known items. However, the responses provided no useful information. It may be that the students either failed to review the relevant areas of the multimedia prototype or didn’t learn anything about finding known items. Another explanation may be that the respondents did not find this task inherently difficult therefore the system did not teach them anything in this regard.

6. What did the instructional programme teach you about finding items on a particular topic or for an essay?

The initial user survey (reported in Chapter Three) showed a low usage of keywords as a method for finding information on a subject. Seven responses to this question mentioned using keywords. One student remarked that they had been limiting themselves by only using subject and were now much more likely to try the keyword approach.

Other responses included: starting with the reference collection; analysing a topic; using ‘berrypicking’ strategies; looking at the list of Library of Congress Subject Headings.

It is interesting to compare the response rate between this question and the previous question. The students learnt much more about finding information on a subject than they did about locating known items.

7. Was having access to the ‘actual’ catalogue useful? Explain your answer.

Having access to the ‘actual’ online catalogue was seen as being a useful feature. The students mentioned that is was good to be able to practise what they had learnt. One student commented that it was helpful to use the online catalogue with the enhanced information provided by the multimedia prototype. Another student stated that access to the ‘actual’ online catalogue was essential for building user confidence.
6.5.3 General Comments

In this section of the novice review, the students were asked to describe their overall impression of the multimedia prototype and make any general comments they thought were appropriate.

The respondents made few negative comments although several areas were identified as requiring modification. Some of these areas compare with the comments made by the multimedia producers and the librarians in the expert review.

Most of the general comments can be grouped into six areas. The following table lists those areas and example comments made:

<table>
<thead>
<tr>
<th>Area</th>
<th>Example comments</th>
<th>Number of responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moving menus</td>
<td>• &quot;The screens with the moving objects are distracting and confusing&quot;</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>• &quot;The moving titles are difficult to read and catch&quot;</td>
<td></td>
</tr>
<tr>
<td>Value of the programme</td>
<td>• &quot;Takes the fear and uncertainty out of using libraries&quot;</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>• &quot;Would like to see this system available in the library and computer laboratories&quot;</td>
<td></td>
</tr>
<tr>
<td>User instructions</td>
<td>• &quot;Some areas need more instructions to be able to use them properly&quot;</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>• &quot;The system should indicate which topics have been completed&quot;</td>
<td></td>
</tr>
<tr>
<td>Plan or map</td>
<td>• &quot;A general plan of the libraries would be useful&quot;</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• &quot;When visiting the libraries, it would be good if the system provided a description of what you were looking at&quot;</td>
<td></td>
</tr>
<tr>
<td>Simulations</td>
<td>• &quot;How do I find out what the correct sequence is?&quot;</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>• &quot;I was confused about whether I should be using the keyboard or the mouse&quot;</td>
<td></td>
</tr>
<tr>
<td>Text</td>
<td>• &quot;There is too much text. I can’t be bothered reading it and don’t learn from it&quot;</td>
<td>3</td>
</tr>
</tbody>
</table>

It should be noted that the same table provides a reasonable summary of the key issues raised by the three groups involved in the evaluation of the multimedia prototype.
Chapter Seven: Conclusion

The purpose of this research project has been to examine the application of multimedia to the teaching of information access skills in tertiary libraries. Specifically the project has involved the development and evaluation of a multimedia system to instruct novice users of online library catalogues.

A clear understanding of the needs and characteristics of novice users of online library catalogues has been established. It is evident that novices rely heavily on online library catalogues as their main source for finding information to support their studies. Academic pressure and unfamiliarity with libraries and information systems mean that novices are uncertain and anxious about the task of finding information.

An important area for the instruction of novices is the information seeking process itself. Novices are generally able to locate references provided to them by their lecturers. Knowing where and how to look for information on a particular topic is more problematic. It is now clear that information skills programmes in academic libraries would be improved if they were to promote a subject-based approach through a more holistic view of the information seeking process.

The current research project has confirmed that online library catalogues are still hard to use. Christine Borgman, writing in 1986, questioned "Why are online catalogs difficult to use" (Borgman, 1986b). Ten years later she asks "Why are online catalogs still difficult to use" (Borgman, 1996). The finding acknowledges that rapid technological change does not necessarily contribute to the development of more suitable information resources. The current research project reveals as much about the deficiencies in the design of online library catalogues as it does about developing multimedia instructional systems.
Borgman (1996, p.501) argues that “in the short term, we can help make online catalogs easier to use through improved training and documentation that is based on information seeking behavior.” To this end, the current research has proposed a Conceptual/ Mechanical/ Locational (CML) structure for instructional multimedia systems. Information gathered from an assessment of online library catalogues, from interviews and studies of novice users, and from various expert sources, has been used to develop and confirm the proposed structure. The CML framework is appropriate for training novice users of online catalogues. The model might also be applicable more generally, to instructional and training methods for other bibliographical databases and library resources.

A multimedia prototype system based on the CML model has been designed, implemented and evaluated as part of this research project. It is important to the evaluation of any system, but particularly with new technologies, that the system implementation is a realistic reflection of what multimedia might provide. A significant amount of time and effort was therefore committed to ensure that the utility of the multimedia system was not compromised by ineffective design or production.

The multimedia prototype has enabled a level of user involvement in the development, which commonly proves difficult to deliver using other methods of instruction. It is capable of providing a more flexible method of instruction for use in academic libraries. The success of the multimedia prototype is most clearly measured by the comments of the participants in the novice review most of whom liked using the system, learnt something from it, and would use a similar system again.
The evaluation process involved novice users, expert multimedia producers, and librarians. It raised a number of key issues, mentioned by all three groups involved in the review. These key issues may well have application to the development of multimedia systems in general, not just to the prototype system described here:

(i) Greater attention needs to be paid to the amount and form of user instructions provided by the system. The evaluation of the current multimedia prototype revealed a conflict between the provision of an interface which motivates people to explore the system, and the user’s stated requirement for some direction in that exploration. A designer who is developing a computer-based system to instruct novices on how to use another computer-based system, must be aware of the confusion this can create.

(ii) Novices need an overview of the instructional system if they are to use it effectively. In evaluating the multimedia prototype, the reviewers wanted to be able to identify where they were in the system, and what areas they had investigated or were yet to examine. Novices require a conceptual understanding of the instructional system in the same way as they require a conceptual understanding of the operation of the online library catalogue.

(iii) The individual and diverse characteristics of users mean that it is difficult to design a multimedia system which will suit everyone. This applies particularly to the user interface. More research is needed in this area to determine the most effective method for allowing users to access the information in multimedia systems. It may not be possible to develop an interface which is effective for all users. The development of interfaces which can be modified to meet individual user needs may solve this problem. The provision of multiple styles or modes of interaction is another possibility.
(iv) Consideration needs to be given to the level of the information presented in a multimedia system. Is it too easy or too complex for the target audience? The reviewers of the multimedia prototype wanted an overview of the system so that they knew what was covered in each topic. They also wanted to be able to distinguish between the essential information and the topics which provided a more in-depth analysis of the subject.

(v) It is difficult to establish the most appropriate media elements to use in a multimedia instructional system. Some of the reviewers stated that they didn’t like having to read too many screens of text. In that case, how do you adequately explain a topic? Which media elements should you use? What is the most effective way of getting your message across? The formative evaluation techniques (rapid prototyping) described in Chapter Six are crucial in this regard. The designer must not only know the user, but also determine which design elements work and which don’t. The evaluation process must be carried out as frequently as possible during the production phase. It is important that the findings at each stage inform the subsequent development.

Future work could involve a professional multimedia design team in the production of a full-functional and robust instructional system. However, the specific needs of novices might equally be provided by online catalogues which themselves incorporate some of the instructional features of the multimedia prototype. As one student reviewer stated “ideally the online catalogue should be so self-contained that this multimedia system of yours would not be needed.”

The ability to search the online catalogue and use the multimedia programme was a popular feature of the prototype. A more effective pairing of the two systems may have improved the instructional value of the prototype. The immediacy of this kind of instruction would appeal to those users who have a preference for personal help.
The application of multimedia instruction to other information skills or library-based technologies could also be investigated. One area might be how to find articles in journals using online and CD-ROM databases. It remains important for libraries to investigate the instructional needs of their users and to consider a variety of modes for the delivery of that instruction.

The object of the research project reported here has been to produce a prototype computer-based instructional system as a research tool and to evaluate the application of multimedia to the instruction of novice users of online library catalogues. The research has resulted in an increased understanding of the instructional needs of novice users of online library catalogues, and has provided a clear indication of the potential for multimedia programmes to meet those needs. The research has also provided further justification for the design of more user-centred online library catalogues.
Reference List


Bibliography


Appendix One: Online Catalogue Survey Form

Current search

What are you looking for?
(Specific item or subject)

What options will you use in the catalogue to find this information?
/Search history/

Have you considered using other search options?
(eg. keywords, subject)

Training

How did you learn to use the catalogue?

Have you used the help screens? Were they useful?

Have you had any catalogue training?

Did the training help you to use the catalogue?
Problems

If you can’t find something using the catalogue, what do you do? What sort of help do you require?

Which catalogue features or options would you like more information about? (eg. keyword, restore last search, related terms, etc.)

What information displayed by the catalogue don’t you understand? (Call numbers, circulation status, copy details, etc.)

What problems have you experienced in using the catalogue? (These may be mechanical — eg. keyboard, menus, etc. or conceptual — how to relate an information need to the way the catalogue works)

Success

How would you rate your success in using the catalogue?

☐ Always successful
☐ Mostly successful
☐ Can never find anything

Are there any general comments you would like to make about the catalogue?:

122
How does a catalogue work?

A catalogue could be likened to a card file.

You could start a card file listing all the books you have at home. Most books have an author, title and are on a particular topic. Your card file could include 3 categories: author, title and subject. For each book you would create a card using the author as a heading and a card using the title as a heading. You may decide that the book is about a number of subjects. In this case you would create one card for each subject. Every card would have a heading and include all the details about the book. You would then file the cards alphabetically in their respective categories. Once all the books have been listed you now have a systematic record of everything in your collection. When you want to know if you have already bought a particular book you can now flick through your card file rather than having to search the whole house.

Click on the guide to see how a card file works
Appendix Three: Multimedia Prototype Evaluation Form

Multimedia Instructional System Evaluation Sheet

Faculty: .................................................................

Course: .................................................................

Male □ Age: 18 — 21 □
22 — 25 □
Female □ 26 — 35 □
36 — 50 □
50+ □

Are you an experienced computer user?

No experience □
Some experience □
Very experienced □
Section 1 — Attitudes

(Please circle the number which best answers the following questions.)

1. Was the system easy to understand?
   Difficult 1 2 3 4 5 Easy

2. Did you find it easy to move around the screens?
   Difficult 1 2 3 4 5 Easy

3. Was the information presented useful?
   No use 1 2 3 4 5 Very useful

4. Did the way in which the information was presented suit the way you like to learn?
   Not at all 1 2 3 4 5 Consistently

5. What was your opinion of the various media elements used? (this includes the graphics, sound, video, text, etc.)
   Poor 1 2 3 4 5 Excellent

6. Did the use of these media elements add to the learning experience?
   Not at all 1 2 3 4 5 Consistently
Appendix Three: Multimedia Prototype Evaluation Form

7. Do you think the system would help people who don't know much about libraries?

Of no use 1 2 3 4 5 Very helpful

8. How would you rate the prototype as an instructional programme?

Poor 1 2 3 4 5 Excellent

9. Would you use this system or a similar system again?

Never 1 2 3 4 5 Consistently
Section 2 — Specific questions

1. Which areas of the prototype multimedia system did you find most useful and why?

................................................................................................................................................
................................................................................................................................................
................................................................................................................................................
................................................................................................................................................
................................................................................................................................................

2. Which areas of the prototype multimedia system did you find least useful and why?

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................................................................................................................................................
................................................................................................................................................
................................................................................................................................................

3. In what ways has this instructional system enhanced your understanding of the online catalogue?

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................................................................................................................................................
................................................................................................................................................
................................................................................................................................................
................................................................................................................................................
4. Do you feel that you will now be able to use the online catalogue effectively? What information do you still require?

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........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

5. What did the instructional programme teach you about finding items that you know about or that appear on a reading list?

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........................................................................................................................................
........................................................................................................................................

6. What did the instructional programme teach you about finding items on a particular topic or for an essay?

........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................
7. Was having access to the 'actual' catalogue useful? Explain your answer.

8. Are there any general comments you would like to make?

Thank you for participating in this evaluation.

Paul Evans (02) 8525887
Library
University of Western Sydney Nepean
Appendix Four: CD-ROM Instructions

System Requirements

HARDWARE
- Macintosh II, Performa, PowerBook, Quadra or PowerMac series computer with 68030 CPU
- 8 MB available RAM
- A 640 by 480 pixel (13-inch) or larger colour monitor
- A CD-ROM drive (double speed recommended)
- An Internet connection

SOFTWARE
- Macintosh™ System 7 or later
- QuickTime™ 2.0
- Sound Manager 3.0

Instructions

- Set the monitor to 256 colours
- Insert the CD-ROM in the CD-ROM drive
- Double-click the CD-ROM icon
- Double-click the Movies folder
- To start the programme, double-click the Projector icon
- For instructions on how to use the programme, move the mouse over the Information button

Getting Help

Email Paul Evans:
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A Multimedia System to Instruct Novice Users of Online Library Catalogues

Paul Evans

A thesis submitted for the degree of Master of Arts (Hons) — Design of the University of Western Sydney Nepean

November 1996
PLEASE NOTE

The greatest amount of care has been taken while scanning this thesis,

and the best possible result has been obtained.
I certify that the work in this thesis and the accompanying computer files is entirely my own except for references to the works of others as indicated in the text. This work has not been submitted for a higher degree at any other institution.

Paul Evans
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I would also like to thank the staff at the UWS Nepean Libraries for their help and support particularly with the production and evaluation of the prototype.
Abstract

The research reported here focuses on the application of multimedia to the teaching of information skills in academic libraries. Specifically, the research project has involved the development and evaluation of a multimedia system to instruct novice users of online library catalogues.

The research has included an investigation of the characteristics and needs of novice library users. The ways in which novices approach using library-based information technologies have been analysed. A theoretical model has been developed which may be applied to any instructional programme for teaching novices how to use library-based information technologies.

The research project has involved the development of a comprehensive multimedia system based on the theoretical model. The multimedia system was designed using Macromedia Director™ v.4.04. The production techniques and operation of the multimedia system are described in some detail.

The multimedia system was evaluated and tested using formative evaluation strategies. The evaluation involved the prototype system being reviewed by expert librarians, and multimedia producers, as well as novice users of online library catalogues. The information gathered during the evaluation was used to make suggestions about improvements to the design of the prototype. The results of the evaluation are reported and analysed.
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Multimedia item accompanies print copy