

**Perspectives on Learning and Information
in
Flexible Learning Environments**

Craig George Littler

A thesis submitted to the
University of Technology, Sydney
in fulfilment of the requirements for the degree of
Master of Arts (by thesis)

**Faculty of Humanities and Social Sciences
University of Technology, Sydney
2004**

Certificate of Authorship/Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of the requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Candidate

.....

Acknowledgements

I wish to acknowledge the guidance and encouragement provided by my supervisors, Dr. Ross Todd (Rutgers, State University of New Jersey; formerly at University of Technology, Sydney) and Associate Professor Hilary Yerbury (University of Technology, Sydney), who have alternated in the roles of principal supervisor and co-supervisor throughout my candidature. Thanks are due to Dr. Todd for encouraging me to embark on the research process, and for providing his informed input at significant points along the way. I am indebted to Associate Professor Yerbury for her critical feedback and positive support during the writing of this thesis, and have appreciated her generous sharing of time and advice.

I am grateful to Mr. Alex Byrne, University Librarian at the University of Technology, Sydney, who made time in his busy schedule to act as co-supervisor during Spring Semester 2001. I benefited from his professional comments during the early stages of data analysis, and in drafting methods for presenting the study findings.

My thanks also to students and academic staff at the University of Wollongong who participated in this research study, and to Ms. Marie Johnson, Faculty of Health and Behavioural Sciences, University of Wollongong, for her prompt and professional transcription of participant interviews.

I would also like to acknowledge the support of management and colleagues at the University of Wollongong Library who accommodated my need for some flexibility in working arrangements over an extended period of part-time study.

Finally, I wish to thank my friend, Ms. Kath Tonkin, for her support and understanding during the process of researching and writing this thesis.

Table of Contents

| | |
|--|------|
| Certificate of Authorship/Originality | i |
| Acknowledgements | ii |
| List of Figures and Tables | vii |
| Abstract | viii |
| Chapter 1: Background to the Study | |
| 1.1 Introduction | 1 |
| 1.2 Origins of the Study | 1 |
| 1.3 The Nature of Flexible Learning | 3 |
| 1.4 The Role of Libraries and Librarians | 10 |
| 1.5 Information and the Learning Process | 15 |
| 1.6 Aims of the Study | 17 |
| 1.7 Research Focus | 17 |
| 1.8 Significance of the Study | 19 |
| Chapter 2: Context and Conceptual Framework | |
| 2.1 Introduction | 21 |
| 2.2 Theories and Conceptions of Learning | 21 |
| 2.3 Learning Environments | 25 |
| 2.4 Student and Teacher Perceptions of Flexible Learning Environments | 32 |
| 2.5 Theories and Conceptions of Information | 34 |
| 2.6 Information Use | 39 |
| 2.7 Conceptual Framework for the Study | 41 |
| Chapter 3: Research Methodology | |
| 3.1 Introduction | 44 |
| 3.2 The Research Focus | 44 |
| 3.3 Research Methodologies | 45 |
| 3.3.1 Quantitative and Qualitative Approaches | 46 |
| 3.3.2 Characteristics of Qualitative Research | 47 |

| | | |
|-------|---------------------------------------|----|
| 3.3.3 | The Role of the Researcher | 50 |
| 3.4 | Review of Research Methodologies | 51 |
| 3.4.1 | Action Research | 51 |
| 3.4.2 | Sense-Making | 52 |
| 3.4.3 | Phenomenography | 53 |
| 3.4.4 | Grounded Theory | 54 |
| 3.4.5 | Case Study | 54 |
| 3.5 | Research Design and Procedure | 57 |
| 3.5.1 | Defining the Case | 57 |
| 3.5.2 | Selection of Cases for Study | 60 |
| 3.5.3 | Selection of Study Participants | 61 |
| 3.5.4 | Key Case Study Questions | 63 |
| 3.5.5 | Methods of Data Collection | 64 |
| 3.5.6 | Final Selection of Cases for Analysis | 67 |
| 3.5.7 | Ethical Considerations | 67 |
| 3.6 | Data Analysis | 68 |
| 3.6.1 | Contextual Analysis | 68 |
| 3.6.2 | Questionnaire Analysis | 69 |
| 3.6.3 | Interview Analysis | 69 |
| 3.7 | Establishing Trustworthiness | 73 |
| 3.7.1 | Credibility | 75 |
| 3.7.2 | Transferability | 76 |
| 3.7.3 | Dependability | 77 |
| 3.7.4 | Confirmability | 77 |

Chapter 4: Findings

| | | |
|-------|---------------------------|----|
| 4.1 | Introduction | 79 |
| 4.2 | The Institutional Context | 79 |
| 4.3 | The Case Study Context | 80 |
| 4.4 | Questionnaire Findings | 82 |
| 4.4.1 | Case Study A | 82 |
| 4.4.2 | Case Study B | 83 |
| 4.4.3 | Case Study C | 83 |
| 4.5 | Interview Findings | 84 |

| | | |
|-------|--|-----|
| 4.6 | Perspectives on Flexible Learning | 85 |
| 4.6.1 | Concepts of Flexible Learning | 85 |
| 4.6.2 | The Flexible Learning Environment | 87 |
| 4.6.3 | The Teacher | 88 |
| 4.6.4 | The Learner | 93 |
| 4.6.5 | Methods of Communication | 95 |
| 4.7 | Perspectives on Information | 97 |
| 4.7.1 | Concepts of Information | 97 |
| 4.7.2 | Methods of Presenting Information | 100 |
| 4.7.3 | Using Information Resources and Services | 102 |
| 4.7.4 | The Librarian | 107 |
| 4.8 | Perspectives on Learning | 110 |
| 4.8.1 | Concepts of Learning | 110 |
| 4.8.2 | The Learning Process | 112 |
| 4.8.3 | Information, Learning and Knowledge | 116 |

Chapter 5: Discussion of Findings

| | | |
|-------|--------------------------------------|-----|
| 5.1 | Introduction | 123 |
| 5.2 | Perspectives on Flexible Learning | 123 |
| 5.2.1 | Concepts of Flexible Learning | 123 |
| 5.2.2 | The Flexible Learning Environment | 124 |
| 5.2.3 | The Role of the Teacher | 125 |
| 5.2.4 | Communication | 127 |
| 5.3 | Perspectives on Information | 128 |
| 5.3.1 | Concepts of Information | 128 |
| 5.3.2 | Information Presentation | 130 |
| 5.3.3 | Using Information | 131 |
| 5.3.4 | The Librarian | 132 |
| 5.4 | Perspectives on Learning | 134 |
| 5.4.1 | Concepts of Learning | 134 |
| 5.4.2 | The Learner and the Learning Process | 135 |
| 5.4.3 | Information, Learning and Knowledge | 138 |

Chapter 6: Conclusions and Implications

| | | |
|-----|------------------------------|-----|
| 6.1 | Introduction | 143 |
| 6.2 | Conclusions and Implications | 143 |
| 6.3 | Further Research | 149 |

Appendices

| | | |
|-------------|--|-----|
| Appendix A: | Key Case Study Questions | 152 |
| Appendix B: | Case Study Procedure | 154 |
| Appendix C: | Questionnaires | 155 |
| Appendix D: | Interview Questions | 159 |
| Appendix E: | Conceptual Categories and Themes (Examples from Case B) | 163 |

| | | |
|---------------------|--|-----|
| Bibliography | | 165 |
|---------------------|--|-----|

List of Figures and Tables

| | |
|---|-----|
| <i>Table 1: Types of Learning Environment</i> | 26 |
| <i>Figure 1: Model of Flexible Learning</i> | 28 |
| <i>Figure 2: Model for Designing Constructivist Learning Environments</i> | 30 |
| <i>Figure 3: MOLTA: A Model of Learning and Teaching Activities</i> | 31 |
| <i>Figure 4: Theoretical and Empirical Perspectives on Learning and Information</i> | 40 |
| <i>Figure 5: Framework for Studying Perspectives on Learning and Information in a Flexible Learning Environment</i> | 42 |
| <i>Table 2: Selected Cases</i> | 61 |
| <i>Table 3: Participant Coding</i> | 63 |
| <i>Table 4: Features of Case Study Academic Subjects</i> | 81 |
| <i>Table 5: Concepts of Information</i> | 129 |
| <i>Table 6: Concepts of Learning</i> | 134 |
| <i>Table 7: Phases of the Learning Process</i> | 139 |
| <i>Table 8: Phases in Bruner's Interpretative Task</i> | 140 |

Abstract

This study explores the perspectives of teachers and learners in flexible learning environments in relation to information and learning, and the implications of these perspectives for the design of effective library and information services.

It adopted a case study methodology to investigate three flexible learning academic subjects offered at the University of Wollongong in Autumn Semester (March to June) 2000. Using a contextual and document review, teacher and student questionnaires, and in-depth interviews, data were gathered on participant perspectives on the following key areas of research interest: concepts of flexible learning; the flexible learning environment; the role of the teacher; the role of the learner; methods of communication; concepts of information; methods of presenting information; using information resources and services; the role of the librarian; concepts of learning; the learning process; and the relationships between information, learning and knowledge. Interview data were analysed using the constant comparative method to identify conceptual categories and higher-level themes within individual cases as well as collectively across all three cases.

The main conclusions of the study were that: (1) the ways in which information and learning are conceived are central to understanding information use as part of the learning process; (2) there are a number of identifiable processes or phases involved in using information to learn; (3) the integration of information resources and communication mechanisms is a major benefit of the online learning environment; and (4) the design of the flexible learning environment influences student approaches to learning and the use of information and learning resources.

The implications of the study conclusions for library and information services include the need for librarians to develop an understanding of the relationship between information and learning; the need to encourage active engagement

with information, qualitative/deep approaches to learning, and critical and interpretative thinking; the need to integrate library resources, services and communication systems into online learning environments; and the need for librarians to develop their roles as collaborative partners with teachers, as guides and facilitators of student learning, as designers of information environments, and as advocates for the incorporation of information resources and services into flexible learning environments.

Suggestions for further research include ongoing studies on information conceptualisation and use within flexible learning environments, and a larger scale phenomenographic study of conceptions of information.

Chapter 1

Background to the Study

1.1 Introduction

This chapter presents the background and rationale for the study. Section 1.2 traces the origins of the study in changes to higher educational provision and the researcher's practice as a librarian. Section 1.3 explores the meaning and nature of flexible learning as a basis for discussing the role of libraries and librarians in relation to new forms of learning (Section 1.4). Section 1.5 examines the relationship between information and the learning process to provide an orientating framework for the aims of the study (Section 1.6) and the research focus (Section 1.7). The chapter concludes with a consideration of the significance of the study for the library and information science disciplines (Section 1.8).

1.2 Origins of the Study

This research study has been undertaken in order to explore the implications for academic libraries of moves towards flexible teaching and learning in higher education. These represent significant changes in educational methods and approaches which academic libraries must respond to if they are to be viable and effective. A recent survey of flexible provision of higher education in Australia (Ling et al. 2001, pp. 29-53) revealed that most universities now have formal policies and practices concerned with flexible learning. Much rethinking of learning and teaching has been occurring in the higher education sector over the past decade, with a shift in educational vision from providing instruction to providing learning which is student-centred and co-active (Ramsden 1992; Laurillard 1993). Developments in communications and information technology, particularly the Internet and the World Wide Web, have contributed to the rapid and widespread adoption of flexible approaches to education, and have enabled the emergence of the globalised virtual university (Rossman 1992; Ryan et al. 2000; Devlin, Larson & Meyerson 2002).

These new approaches to educational provision, and associated digital technologies, will have an impact on the traditional functions of academic libraries, namely (1) the acquisition and organisation of information resources to support research, teaching and learning, (2) the provision of access to information resources, and (3) the provision of instruction in the location, use and evaluation of information resources (Crawford & Gorman 1995; Graham 1995; Burke 2002, pp. 33-34). There is a clear need for academic librarians to understand the significance of the new educational developments so that appropriate and effective information services can be developed (McPherson 2001). The changing role of librarians in providing collaborative support in new learning environments (Fowell & Levy 1995; Walton, Day & Edwards 1996; Hughes, Hewson & Nightingale 1997) also needs to be acknowledged to enable the design of strategies for appropriate professional education and training.

The impetus for undertaking this research project has arisen from the researcher's role as a practising librarian at the University of Wollongong, where he has responsibility for developing library services to support flexible learning. From 2000 onwards, the University implemented more widespread flexible learning programs, established a number of small satellite campuses, and adopted the WebCT learning management system for online subject delivery. The researcher's involvement in developing services to support these initiatives raised broader questions about (1) the nature of flexible learning, (2) the role of libraries and librarians in relation to flexible learning, and (3) the ways in which information is used as part of the learning process within a flexible learning environment. There was an imperative to situate the local practice perspective within the larger theoretical and practical context of information studies and education. The confrontation with these concerns, and the desire to understand them, evokes the role of the librarian-as-researcher.

Librarians have a long association with research, often involving multiple roles and responsibilities. These can include supporting research undertaken by students and academic staff, conducting research to determine client needs and levels of satisfaction with services, and conducting more generalised

research designed to increase the knowledge base of the profession (Glazier 1992, p. 4). Research by librarians is often grounded in practice, with the aim of the research being to improve services or systems. Practice-based research may be extended to include the development of models to guide practice, but with fully-fledged theory building being a less common outcome. Model building can be seen as a step along the way to theory building, through the process of “arranging the conceptual categories in a way that explains the patterns that are emerging from the data analysis process” (Glazier 1992, p. 5).

The process of reviewing the relevant literature identified the value of exploring the nexus between information and learning from a teacher and learner perspective within a flexible learning context. It was felt that such an exploration would provide a richer picture of information use in relation to learning, and offer insights into how more effective information services can be developed. The background and rationale for conducting such a study are presented in the sections below.

1.3 The Nature of Flexible Learning

Flexible learning is an evolving concept, and this is reflected in the variety of terms used to describe it. The phrase *flexible learning* is one of a number of terms, including *flexible delivery*, *flexible teaching*, *distributed learning*, *open learning*, *networked learning*, *online learning* and *e-learning*, which have been used to describe a wide range of educational methods, techniques, approaches and strategies which seek to provide flexibility to both learners and teachers. From the learner’s perspective, flexibility is seen in terms of the ability to select the time and place of study appropriate to one’s needs, to study in a way which suits one’s learning style, and to benefit from less formalised admission and progression requirements. From the teacher’s perspective, flexibility is seen in terms of the ability to select teaching methods, techniques, resources, and technologies which are in accord with pedagogical aims and objectives. Institutions have also seen these developments as a way of expanding their student base, and of offering more economical subject delivery through technological applications. The distinctions between on-campus and off-campus education are now often blurred (Tait & Mills 1999), with the application

of distance education materials and techniques for on-campus education, particularly at multi-campus institutions (Lim & Van Dyk 1997, p. 58).

The term *flexible delivery* has often been used, especially in Australia, as an umbrella term under which to gather all aspects of flexibility in education. Critics have pointed out that the emphasis on the delivery of packaged learning resources tends to commodify education by focusing on products rather than the educational process (Beattie & James 1997, pp. 179-180; Ling et al. 2001, p. 3), and the use of technological delivery methods may disembodify students from the physical interactions which characterise traditional university education (Beckett 1998; Brabazon 2002; Noble 2002). A study by Taylor, Lopez and Quadrelli (1996, pp. 48-50) revealed that some academics have been sceptical about the underlying agenda associated with flexible learning, perceiving it as part of an economic rationalist approach to education which seeks to increase student numbers while reducing economic outlays. Negative perceptions have also sometimes stemmed from experiences with traditional forms of open and distance education. Others perceive the move to flexibility in more positive ways, seeing it as an opportunity to engage in new and creative forms of teaching, and as offering greater access and equity to students. Successful implementation of flexibility, however, is most often seen as dependent on the quality of student-teacher relationships.

Given this background, the terms *flexible teaching and learning* or simply *flexible learning* are to be preferred to *flexible delivery* because of their emphasis on pedagogical processes. *Flexible teaching and learning* has the advantage of explicitly including both sides of the educational equation – learners *and* teachers – yet the phrase *flexible learning* emphasises student-centredness and should also imply the teaching side of the equation.

On the teaching side of the educational equation, there has been a great deal of analysis of, and critical thinking about, university teaching over the past decade. These developments are exemplified in the work of Ramsden (1992) and Laurillard (1993), who both base their approach to teaching on an

understanding of the ways in which students actually learn. Ramsden (1992, p. 5) considers the aim of teaching as being simply “to make student learning possible”. Laurillard (1993, pp. 4-5) argues the need for a new organisational infrastructure to create the conditions for effective teaching and quality learning. Against the traditional view of teaching as “imparting knowledge”, she proposes a view of teaching as “mediated learning” (Laurillard 1993, p. 14) which involves the construction of environments which “afford the learning of descriptions of the world” (Laurillard 1993, p. 26). With their emphasis on student-centredness and the facilitation of learning, such approaches share many of the features associated with the move towards flexibility in education.

Flexibility has often been equated with distance education, open learning, or the application of educational technologies. While these approaches may all be characterised as offering various degrees of flexibility, none of them individually embody all that is meant by *flexible*.

In discussions of *open*, *distance* and *flexible*, a useful distinction which is often made is that between educational philosophy or approach, and educational method or technique. The term *open learning* is generally thought of as referring to a philosophy or approach to education which seeks to move away from traditional face-to-face practices, to focus more on individual student needs and learning styles, and to remove traditional barriers to entry to higher education. Rumble (1989, p. 35) identified fifteen criteria of *openness* related to access, place or pace of study, means, structure of the program in terms of content and assessment, and support services. Within this framework, *open* refers to “the *objectives* and *character* of the educational process” (Rumble 1989, p. 30)

Distance education is usually distinguished from open learning by describing it as a method of education, “the *means* by which education is achieved” (Rumble 1989, p. 30). An open learning approach might thus use distance education techniques to achieve its aims, but open learning is not necessarily synonymous with distance education.

In practice, these distinctions are not always strictly observed. A review of definitions of flexible learning reveals a fusion of philosophy, method, and technology. Flexible learning is often equated with web-based or online subject delivery. In practical terms, this is often what higher education institutions mean when they use the terms *flexible learning* or *flexible delivery*.

The notion of learner choice, however, is central to most definitions of flexible learning, with the level of choice being determined in relation the following dimensions: (1) access to learning; (2) place, time and pace of learning; (3) methods of learning; (4) content and assessment of learning; (5) learning process; and (6) learning support systems. The emphasis on learner choice is exemplified in the work of a number of writers and researchers highlighted in the following discussion. The six dimensions of learner choice also provide the criteria that this study will use in determining the level of flexibility embodied in particular learning environments.

Van den Brande (1993, pp. 1-2) identifies four conceptual elements which underpin definitions of flexible and distance learning:

- *Openness* in terms of meeting changing and differentiated learning needs.
- *Flexibility* in terms of adaptation to the individual needs and learning modes, and the provision of full interactivity between learners and teachers.
- *Decentralization* in terms of reaching people in remote areas, and of unimpeded access to study facilities at a distance.
- *Multimedia* instructional methods and techniques.

Van den Brande (1993, p. 2) provides the following definition of flexible learning:

Flexible learning is enabling learners to learn when they want (frequency, timing, duration), how they want (modes of learning), and what they want (that is learners can define what constitutes learning to them). These flexible learning principles may be

applied at a distance. If so then the term “distance learning” is used. In such cases the learners can *choose where they want to learn (at home, at an institution or company, at a training centre, etc.)*. [Van den Brande's italics]

Noting that the terms “open learning, distance learning and flexible learning are often used synonymously”, Wade (1994, p. 12) describes flexible learning in terms of learner needs:

an approach to university education which provides students with the opportunity to take greater responsibility for their learning and to be engaged in learning activities and opportunities to meet their own individual needs.

Taylor, Lopez and Quadrelli (1996, p. 6) focus more on the use of technology, using the term *flexible*:

to refer to practices which utilise the capacities for learner-learner and teacher-learner interaction made possible through recent developments in communication and information technology (CIT) to provide increased ‘openness’ in both on- and off-campus delivery of educational programs.

They also use the expression *flexible modes of delivery* to capture a “combination of philosophy and technology” which “frees the provision of educational programs from both geographical and time constraints” (Taylor, Lopez & Quadrelli 1996, p. 6).

Collis and Moonen (2001, p. 9) see learner choice as the key idea informing flexible learning. They identify five key dimensions of learning flexibility: (1) flexibility related to time, (2) flexibility related to content, (3) flexibility related to entry requirements, (4) flexibility related to instructional approach and resources, and (5) flexibility related to delivery and logistics. Each of these dimensions can be expressed on a continuum from fixed to flexible, with many possible options within each flexibility dimension (Collis & Moonen 2001, pp. 10-12). Flexible learning is “a movement away from a situation in which key decisions about learning dimensions are made in advance by the instructor or institution, towards a situation where the learner has a range of options to

choose with respect to key dimensions” (Collis & Moonen 2001, p. 10). In developing a framework for the discussion of flexible learning in higher education, Collis and Moonen (2001, pp. 18-26) identify four key interactive components: (1) technology, (2) pedagogy, (3) implementation strategies, and (4) institutional framework.

A recent Australian government study of the effectiveness of models of flexibility in higher education (Ling et al. 2001) uses the term *flexible provision* to refer to “the provision of choice to learners” (Ling et al. 2001, p. 3). The provision of choice is achieved through a variety of strategies including the use of learning and teaching techniques and technologies, and the adoption of policies affecting learner choices (Ling et al. 2001, p. 3). The study also identifies a number of “elements of flexibility” (Ling et al. 2001, p. 3) as follows:

- The *time* at which the study occurs.
- The *pace* at which the learning proceeds.
- The *place* in which study is conducted.
- The *content* that is studied, which includes the concept of flexible entry and exit points to a programme.
- The *learning style* adopted by the learner.
- The form(s) of *assessment* employed.
- The option to *collaborate* with others or to learn independently.

Oblinger and Maruyama (1996, pp.1-6) argue for the need to develop new instructional models in response to a variety of influences including changes in educational and training practices, student needs, demographic and social trends, and advances in technology. They introduce the concept of a *distributed learning environment* based on learner needs, employing information and communications technologies to allow students and teachers to enter the learning environment at different times and locations (Oblinger & Maruyama 1996, p. 5). In such a scenario, students in the future will receive their education in three locations: (1) a residential campus community, (2) a global

electronic campus accessed via computer, and (3) continuing education and training provided in the workplace (Oblinger & Maruyama 1996, p. 4).

Traditional models of educational provision place institutional organisation and functions at the centre, with students moving from place to place or person to person. Emerging models shift this focus by placing the student at the centre, and providing more flexible access to people and information (Oblinger & Maruyama 1996, p. 6). A distributed learning environment is thus “structured according to learner needs, and tends to integrate traditional institutional functions” such as the classroom and library (Oblinger & Maruyama 1996, p. 6). Four factors are identified as contributing to the development of such an environment: (1) cognition – understanding how students learn, (2) collaboration – interaction with information, other students, and the instructor, (3) communication – using technological tools to communicate with colleagues, experts, and diverse sources of information, and (4) computing – using technology to enable the transformation of learning (Oblinger & Maruyama 1996, p. 5).

Central to supporting the development of distributed learning environments is the creation of advanced computer networks (Barone & Luker 2000), providing systems that “support a convergence of separate voice, video, and data communications technologies into a single advanced Internet” (Barone & Luker 2000, p. 6). The term *networked learning* has been applied to the use of such networks for educational purposes. Networked learning is “learning in which information and communication technology (C&IT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources” (Jones & Steeples 2002, p. 2). Developments in this area are closely linked with various attempts around the world to establish virtual or e-universities offering online courses (Darby 2002, p. 20-24). There is still much work to be done, however, in creating an appropriate pedagogy for the networked environment, with some observers commenting that most current online courses are “direct analogues of conventionally delivered courses copying directly their structure, modes of assessment, timetable etc.” (Darby 2002, p. 23). Darby (2002, p. 25) argues

that the “key to realizing the transforming potential of networked learning will be to find a way to connect all the disparate elements”.

1.4 The Role of Libraries and Librarians

Libraries have a relatively long history of providing services for forms of flexible learning such as distance education and open learning. The literature on these services for the period 1930 to 1999 has been comprehensively surveyed by Latham, Slade and Budnick (1991), Slade and Kascus (1996), and Slade and Kascus (2000). With the convergence of distance and conventional education (Tait & Mills 1999), and the blurring of the distinction between on-campus and off-campus students (Lim & Van Dyk 1997, p. 58), many of the library services to support new modes of learning have evolved from those developed to support distance education. Slade and Kascus (2000, pp. xix-xx) note the use of new terms which have “expanded the parameters of open and distance learning” in response to developments in information and communication technology. These new terms include *off-campus education, flexible learning, flexible delivery, extended learning, distributed learning, synchronous learning, asynchronous learning, virtual learning, networked learning, web-based learning, computer learning, online learning, independent learning, and tele-learning*. Libraries have responded to this rapidly changing educational environment by developing a variety of service provision, learner support, and information literacy programs.

Most responses on the part of libraries to this new educational environment have involved the development of services which provide more flexible access, with an emphasis on the *delivery* of information resources. The advent of new communication and information technologies, and the availability of high speed networks, has seen traditional distance education library services extended to support the learning activities of on-campus students (Peacock & Middleton 1999). These services have employed technological developments to facilitate access to resources and to improve communication, and to reduce the dependence on time and place associated with traditional library services and educational modes. A review by Pernat (1999, p. 201) of initiatives in Australian libraries to support flexible delivery, revealed the most common practices as:

- Increased availability of networked web resources such as databases and electronic journals within the library, in campus laboratories and offices, and at home.
- Greater collaboration between library and academic staff in planning the teaching of information literacy skills, and in the selection of resources for use in web teaching.
- Installation of web interfaces to library catalogues and databases, and the development of subject-based gateways to the web and other electronic resources.
- Increased numbers of computers for student use within the library and greater allocation of space for workstations.
- Reorganisation of library services and staff to include flexible delivery/distance education units.

McPherson (2001) explores the implications of online learning for the design of library services, emphasising the need for librarians to work with academic staff to “identify relevant sources with much greater granularity than is now common” (McPherson 2001, p. 169). She sees the potential for digital document repositories and metasearch engines/portals to provide a personalised approach to the information needs of individual students (McPherson 2001, pp. 168-170). A key consideration in designing future services will be the integration and convergence of information technology systems, with library resources and assistance embedded in the web learning environment. McPherson (2001, p. 173) argues that librarians must “acquaint themselves with what is happening in the world of teaching and learning management systems ... if they wish to be a part of the new environments”.

Beagle (2000) reports on a review of the literature on web-based learning in which he sought to determine the extent to which library services and resources are considered to be integral to the new learning environments. The majority of articles in his study did not mention libraries, and in most of those that did mention them, library resources were touched upon only “in a marginal or tangential way” (Beagle 2000, p. 370). Beagle (2000, p. 371) speculates that

this situation may be the result of a “reductionist tradition” common in distance education which relies on prepackaged, self-contained resources. This is contrasted with a smaller “expansionist group” which sees “the broader potential of distributed access to Web-based learning environments in which libraries play an active interpretive or facilitative role” (Beagle 2000, p. 371). The apparent marginalisation of libraries within the new learning environments, as exemplified in the literature, may also be explained by course developers and educational administrators taking for granted that the increasing availability of library web-based resources will ensure that libraries are automatically compatible with web-based learning environments (Beagle 2000, p. 371). Beagle (2000, p. 371), however, discounts this argument, based on the absence of library considerations in a selection of evaluation reports on courseware products conducted by several US universities. By way of comparison, Beagle’s review of the relevant library literature for representative views expressed by librarians on web-based learning environments identified a number of thematic and polemical correlations (Beagle 2000, pp. 373-376):

- (1) Librarians must play an enhanced instructional role, for both students and faculty.
- (2) The importance of active collaboration between librarians, teaching faculty, and IT training and support staff, on pedagogical design for better integration of library resources with course content.
- (3) Collaboration between systems librarians and IT staff to facilitate the functional integration of library resources and web courseware on the operational level.
- (4) Institutional cooperation between academic and public libraries to support distributed learning, and the need for consortial and resource-sharing arrangements.
- (5) A renewed need for internal team-based organisational structures, especially for selection and implementation of electronic resources and coordination of instructional activities.
- (6) A need for greater awareness of economic and marketplace issues, including the increased competitiveness of the educational environment and the budgetary constraints imposed on libraries.

- (7) Fears expressed by librarians about the marginalisation of libraries in the world of web-based learning, and the economic pressures of a competitive marketplace.

Beagle (2000, p. 377) argues that the issues and experiences faced by librarians in web-based learning environments can be seen as “a bellwether for all library services in the future”.

Fowell and Levy (1995) see opportunities for a new professional role for librarians in providing “networked learner support”, which they define as the “delivery of learner support programmes and services by means of computer-mediated communication” (Fowell & Levy 1995, p. 272). Networked learning is “learning mediated by communication technologies” (Fowell & Levy 1995, p. 272). Fowell and Levy (1995, p. 272) argue that if librarians are “to adopt new teaching and research support roles successfully, they must understand this environment and prepare to work within it”.

Fowell and Levy (1995, p. 275) envisage information professionals taking a leading role in developing and delivering learner support in the new learning environments, and acting as “significant culture change agents” within their institutions. A wide variety of models and strategies will develop as the “new educational space” evolves. Some possible activities in networked learner support include (Fowell & Levy 1995, pp. 275-277):

- Liaison and advice to academics in the information and communication resource aspects of curriculum design, and the technical requirements associated with course delivery.
- Networked delivery of information skills training, information and communication resource training, and guidance on developments in scholarly communication.
- Online assistance to users in searching bibliographic and other resources.
- Networked enquiry services.

- Technical advisory work involving just-in-time troubleshooting.
- Involvement in strategic planning at the institutional level.

Fowell and Levy (1995, p. 278) call for the practice of networked learner support to be “defined collaboratively from within the profession”. They also identify the need for professional development programs to educate information professionals and others involved in the provision of networked learner support in the mix of skills and competencies required for their new roles. These ideas have been implemented through a number of projects in the UK, specifically, the IMPEL project which explored the roles of academic librarians in supporting networked learners (Walton, Day & Edwards 1996), and the NetLinkS project (Levy et al. 1996) which aimed to encourage further development of networked learner support through awareness-raising and professional development activities. An updated review of networked learner support developments (Levy 2002) identified the integration of information literacy instruction in online learning environments, and an understanding of pedagogical design, as key elements in the librarian’s support role.

Much of the literature on flexible learning and libraries has been written from the perspective of librarians’ practice, experience and polemical standpoint. Despite their concerns about marginalisation, librarians have been proactive in their engagement with the new learning environments, and have sought to understand how libraries can best integrate their resources and services into the teaching and learning process.

While recognising that there is much that is positive and useful in library-focussed responses to flexible learning, the present study sees value in exploring flexible learning environments from the perspective of teachers and learners as a way of gaining insight into how we might create library services which are more highly integrated with the needs of those participating in flexible learning. Such an approach will complement the work that has been done thus far in coming to terms with the role of libraries and librarians in flexible learning environments.

1.5 Information and the Learning Process

While there has been much discussion of library systems, and a focus on the behavioural aspects of information use, much less study has been undertaken on the ways in which learners use information in the context of learning. It is an underlying contention of this research project that information services provision must be seen as an integral part of the educational process. Arfield (1994, p. 75) argues that “the successful development of flexible learning within a university requires that the library and its staff should be closely involved in the process at all stages”, and that it is important to realise that “library staff are partners with academic staff in the teaching and learning of students and that they have a distinctive and important contribution to make”.

Over the last decade or so, the primary involvement of librarians in the learning process has been in relation to information literacy education. Librarians have taken a leading role in the implementation of the information literacy agenda (Behrens 1994) which aims to develop information seeking, evaluation and management skills for lifelong learning (Candy 1991; Candy, Crebert & O'Leary 1994; Bruce & Candy 1995). Initiatives in this area have included integrating information literacy instruction into subject curricula (Warmkessel & McCade 1997; Schilling et al. 1995) and developing students' critical thinking skills (Bodi 1992; 1995). George and Luke (1996) argue that information literacy is critically important in the context of moves towards flexible delivery, since changes in teaching and learning processes require learners to be independent and adaptable. They perceive a strong need for universities to reconceptualise institutional structures and staff work practices to “reform the educational environment in ways which are student-centred, resource rich and which make use of the technologies available for distribution and access” (George & Luke 1996, p. 211).

A number of writers have discussed the development of information literacy programs and strategies in response to flexible learning initiatives (Clark & Store 1998; Orr & Wallin 2001). Orr, Appleton and Wallin (2001) developed a conceptual framework and model for information literacy instruction which views information use as integral to the learning process. More broadly, Bruce's

(1997) study of the information literacy conceptions of higher educators in Australian universities provides “target conceptions” which can be applied to learning environments in the development and evaluation of teaching curricula, the devising of new teaching approaches, and the facilitation of staff development (Bruce 1997, p. 164).

A relatively small number of studies in library and information science have explicitly investigated the relationship between information and learning. Kuhlthau’s (1993) studies of the information search process employ a constructivist view of learning “to understand information seeking from the user’s perspective” (Kuhlthau 1993, p. 15), with the aim of designing “more effective library and information services” (Kuhlthau 1993, p. 14). She sees information seeking as a constructive process, and draws parallels between phases of learning identified in the theories of John Dewey, George Kelly and Jerome Bruner, and stages of the information search process revealed in a series of her own empirical studies. Kuhlthau (1993) uses this conceptual framework to develop a grounded theory and model of users’ information processes which acknowledges the cognitive, affective and behavioural dimensions of learning.

Limberg’s (2000) phenomenographic study of the interaction between information seeking and learning outcomes treated information seeking and use as “integrated in the learning process” (Limberg 2000, p. 194). The study found significant relationships between students’ ways of experiencing information seeking and use, and their understanding of the subject matter to be learned. Limberg (2000, p. 203-204) proposes that such findings can add a “learning perspective” to information literacy education which would “take an active interest in students’ ways of experiencing or thinking about or understanding information seeking and use”.

The approaches exemplified in the work of Kuhlthau (1993) and Limberg (2000), which see information use within the larger context of learning, provide useful precedents for the current study and highlight the value of studying such processes from a user’s perspective.

1.6 Aims of the Study

The present study seeks to understand the nexus between information and learning from the viewpoint of teachers and learners in flexible learning environments. As such, the study has two broad aims:

- (1) To explore the perspectives of teachers and learners in flexible learning environments in relation to information and learning.
- (2) To explore the implications of these perspectives for the design of effective library and information services to support flexible learning.

1.7 Research Focus

The study focuses on teacher and learner perspectives in relation to learning and information within a flexible learning context. It has an exploratory intent, rather than an explanatory or purely descriptive one, and seeks to build a multi-dimensional, richly patterned picture of participants' perspectives. These may include thoughts, perceptions, ideas, concepts, conceptions, or cognitive models. Some definitions of these terms derived from *The Oxford English Dictionary Online* (2004) reveal the close associations and family resemblances between them, and give a sense of the range of cognitive activities, processes and phenomena which this study proposes to gather under the general term *perspectives*:

perspective: The relation or proportion in which the parts of a subject are viewed by the mind; the aspect of a matter or object of thought, as perceived from a particular mental 'point of view'. Hence the point of view itself; a way of regarding (something).

thought: A single act or product of thinking; an item of mental activity; something that one thinks or has thought; a thing that is in the mind; an idea, notion.

perception: An interpretation or impression based upon one's understanding of a situation, etc.; an opinion or awareness.

idea: A picture or notion of anything conceived by the mind; a conception. ... Any product of mental apprehension or activity, existing in the mind as an object of

knowledge or thought; an item of knowledge or belief; a thought, conception, notion; a way of thinking.

concept: The product of the faculty of conception; an idea of a class of objects, a general notion or idea.

conception: The forming of a concept or general notion; the faculty of forming such. ... That which is conceived in the mind; an idea, notion.

model: A simplified or idealized description or conception of a particular system, situation, or process ... ; a conceptual or mental representation of something.

Some researchers, such as those in the phenomenographic tradition, define terms such as *concept*, *conception*, and *conceptualisation* in a more closely technical way (Bruce 1997, pp. 85-87). In a manner similar to the phenomenographic approach, the present study adopts a “second-order perspective” which tries to understand “people’s ideas about the world (or their experience of it)” (Marton 1981, p. 178). Unlike phenomenographic studies, however, the present study does not focus on conceptions of a single, particular phenomenon, but seeks to explore a broad range of perspectives in relation to information and learning. For the purposes of this study, perspectives will be defined by the cluster of meanings contained in the dictionary definitions provided above.

The areas of research interest to be explored in relation to teacher and learner perspectives on learning include: the nature and characteristics of learning; the nature and characteristics of flexible learning; the nature and characteristics of the flexible learning environment; the role and characteristics of the teacher; the role and characteristics of the learner; the process of learning; and methods of communication used in the flexible learning environment. The areas of research interest to be explored in relation to teacher and learner perspectives on information include: the nature and characteristics of information; the relationship between information and learning; the relationship between information and knowledge; methods of presenting information; using

information resources and services; and the role and characteristics of the librarian.

The study adopts a case study approach to eliciting multiple perspectives from participants on these areas of research interest. Findings are presented from three case studies of flexible learning environments at the University of Wollongong. Data collection was conducted from March to June 2000, during the first year of implementation of the WebCT online learning management system. The findings of the study thus represent the perspectives of teachers and learners during a period of transition from traditional to more flexible forms of learning.

1.8 Significance of the Study

The significance and distinctive character of the study is that it seeks to explore the relationship between information and learning by focussing on users of information – teachers and learners – in flexible learning environments. It aims to understand the ways in which information is used in a learning context and to understand the cognitive and behavioural processes associated with such use. As a small-scale, in-depth study, the present research contributes to the broader conceptual understanding of the relationship between information and learning, and the ways in which information is used as part of the learning process. This is a relatively unresearched area within information science and education. It is hoped that such an understanding will enable librarians and educators to conceptualise information use as a more integrated component of learning environments.

At a more detailed level of inquiry, the study makes a contribution to the identification of various phases of information use and their relationship to phases of learning. This builds on the work of researchers such as Kuhlthau (1993) in information science and Shuell (1990) in educational research. Such linkages can provide a framework for librarians to formulate appropriate interventions and to develop information literacy programs which assist learners at their individual stage of learning.

The study also adds to the understanding of the ways in which information is used within flexible learning environments, specifically online learning environments. While information is an acknowledged component within various models of flexible learning (Thomas 1995; Nikolova & Collis 1998; Caladine 1999; Jonassen 1999), there are few studies which focus on information use within this context. By exploring this aspect, the present study provides an empirical base or framework to assist librarians to engage with the new learning environments, to integrate resources and services, and to develop collaborative partnerships with academic staff and educational developers in the design of more effective learning environments.

The study has implications for the practice of librarianship, both locally at the University of Wollongong, and for academic librarianship in a broader sense. At the local level, the study will have particular applications in the design of information services integrated with online learning, the selection of information resources to assist learning, and the development of information literacy programs to support the new learning environments. It is hoped that perspectives gained from the study will contribute to libraries making more effective use of resources, and encourage librarians to take a proactive role in the design and implementation of flexible learning programs. More generally, the study contributes to the debate about the changing role of librarians within higher education, and offers some insights into reconceptualising their role as active participants in the learning process and as designers of information environments which encourage learners to actively engage with information.

Chapter 2

Context and Conceptual Framework

2.1 Introduction

This chapter reviews the literature in order to explore what is known about people's perspectives on learning and information, and the relationship between the two. The discussion also aims to situate the research inquiry within the context of theories and conceptions of learning and information, as a way of identifying ideas to guide the empirical research program and to develop an orienting framework for selecting an appropriate research methodology. Section 2.2 reviews theories and conceptions of learning applicable to the present study. The various types of learning environment, and some models of flexible learning, are presented in Section 2.3. The results of several studies of student and teacher perceptions of flexible learning environments are discussed in Section 2.4. Section 2.5 reviews theories and conceptions of information, with a particular focus on the cognitive approach, and Section 2.6 outlines the cognitive and behavioural dimensions of information use. Drawing on the elements of the previous discussion, Section 2.7 presents a conceptual framework for the study.

2.2 Theories and Conceptions of Learning

Theories of learning can be classified into two broad categories: behavioural and cognitive (Schunk 1991, p. 6). Behavioural theories see learning as “a change in the form or frequency of behavior as a consequence of environmental events” (Schunk 1991, pp. 6-7), involving the formation of stimulus-response associations arising from the learner's interaction with the environment. Cognitive theories see learning as the “acquisition of knowledge and cognitive structures”, focussing on “the mental processing of information” involving the encoding of new information and relating it to existing knowledge, storing new knowledge in memory, and retrieving it as required (Schunk 1991, p. 7).

Behavioural conceptions of learning tend to give greater emphasis to the environmental factors influencing learning, whereas cognitive conceptions focus on the learner (Shuell 1986, p. 413). Schunk (1991, pp. 7-8) argues that these two approaches to understanding learning have implications for educational practice, with behavioural theories implying that teachers should “arrange environmental conditions” so that students can respond appropriately to stimuli, and with cognitive theories emphasising the need to make knowledge meaningful and to help learners “organize and relate it to knowledge in memory”. He also argues (Schunk 1991, p. 9) that behavioural theories are best at explaining simpler forms of learning such as memorising multiplication tables, while cognitive theories find their most appropriate application to more complex forms of learning such as solving mathematical problems.

There are many different types of learning. Learning a skill such as riding a bicycle, for instance, is different from the higher-order conceptual learning required to understand Einstein’s theory of relativity. Gagné (1985) identifies eight different types of learning and argues that for learning to be comprehensively understood it must be viewed from both behavioural and cognitive perspectives.

In a university context, the focus is typically on higher-order conceptual learning, as in Laurillard’s (1993, p. 26) “learning descriptions of the world”, but the learning of skills can also be important, particularly in vocationally oriented disciplines. University-level learning may also include the acquisition of more generalised skills, such as those associated with oral and written communication, and the use of information technology.

In an historical overview of learning theories, Shuell and Moran (1994) argue that behavioural theories have largely been displaced by cognitive theories, following the rise of cognitive psychology and information processing views of human learning during the 1960s and 1970s. The shift to more cognitive conceptions has been influenced by Piaget’s studies of cognitive development, Gestalt psychology, the action psychology of Vygotsky (1978), Bruner’s (1990) view of learning as the development of meaning, and the emerging field of

cognitive science which views the learner as “an active information processor analogous to computers” (Shuell & Moran 1994, p. 3340). As a further development within the cognitive tradition, constructivism is a distinct theoretical perspective influenced by the work of Piaget (1970; 1977), Vygotsky (1986) and Bruner (1986), which “construes learning as an interpretive, recursive, building process by active learners interacting with the physical and social world” (Fosnot 1996, p. 30).

Cognitive conceptions focus on more complex, meaningful learning, generally regarded as the “primary goal of education” (Shuell & Moran 1994, p. 3341). Meaningful learning is characterised as active, constructive, cumulative, self-regulated and goal-oriented (Shuell & Moran 1994, p. 3341-3342). Shuell (1990) identifies a number of phases of meaningful learning: (1) an *initial phase*, where the learner “encounters a large array of facts and pieces of information that are more-or-less isolated conceptually” and must rely on memorising facts and use pre-existing knowledge structures to “interpret the isolated pieces of data” (Shuell 1990, p. 541); (2) an *intermediate phase* in which the learner “begins to see similarities and relationships among ... conceptually isolated pieces of information” (Shuell 1990, p. 542); and (3) a *terminal phase* in which the learner’s “knowledge structures and schemata formed during the intermediate phase become better integrated and function more autonomously” (Shuell 1990, p. 543).

A number of researchers (Marton, Hounsell & Entwistle 1984) have sought to understand the conceptions of learning held by teachers and learners, independent of the experimental and theoretical perspectives of professional researchers in education and psychology. Entwistle (1984, pp. 12-14), for instance, proposes an alternative research paradigm involving “a shift not just of methodology, but of perspective”, which “seeks an empathetic understanding of what is involved in student learning derived from students’ descriptions of what learning means to them”. He comments (Entwistle 1984, p. 13) on the lack of congruence between teacher and learner perspectives that such studies may reveal, and argues that such findings can provide insight for the teacher and illuminate the reasons for student difficulties in learning.

Researchers in the phenomenographic research tradition, which “aims to reveal the qualitatively different ways in which people experience and conceptualise various phenomena in the world around them” (Marton, Dall’Alba & Beaty 1993, p. 278), have explored students’ conceptions of learning. Based on interviews with university students regarding their view of learning, Marton, Dall’Alba and Beaty (1993) identified six qualitatively different conceptions:

- (1) Increasing one’s knowledge
- (2) Memorising and reproducing
- (3) Applying
- (4) Understanding
- (5) Seeing something in a different way
- (6) Changing as a person

These findings confirmed the five conceptions previously identified by Säljö (1979) and Giorgi (1986), in addition to a sixth conception described as *changing as a person*.

Biggs (1994) proposed two perspectives on learning: (1) the *quantitative*, concerned with the acquisition and accumulation of content, and (2) the *qualitative*, concerned with understanding and meaning by relating new material to existing knowledge. Similarly, Marton, Dall’Alba and Beaty (1993, p. 297) draw a distinction between their first three conceptions (1, 2 and 3) and the latter three (4, 5 and 6) which “relates to the role of meaning in learning”. Dart et al. (2000, p. 264) explicitly draw this parallel, by stating that in Säljö (1979) and Marton, Dall’Alba and Beaty’s (1993) frameworks, “Levels 1, 2 and 3 can be considered as indicative of a quantitative outlook, and Levels 4, 5 and 6 as representative of a qualitative outlook”. Van Rossum and Schenk (1984) also defined two categories of conceptions, characterising Levels 1, 2 and 3 as *reproductive*, and levels 4 and 5 as *constructive*.

Approaches to learning may be categorised as *surface* or *deep* (Dart et al. 2000). The surface approach to learning involves the reproduction of the study material using routine procedures (Dart et al. 2000, p. 262). This approach “is

related to the traditional transmission model of teaching in which information is transferred from teachers to learners and in which learners assume passive roles” (Dart et al. 2000, p. 262). The deep approach to learning is characterised by “an intention to seek meaning of the material being studied by using the material to elaborate and transform it” (Dart et al. 2000, p. 262). This approach is “associated with constructivist teaching” in which “learners actively construct knowledge for themselves” (Dart et al. 2000, p. 262). Van Rossum and Schenk (1984) found that students with a surface approach to learning held a reproductive (quantitative) conception of learning, while those with a deep approach held a constructive (qualitative) conception.

In a study of Australian high school students, Dart et al. (2000) explored the relationship between students’ conceptions of learning, perceptions of the classroom environment, and approaches to learning. Their results indicated a strong association between conceptions of learning and approaches to learning. Students holding qualitative conceptions were more likely to adopt deep approaches to learning, and students with quantitative conceptions were more likely to use surface approaches (Dart et al. 2000, p. 267). Qualitative conceptions and deep approaches to learning were also associated with learning environments perceived as having high levels of personalisation and the use of investigative skills and strategies (Dart et al. 2000, p. 267). The implications of Dart et al.’s study are that “the classroom environment, the teaching strategies, and the assessment procedures must reflect the qualitative view” in order to encourage students to adopt qualitative conceptions and deep approaches to learning (Dart et al. 2000, p. 268).

2.3 Learning Environments

Learning can occur within different types of learning environment, which have been conceptualised in a variety of ways. Collins, Greeno and Resnick (1994) comment on the use of the term *learning environments* as reflecting a shift in emphasis from teaching to learning, and “a move away from an information transmission view to a constructivist view of education” (Collins, Greeno & Resnick 1994, p. 3297). They categorise different learning environments according to three broad functions (Collins, Greeno & Resnick 1994, p. 3298):

(A) participating in discourse, (B) participating in activities, and (C) presenting examples of work to be evaluated. Each of these functions can be further divided into two sub-categories, producing a typology of six kinds of learning environment, as shown in *Table 1*. Most learning environments contain all six types, with the most effective combining the advantages of each type (Collins, Greeno & Resnick 1994, p. 3298). Traditional learning environments tend to be characterised as information transmission A(2), training B(2), and recitation and testing environments C(2). Constructivist learning environments are generally characterised as communication A(1), problem-solving B(1), and evaluative performance environments C(1).

| FUNCTION | A Participating in Discourse | B Participating in Activities | C Presenting Examples of Work to be Evaluated |
|--|---|--|---|
| TYPES OF LEARNING ENVIRONMENT | (1) <i>Communication Environments</i> Learners participate in discourse by actively constructing goals, problems, meanings, information, and criteria of success | (1) <i>Problem-Solving Environments</i> Learners work on projects and problems | (1) <i>Evaluative Performance Environments</i> Learners perform for an audience |
| | (2) <i>Information Transmission Environments</i> Learners participate in discourse by receiving information | (2) <i>Training Environments</i> Learners practise exercises to improve specific skills and knowledge | (2) <i>Recitation and Testing Environments</i> Learners demonstrate their ability to work problems or answer questions |

Table 1: Types of Learning Environment (Collins, Greeno & Resnick 1994, p. 3298)

Information and the way it is used are an integral part of the functional categories presented in this typology. The *participating in discourse* function is

the most directly relevant aspect, with the classification of learning environments as either information transmission or communication environments. Information resourcing, access and presentation are also clearly implicated in the *participating in activities* and *presenting examples of work to be evaluated* functions.

In the context of discussions on the characteristics of flexible and constructivist learning environments, various authors have developed diagrammatic representations rather than textual descriptions to illustrate the interactive relationships characteristic of such learning environments. A number of these models, which are relevant to the present study, are discussed below.

Thomas (1995, p. 2) states that flexible learning “is about being prepared to configure all available resources, expertise and learning opportunities in the way that fits the learning purpose best”. She argues that there is no universally applicable model of flexible learning and presents a model in which flexible learning is seen as “the dynamics of the learning process which takes place between the expert, the learner and the learning resource” (Thomas 1995, p. 3). The relationship between these three elements, as shown in *Figure 1* (p. 28) below, is determined by:

- the *purpose* of the learning;
- the *capabilities* of the expert, learner and learning resource; and
- the *needs* of the expert, learner and learning resource.

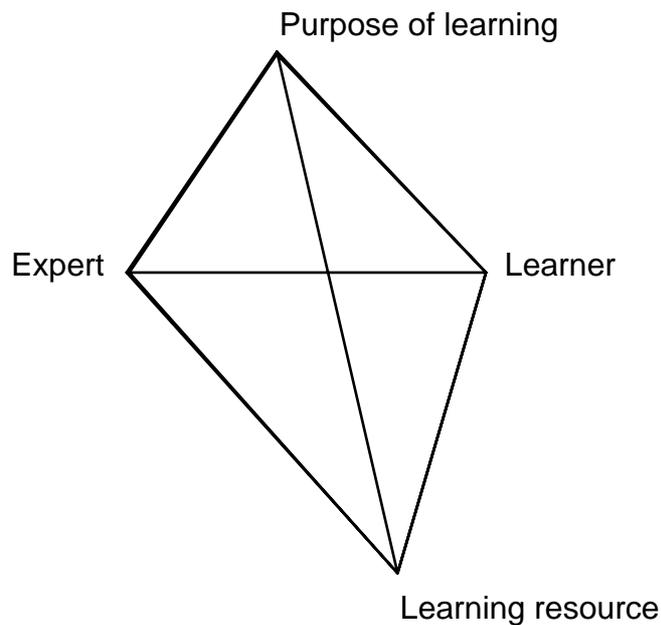


Figure 1: Model of Flexible Learning (Thomas 1995, p. 5)

In this model, the organisation and infrastructure which support learning are included in the *learning resource* component. The *needs* of the learning resource will include the needs of participants such as managers, administrators and librarians. While recognising that the learner should be at the centre at the point of learning, Thomas (1995, pp.5-6) argues that there is more to learning than the focus on the point of learning. All the elements in the process are seen as being equally influential. The model thus gives some responsibility to learners for representing their own interests.

The dynamic nature of the processes reflected in the model also means that the model must be “infinitely variable” in order to accommodate particular circumstances (Thomas 1995, p. 7). Roles and relationships are themselves flexible: an *expert* may not always be the teacher, a *learner* may not always be a student, and *learning resource* will not always be confined to a limited range of course materials. The learner is not to be regarded as simply a passive recipient of knowledge, but as actively engaged in the learning process. In some situations, the learner may play the role of expert to other learners, or engage in critical appraisal of knowledge rather than its acquisition. The nature of the learning resource may also have an impact on the dynamics of the

learning relationship, particularly those technological applications which provide interactivity. A learning resource can add to the store of knowledge and expertise within the learning relationship (Thomas 1995, p. 9). Finally, the relationships between the elements in the learning relationship may be affected by social, economic and technological factors outside the particular learning context.

In presenting a model for designing constructivist learning environments which “engage learners in meaning making”, Jonassen (1999, p. 217) states that constructivist conceptions of learning “assume that knowledge is individually constructed and socially co-constructed by learners based on their experiences in the world”, and that “instruction should consist of experiences that facilitate knowledge construction”. His model “conceives of a problem, question, or project as the focus of the environment, with various interpretative and intellectual support systems surrounding it” (Jonassen 1999, p. 217). The various components of the model are presented as a series of six concentric circles as shown in *Figure 2* (p. 30) below.

Circle 1 represents the problem, question or project as the focus of the environment. Related cases (circle 2) and information resources (circle 3) “support understanding of the problem and suggest possible solutions” (Jonassen 1999, p. 218). Learners “need information with which to construct their mental models and formulate hypotheses” (Jonassen 1999, p. 225). “Rich sources of information” which are “learner-selectable” and “just-in-time” are essential components of the learning environment (Jonassen 1999, p. 225). Relevant information resources should be linked to the learning environment, but Jonassen (1999, p. 225) warns against linking to web sites based on their surface features alone. He argues that “learners do not possess sophisticated literacy skills for evaluating the quality of and filtering the information provided”, and that information resources should be “evaluated for their relevance and organized for ready access in ways that support the kind of thinking that you want the learners to do” (Jonassen 1999, p. 225). This view points to a potential role for librarians in the design of learning environments, with their skills in resource selection and evaluation, and in information literacy instruction.

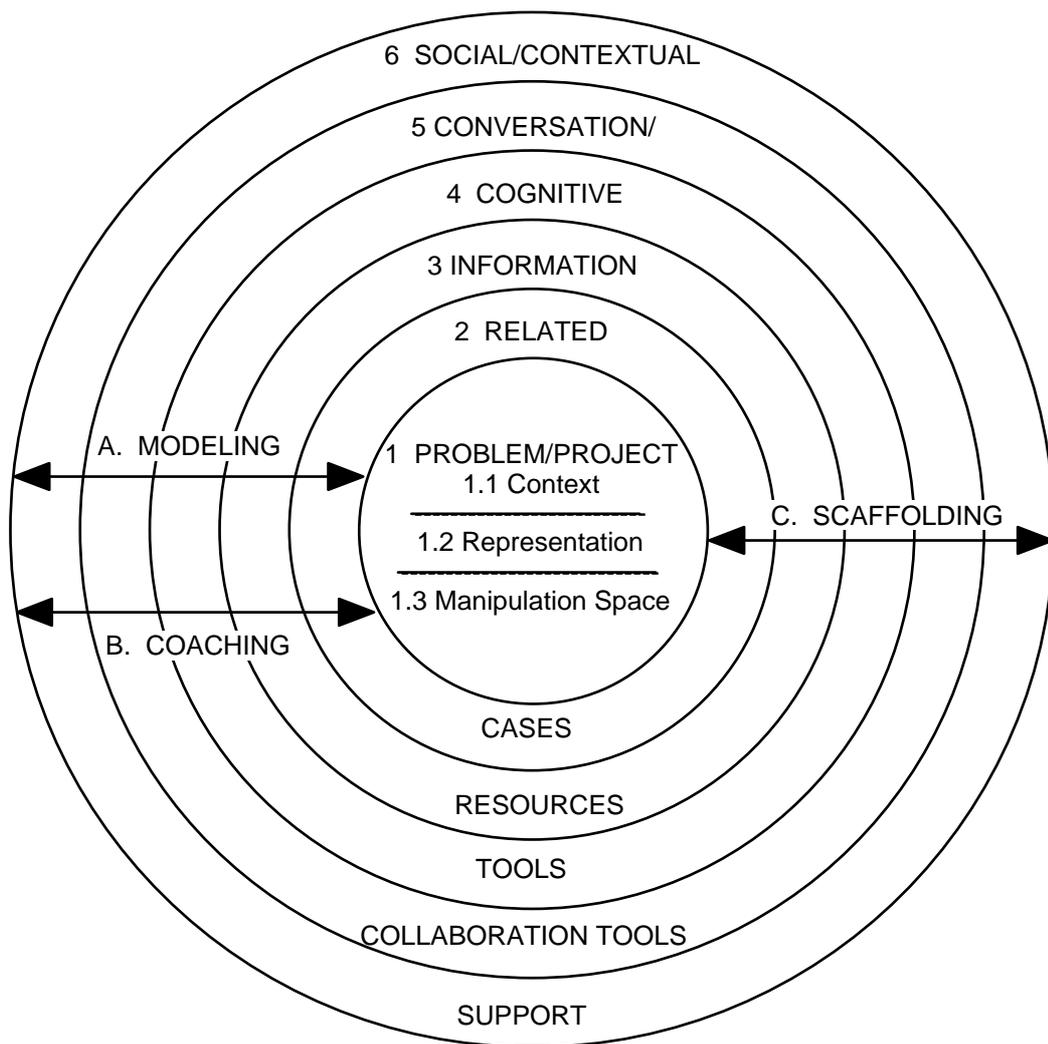


Figure 2: Model for Designing Constructivist Learning Environments (Jonassen 1999, p. 218)

Cognitive tools (circle 4) help learners “to interpret and manipulate aspects of the problem” (Jonassen 1999, p. 218). Conversation and collaborative tools (circle 5) such as email discussion groups “enable communities of learners to negotiate and co-construct meaning for the problem”, and social and contextual support systems (circle 6) help users to “implement” the constructivist learning environment (Jonassen 1999, p. 218). Jonassen’s model also identifies three main instructional activities or strategies to support learning in a constructivist learning environment (1999, pp. 230-236): *modeling* of behavioural activities and cognitive processes by the instructor; *coaching* by motivating and providing

feedback to learners; and *scaffolding* to provide “temporary frameworks to support learning and student performance beyond the learner’s capacities” (Jonassen 1999, p. 235).

Caladine (1999) presents a flexible learning model composed of five categories of teaching and learning activities, which he terms MOLTA (*Model Of Learning and Teaching Activities*) and which is represented graphically in *Figure 3*.

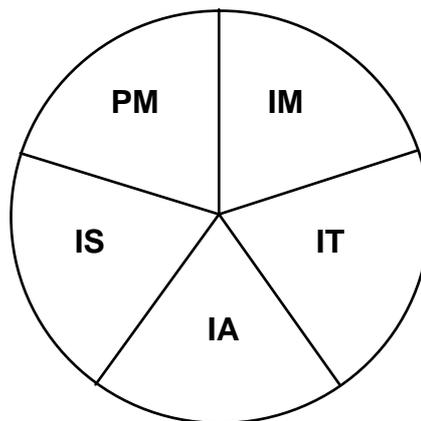


Figure 3: MOLTA: A Model of Learning and Teaching Activities (Caladine 1999, p. 24)

The five categories are: provision of materials (PM); interaction with materials (IM); interaction with teachers (IT); interaction between students (IS); and self-reflective activities, or intra-action (IA). In this model, the categories are used as a framework to construct the elements of new learning environments, and to analyse and compare the attributes of different learning environments (Caladine 1999, pp. 24-61). The categories of provision of materials (PM) and interaction with materials (IM) are clearly relevant to library and information resource provision, and to the ways in which students use information.

While the models of learning environments presented here all acknowledge the provision of information, communication of information, use of information, and interaction with information as important components of a flexible or constructivist learning environment, there are few studies which explore these

aspects of learning in an in-depth or detailed way. This highlights the value of an approach to research such as that of the present study.

2.4 Student and Teacher Perceptions of Flexible Learning Environments

In practice, flexible learning in the higher education sector is often equated with the implementation of online or web-based learning environments. A number of studies which attempt to evaluate the impact of web-based learning environments on students' learning experiences are discussed below. These studies provide a picture of some of the major student and teacher perceptions of various aspects of the online learning environment, even though they are not explicitly focussed on information use.

Ward and Newlands (1998) reported on an experiment at Aberdeen University which replaced traditional face-to-face lectures with a web-based system consisting of an electronic notice board, online lectures, supporting documents, a glossary of terms, a reading list, and hypertext links to web information resources. Students perceived the advantages of the web environment over a traditional learning environment as having access to richer learning resources and greater flexibility in the timing and pace of study. Perceived disadvantages were the loss of contact with staff and other students, and the lack of access to computers. From a teacher perspective, concerns were also raised about the amount of time required for the acquisition of new skills and the conversion of traditional course materials to a format appropriate for the web (Ward & Newlands 1998, pp. 183-184). The use of web resources by students appeared to replicate that of a traditional lecture system (Ward & Newlands 1998, p. 182), with most students accessing the system to print the lecture notes and very few using the suggested web links or searching for other web resources. These results may reflect the fact that this particular experiment did not implement a fully-fledged web-based learning environment, but simply replaced a small component of a traditional academic course.

In a review of teacher and student perceptions of web-based educational delivery, Ryan, Hodson Carlton and Ali (1999) observed "some commonalities in student and faculty perceptions of positive and negative attributes of on-line

education” (Ryan, Hodson Carlton & Ali 1999, p. 272). Positive perceptions included time flexibility, convenience, lack of the need to travel, a single source for course materials and access to web information resources, high quality asynchronous discussions, possibilities for networking with colleagues, and improved information literacy and computer skills. Negative perceptions included difficulties with hardware, software and Internet connectivity; and the need for students to be more self-disciplined to complete tasks.

Ryan, Hodson Carter and Ali’s (1999) study at Ball State University sought to evaluate graduate students’ perceptions of traditional classroom methods and web-based modules within a course where both approaches were used concurrently. A questionnaire addressed issues of content, interaction, participation, critical thinking, faculty preparation, communication, and technical skills (Ryan, Hodson Carlton & Ali 1999, p. 274). The study found that students perceived that in the traditional classroom setting content was covered more adequately, there was more interaction and participation, faculty preparation and expertise were more important, and more communication skills were required (Ryan, Hodson Carlton & Ali 1999, p. 275). The requirement for critical thinking was not perceived differently within the two educational approaches, and technical skills were seen as being more important in the web environment. Students commented favourably on the immediacy of face-to-face interaction afforded by the traditional classroom setting, but saw new opportunities for communication and interaction, such as learning from reading each other’s ideas in an electronic discussion, in the web environment. The web also provided flexibility and convenience, but some students felt disconnected and isolated from others (Ryan, Hodson Carlton & Ali 1999, p. 276). Implications from the study included the need to reconceptualise course content for the web, to build interactive communication into the process, and to provide adequate student orientation “to create a sense of security with the content, process, and technical applications” (Ryan, Hodson Carlton & Ali 1999, p. 277). Time for academic staff to design, support and maintain courses was also identified as a major concern in implementing a web-based approach.

2.5 Theories and Conceptions of Information

Learning involves the transfer, communication and processing of information. Information is clearly associated with all forms of learning, whether the information is in the form of sensory data as environmental stimuli, or in the form of higher-order concepts. A review of theories and conceptions of information is thus central to developing an approach to the study of the relationship between information and learning.

There has been much discussion in the information science literature on the definition and nature of information. Diverse definitions have been proposed, and the term is widely used in a variety of philosophical, scientific and social settings (Zhang 1988). Discussion has occurred mainly from the theoretical perspective of researchers and practitioners, with very few empirical studies of the ways in which people think about and conceptualise information. Green (1991), for instance, has studied the library and information science profession's models of information by conducting a linguistic analysis of phrases incorporating the word *information* in the *Library and Information Science Abstracts (LISA)* database. She found evidence of direct and indirect communication models which adopted the perspective of the information system, and an information-seeking model which takes the viewpoint of the information user. Green's analysis leads her to argue that the information system perspective dominates the profession, and that "the cognitive models of the user" are not adequately considered (Green 1991, p. 142). She argues that it is crucially important to library and information science "to comprehend what happens when a human being interacts with recorded information and experiences a change in cognitive understanding" (Green 1991, p. 142), and that we should be "more concerned with learning and knowledge than with retrieval and information" (Green 1991, p. 143).

More recently, Bruce (1997) has used a phenomenographic approach to construct a typology of conceptions of information literacy amongst a sample of academics and librarians in Australian universities. In the context of her sense-making approach, Dervin (1992, p. 63) states that "the way in which information is conceptualised" is fundamental "to the specific application of sense-making to

the study of human use of information and information systems". The present study seeks to extend the concern with conceptions of information within the library and information science communities to the broader community of users of information, in the belief that it is fundamental to the ways in which people use information.

Debons (1988, pp. 2-3) conducted an examination of the contexts in which the term *information* is used in everyday life, and identified six main uses:

- (1) *Information as a commodity*. Information thought of in this way may assume economic value.
- (2) *Information as energy*. Information is transmitted by, or embedded in, ordinary forms of energy, such as the information carried by sound waves or radio waves.
- (3) *Information as communication*. Being informed is the result of communication, or information transfer.
- (4) *Information as facts*. Facts gain their meaning and usefulness by being placed in context.
- (5) *Information as data*. Data are the products of symbols that are organised according to established rules and conventions. A fact is one or many data elements embedded in some context. Data may or may not be meaningful, depending on their context.
- (6) *Information as knowledge*. The terms *information* and *knowledge* are often used interchangeably.

Buckland (1991, p. 3) similarly points out that the term *information* can be used in different ways, and that its meaning is dependent on the context in which it is used. He identifies three principal uses of the term:

- (1) *Information-as-process*. The action of informing someone so that their knowledge is changed.
- (2) *Information-as-knowledge*. That which is imparted in the informing process. This also includes the notion of information as that which reduces, or sometimes increases, uncertainty.

- (3) *Information-as-thing*. Recorded knowledge embodied in objects, data and documents which express, describe or represent information-as-knowledge.

These explorations of the usages of the term *information* express certain recurring themes. Information is implicated in the process of communication; it has an inextricable relationship with facts, data and knowledge; and can be thought of as a thing or commodity which represents human knowledge. Beyond its manifestations in the human social world, information can be thought of more broadly in terms of its embeddedness in biological, chemical and physical systems. Young (1987), for instance, considers information at a more fundamental level, seeing it as “the patterned flow of mass-energy forms” (Young 1987, p. 59). Barlow (1994, pp. 14-15) employs a biological metaphor to conceive of information as “a life form” which replicates and evolves within “psycho-ecologies”, or communities of human minds.

The cognitive dimensions of information, and its relationship with data and knowledge, are fundamental to all usages of the term. A number of researchers have proposed a “knowledge spectrum” (Debons 1988, p. 5) or an “information-knowledge continuum” (Nitecki 1985) to express these relationships. Debons (1988, pp. 4-6) sees data, information, knowledge, and wisdom as part of an hierarchical continuum of events and processes “with no clear boundaries between them” (Debons 1988, p. 4). The transformations from data, to information, to knowledge, to wisdom can be represented as a “continuum of cognitive states” (Debons 1988, p. 4). Human beings represent events using symbols, which are in turn organised to generate data. Awareness of data leads to a person becoming informed and acquiring information. Higher cognitive processes applied to information lead to understanding, the acquisition of knowledge. The application of values, ethics and reason to knowledge leads to wisdom, the highest stage on the knowledge spectrum. Nitecki (1985, p. 387) similarly suggests that “information and knowledge are stages of the same continuous process” in which newly perceived data are integrated into existing knowledge structures (or “relations known”) to expand a person’s understanding.

Belkin (1978, pp. 61-62) reviews information concepts based on a set of criteria for meeting the definitional, behavioural and methodological requirements of information science. Based on this review, he proposes a “structural, cognitive concept of information” (Belkin 1978, pp. 80-82) which conceives of information as that which is capable of transforming the cognitive structure of a recipient within a communication system.

Belkin’s cognitive concept of information is closely related to the foundational work of Brookes (1980) and the formulation of his “fundamental equation of information science”:

$$K[S] + \Delta I = K[S + \Delta S]$$

“which states in its very general way that the knowledge structure $K[S]$ is changed to the new modified structure $K[S + \Delta S]$ by the information ΔI , the ΔS indicating the effect of the modification” (Brookes 1980, p. 131). For Brookes, information is a “small bit of *knowledge*” (Brookes 1980, p. 131), where knowledge is “a structure of concepts linked by their relations” and information is “a small part of such a structure” (Brookes 1980, p. 131). Information and knowledge are thus “of the same kind”, but ΔI is distinguished in the equation in recognition of the fact that the same increment of information “may have different effects on different knowledge structures” (Brookes 1980, p. 131). Brookes’ equation, in which knowledge structures are modified by increments of information, can also be seen as an *equation of learning*, particularly when seen in the light of cognitive learning theories.

Brookes’ concepts of information and knowledge draw on the work of Popper (1972), particularly Popper’s notion of three worlds: “We can call the physical world ‘world 1’, the world of our conscious experiences ‘world 2’, and the world of the logical *contents* of books, libraries, computer memories, and suchlike ‘world 3’ ” (Popper 1972, p. 74). Kemp (1976) and Neill (1982) have also used Popper’s ideas in developing an epistemology appropriate for librarianship and information science.

Expanding on the notion of World 3, Magee (1985, p. 61) characterises it as “the world of ideas, art, science, language, ethics, institutions – the whole cultural heritage, in short – insofar as this is encoded and preserved in such World 1 objects as brains, books, machines, films, computers, pictures, and records of every kind”. Both World 2 and World 3 are comprised of information and knowledge (Brookes 1980, p. 132). World 2 can be thought of as subjective human knowledge, and World 3 as that of objective knowledge (Brookes 1980, p. 130). The legitimate domain of librarians and information scientists thus becomes the practical organisation of World 3, and the theoretical explication of the interactions between Worlds 2 and 3 (Brookes 1980, p. 128).

The focus on the cognitive dimensions of information is embodied in the cognitive approach in information science, which sees cognitive processes as logically prior to information use and behaviour, and as being the primary locus for understanding these phenomena. Wilson (1984, p. 197) identifies the essence of the cognitive approach as “the idea of human perception, cognition, and structures of knowledge” and that “the concepts *understanding* and *meaning* must lie behind any of the terms used to describe” it. For De Mey (1977, pp. xvi-xvii) the cognitive view is “that any *processing of information*, whether perceptual or symbolic, is *mediated* by a system of categories or concepts which, for the information processing device, are a *model* of his *world*”. Belkin (1990, pp. 11-12) considers that “the essence of the cognitive viewpoint is that it explicitly considers that the states of knowledge, beliefs and so on of human beings (or information-processing devices) mediate (or interact with) that which they receive/perceive or produce”. Belkin (1990, pp. 14-15) also argues that the application of this point of view to various areas within information science such as user studies and information retrieval has had beneficial results, and that it might provide an integrating framework for the theoretical and practical development of information science. The work of Belkin (1982a; 1982b; 1984) and Ingwersen (1982) on information retrieval and transfer provides useful models for the application of the cognitive approach. The widespread impact of the cognitive approach is exemplified in Allen's (1991) extensive survey of cognitive research in information science and its implications for information systems design. Dervin's (1992) sense-making

methodology, in which information use is seen as an active construction on the part of people trying to make sense of their world, can also be seen as firmly grounded within the cognitive approach.

There are clear parallels between cognitive theories of learning and the cognitive approach in information science, reflected in Brookes' (1980, p. 131) view of knowledge as "a structure of concepts linked by their relations" and information as "a small part of such a structure". The models of information retrieval and transfer processes developed within the cognitive tradition may thus be a fruitful starting point for developing a conceptual framework for the present study.

2.6 Information Use

Information use has both cognitive and behavioural dimensions. The cognitive dimension is concerned with what takes place in a human mind (World 2) when a person interacts with information (World 3). In the cognitive approach in information science, these interactions are seen as being initiated by an information need, arising from an inadequate state of knowledge (Belkin, Oddy & Brooks 1982a; Dervin & Nilan 1986, pp. 22-24) or attempt to make sense of, or give meaning to, a particular situation (Dervin & Nilan 1986, pp. 20-22; Dervin 1992).

The behavioural approach to studying information use focuses on describing patterns of external behaviour in relation to information sources and systems (World 3). In this paradigm, external behaviour is used as an indicator of information need (Dervin & Nilan 1986, p.15). Many studies of information use have adopted this approach (e.g. Guest 1987; Hopkins 1989; Wilberley & Jones 1989; Broadus 1990), using techniques such as ascertaining the range of information sources used by particular user groups, observing search techniques employed, and asking users to rank the importance of different sources of information.

The cognitive and behavioural approaches are both important for understanding information use, in a way similar to Gagné's (1985) observations about the

need to understand learning from both perspectives. Given the focus of this research study on teacher and learner perspectives, the dominance of cognitive theories of learning, and the theoretical and practical applicability of the cognitive approach in information science, this study will give priority to exploring the cognitive dimensions of information use but will also need to give some attention to information use behaviours in order to gain a more complete picture.

In concluding the discussion from previous sections on the main theoretical and empirical perspectives on learning and information, *Figure 4* indicates some of the parallels, relationships and resemblances relevant to the present study.

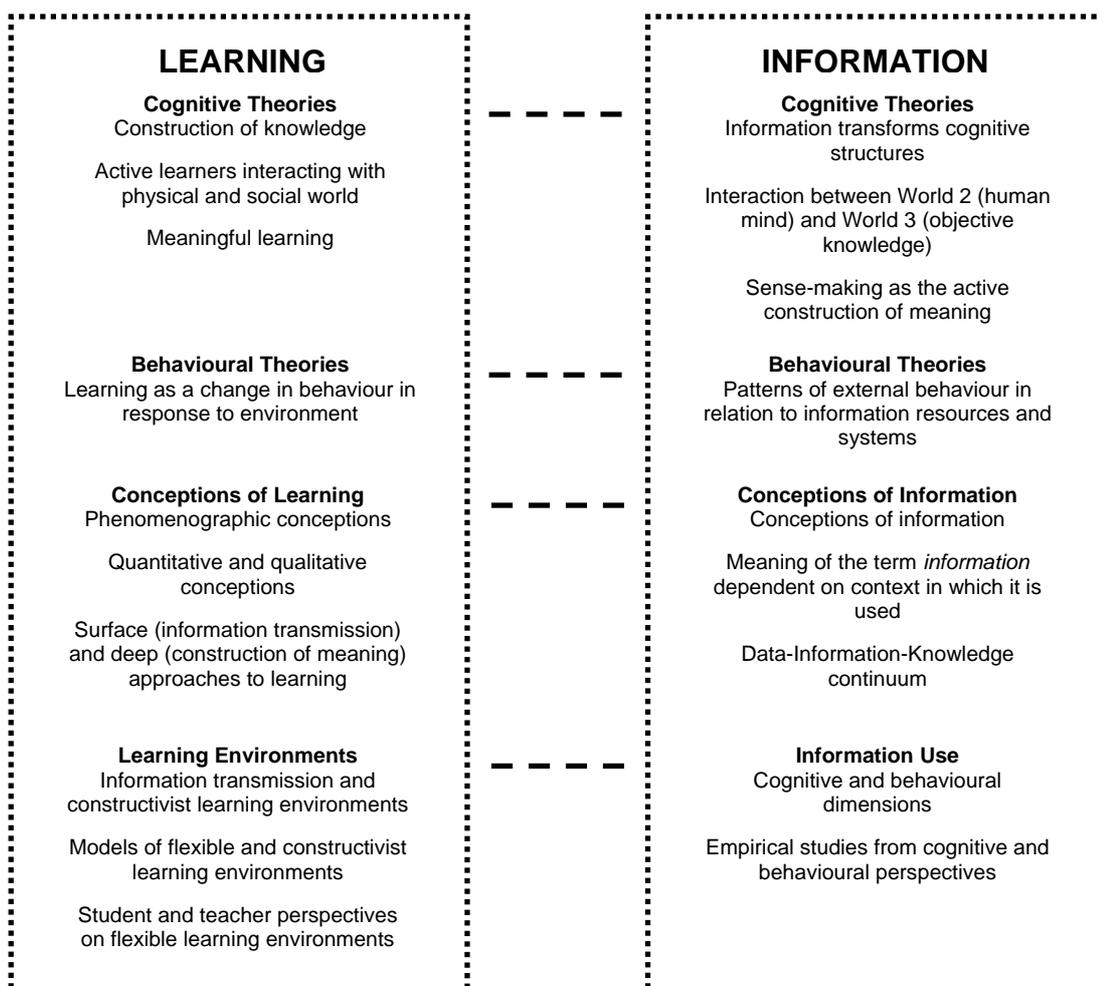


Figure 4: Theoretical and Empirical Perspectives on Learning and Information

2.7 Conceptual Framework for the Study

A conceptual framework for studying perspectives on information and learning in a flexible learning environment is presented in *Figure 5* (p. 42) below.

According to Miles and Huberman (1994, p. 18) a conceptual framework explains, in graphical or narrative form, the main phenomena to be studied, including the “key factors, constructs or variables”, and the “presumed relationships between them” (Miles & Huberman 1994, p. 18). The conceptual framework provides the researcher and the reader with “a map of the territory being investigated” (Miles & Huberman 1994, p. 20).

The framework is derived from a number of sources including models of information retrieval and transfer developed within the cognitive tradition in information science (Belkin, Oddy & Brooks 1982a; Belkin, Oddy & Brooks 1982b; Ingwersen 1982; Belkin 1984), Popper’s (1972) notions of World 2 and World 3, and models of flexible and constructivist learning environments developed by Thomas (1995), Jonassen (1999) and Caladine (1999). The framework delineates the boundaries of the flexible learning environment and situates it within a *context*, comprising institutional policies and practices, the subject or knowledge domain, level and mode of study, modes of delivery, and forms of communications and information technology used. *Information*, comprising subject-specific learning resources and more general information resources and services, is at the heart of the framework since the primary focus of the study is to explore the relationship between information and learning. The realm of information can be thought of as representing Popper’s (1972) World 3.

Three *actors* or *roles* within the flexible learning environment are identified in the framework: the teacher, the learner, and the librarian. While the librarian is not a focus of the present study, the librarian is included in the framework as a potential factor in the engagement of the teacher and the learner with information. The three actors interact with each other through various *communication* channels. They also interact with information, which from the cognitive viewpoint involves the mediation of the actor’s perception, cognition

and knowledge structures of (De Mey 1977: xvi-xvii). The interaction with World 3 information thus involves the actor's mental world, World 2.

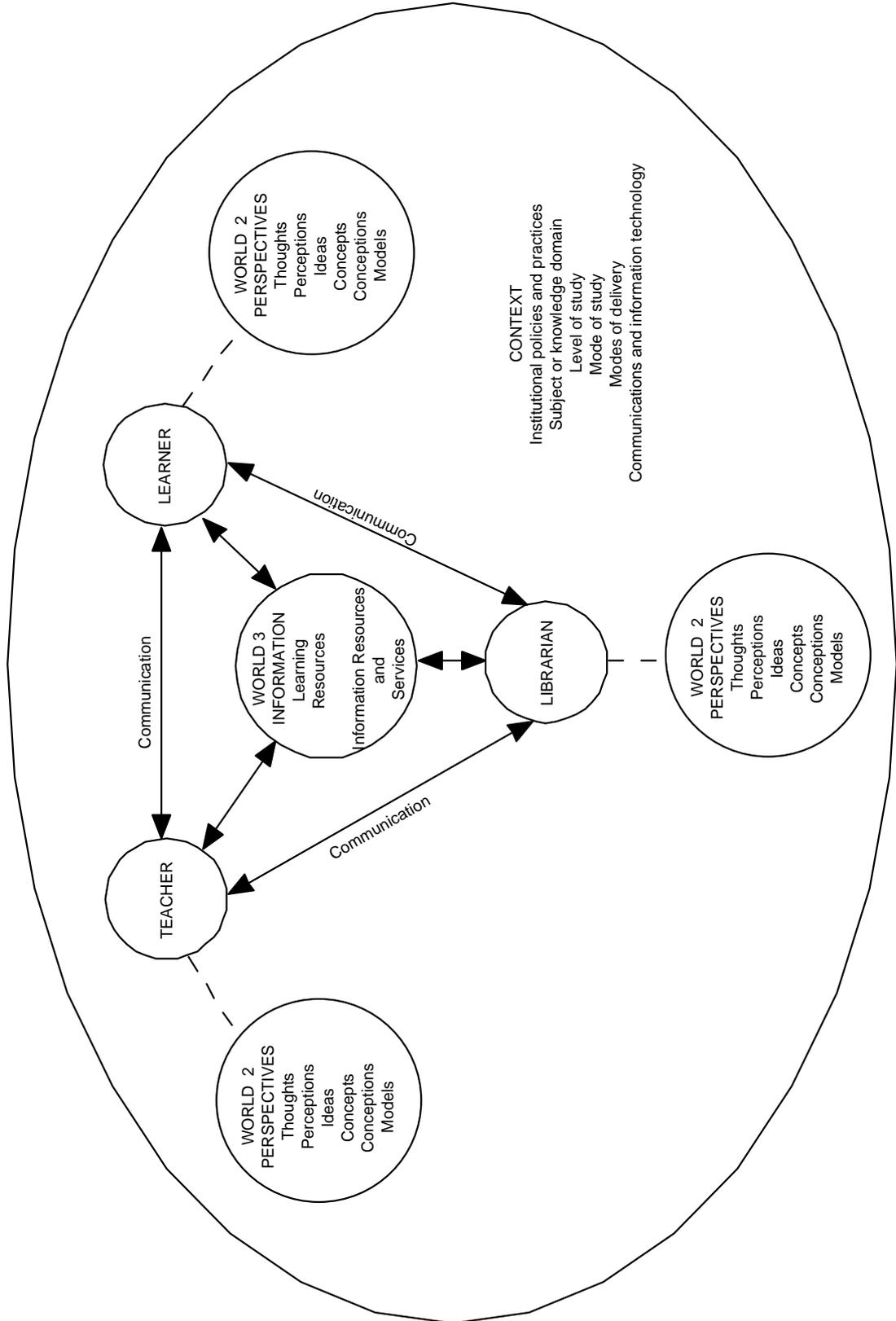


Figure 5: Framework for Studying Perspectives on Learning and Information in a Flexible Learning Environment

Three *actors* or *roles* within the flexible learning environment are identified in the framework: the teacher, the learner, and the librarian. While the librarian is not a focus of the present study, the librarian is included in the framework as a potential factor in the engagement of the teacher and the learner with information. The three actors interact with each other through various *communication* channels. They also interact with information, which from the cognitive viewpoint involves the mediation of the actor's perception, cognition and knowledge structures of (De Mey 1977: xvi-xvii). The interaction with World 3 information thus involves the actor's mental world, World 2.

Each of the actors has cognitive *perspectives* on the other elements within the flexible learning environment. The learner may thus have perspectives on information, the teacher, the librarian, and the flexible learning environment, as well as self-referential perspectives on the learner's own role. The other actors will have a similar set of perspectives on the elements of the learning environment.

The conceptual framework outlined above provided guidance to the researcher in determining the areas of research interest on which the study was to focus, and in exploring the relationships between them.

Chapter 3

Research Methodology

3.1 Introduction

This chapter outlines the process of selecting and applying an appropriate research methodology for the study. Section 3.2 examines the key elements of the research focus which the methodology must address. Section 3.3 discusses quantitative and qualitative approaches, the main characteristics of qualitative research, and the role of the researcher. A review of potential methodologies is undertaken in Section 3.4, including action research, sense-making, phenomenography, grounded theory, and case study approaches. Section 3.5 describes the process of research design using the selected case study methodology, and gives an overview of the procedures involved in conducting each case study. The processes and procedures for analysing case study data are described in Section 3.6. Section 3.7 discusses the trustworthiness of the study findings.

3.2 The Research Focus

The research study aims to understand the perspectives of teachers and learners in relation to learning and information within flexible learning environments, and to explore the implications of these perspectives for the design of effective library and information services to support flexible learning. The study has an exploratory focus and does not seek causal explanations or to develop a general theory, nor is it experimental.

The conceptual framework developed in the previous chapter (*Figure 5*, p. 42), which articulates the cognitive, communication and information transfer processes in a flexible learning environment, provides a basis for developing a research methodology for the study. It incorporates both cognitive and behavioural dimensions. The framework acknowledges subjective aspects of experience in relation to participants' perspectives, which may include thoughts, perceptions, ideas, concepts, conceptions and models. The framework also identifies some of the key interactions taking place within the flexible learning

environment: teacher-to-learner, learner-to-learner, teacher-to-information, learner-to-information, teacher-to-librarian, and learner-to-librarian. The librarian has potential interactions with the teacher and the learner, and a clear relationship with information. The framework also includes the administrative and educational context in which the flexible learning environment operates.

The methodological approach chosen for the study must accommodate the key elements of the research focus and be able to:

- (1) Situate the research phenomena within their broader educational context
- (2) Provide qualitative data from a variety of sources
- (3) Elicit participant perspectives on a range of cognitive and behavioural phenomena
- (4) Use multiple data collection techniques such as document analysis, demographic questionnaires, and participant interviews
- (5) Use data analysis techniques which reflect the qualitative richness of participant perspectives

3.3 Research Methodologies

The choice of methodology in social science research is determined by the nature of the phenomena being studied, the research questions being posed, and the methodological and theoretical allegiances of the researcher. A distinction can be made between methodology and methods of research. Strauss and Corbin (1998, p. 3), for instance, define methodology as “a way of thinking about and studying social reality”, and methods as “a set of procedures and techniques for gathering and analysing data”. Social science research may have an exploratory, descriptive or explanatory focus (Yin 1994, p. 3-4; Babbie 1995, p. 84-86) and the level of participation of the researcher in the phenomena being studied may also vary according to the methodology chosen. This can range from participant observation seen in some forms of ethnographic research, to various forms of unobtrusive research (Kellehear 1993) which rely on documents and archival sources rather than direct contact with subjects.

For the present study, the research approach must be able to engage with a range of phenomena including contextual description, demographic data, and participants' subjective viewpoints.

3.3.1 Quantitative and Qualitative Approaches

In selecting an appropriate research methodology, the most fundamental choice is that between quantitative and qualitative approaches. Quantitative methodologies express their research data and findings in numerical, usually statistical, form. Typical quantitative methods include the survey and questionnaire which seek to identify statistical trends across a subject sample. Qualitative methodologies seek to understand subjects' experience of the world through a variety of techniques such as interviewing and participant observation. Qualitative researchers "seek to explicate the meaning of social reality from the participants' perspectives" (Reichardt & Rallis 1994, p. 11).

Many studies of information use employ a quantitative approach, providing data on such characteristics as patterns of library usage or non-usage, and number and type of information resources used. For example, a number of key Australian studies of distance education students and their information use employ a predominantly quantitative approach (Winter & Cameron 1983; University of Central Queensland Library 1993; Macauley 1997). The findings from such studies provide a useful picture of students' library usage and non-usage patterns, the issues they face in gaining access to appropriate information resources, and the implications for course planning and design. Recommendations arising from quantitative studies (University of Central Queensland Library 1993, pp. x-xiii) have led to the improvement of services for students studying in distance education mode, to the development of programs to raise student awareness of the resources and services available, and to provide instruction in how to use them.

The present study, however, seeks to shift the focus away from library usage *per se*, to gain an understanding of teacher and student perspectives on information within the broader context of learning.

Quantitative and qualitative methodologies can be used in a complementary, integrated way (Hedrick 1994; House 1994, pp. 17-19). Jacobs (1996), for example, reports on the use of a qualitative research methodology to extend understanding of the results of a quantitative survey on the use of the University of Sussex Library Reserve Collection. In discussing librarians' preference for using numerical methods to analyse library operations, Jacobs (1996, p. 139) notes that "it is not always apparent that such numbers relate usefully to aspects of the library service as perceived by the library's users". The qualitative component of the study had positive benefits in terms of "revealing patterns of user attitudes that are difficult if not impossible to access using traditional survey techniques alone" (Jacobs 1996, p. 139).

The primary focus of the present study will be on participants' experiential perspectives, where a qualitative approach will be more appropriate. However, aspects of the present study, such as the demographic description of participants, patterns of library and information resource usage, and use of information and communication technologies, are amenable to a quantitative approach which can be used in a complementary way.

3.3.2 Characteristics of Qualitative Research

Qualitative research is sometimes defined negatively by distinguishing it from quantitative research. Strauss and Corbin (1998, pp. 10-11), for instance, use the term *qualitative research* to mean "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification". The term can refer to research about people's lives, experiences, behaviour and emotions, or to research on organisational functioning, social movements, cultural phenomena or interactional relationships (Strauss & Corbin 1998, p. 11). The process of qualitative research involves "a *nonmathematical* analytic procedure that results in findings derived from data gathered by a variety of means" such as observations, interviews and documents (Strauss & Corbin 1990, p. 18).

There is a wide range of qualitative research methodologies, characterised by different philosophical and methodological approaches. Miles and Huberman

(1994, p. 5) observe that various attempts to create definitive catalogues and taxonomies of the major qualitative research traditions have resulted in descriptions which are largely “incommensurate”. Certain common characteristics or “recurring features” of qualitative research (Miles & Huberman 1994, pp. 5-8) can however be identified. Denzin and Lincoln (2000, p. 3) see qualitative research as involving “an interpretative, naturalistic approach to the world” which attempts to “make sense of, or to interpret, phenomena in terms of the meanings people bring to them”. Creswell (1998, p. 15) describes it as “an inquiry process of understanding” that explores “a social or human problem”, through which the researcher “builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting”. Merriam (1998, p. 6) notes that the key philosophical assumption on which all qualitative research is based is “the view that reality is constructed by individuals interacting with their social worlds”. Qualitative research focuses on “understanding the phenomenon of interest from the participants’ perspectives, not the researcher’s”, which is “sometimes referred to as the *emic*, or insider’s perspective, versus the *etic*, or outsider’s view” (Merriam 1998, pp. 6-7). Merriam (1998, pp. 7-9) identifies four additional characteristics shared by all forms of qualitative research, namely: (1) the researcher is the primary instrument of data collection and analysis, (2) qualitative research usually involves fieldwork, (3) qualitative research primarily employs an inductive research strategy, and (4) the product of a qualitative study is richly descriptive.

In order to position the present study within qualitative research traditions, and to understand the role of the researcher, the philosophical and ideological underpinnings of the various approaches to qualitative research must be considered. Creswell (1998, pp. 74-78) identifies five philosophical assumptions that guide the design of qualitative research:

(1) The ontological assumption

There are multiple perspectives on reality; “reality is constructed by individuals involved in the research situation” (Creswell 1998, p. 76). Multiple perspectives include those of the researcher, the individuals being investigated, and the reader or audience interpreting a study (Creswell 1998, p. 76). Qualitative

researchers are thus involved in reporting “multiple statements representing the diverse perspectives on the phenomena being explored” (Creswell 1998, p. 76).

(2) The epistemological assumption

The researcher has an interactive relationship with the phenomena being studied. There is a move away from being an objective observer “outside” the phenomena being studied, to that of a participatory “insider” actively engaged in constructing understanding of others’ perspectives (Creswell 1998, p. 76).

(3) The axiological assumption

The qualitative researcher “admits the value-laden nature of the study and actively reports his or her values and biases as well as the value-laden nature of information gathered from the field” (Creswell 1998, p. 76).

(4) The rhetorical assumption

The language of qualitative studies is personal and literary, “based on definitions that evolve during a study rather than being defined by the researcher at the beginning of the study” (Creswell 1998, p. 77). Terms such as *understanding*, *discover* and *meaning* are important “rhetorical markers” in the language of qualitative research (Creswell 1998, p. 77).

(5) The methodological assumption

The qualitative research process proceeds inductively, with findings emerging from the data rather than the data being used to test hypotheses (Creswell 1998, pp. 77-78).

In addition to these five basic assumptions, Creswell (1998, pp. 78-84) also acknowledges the influence of ideological perspectives such as postmodernism, critical theory, and feminism on qualitative research approaches. Lincoln and Guba (2000) explore the belief systems and ideological approaches of a range of “alternative inquiry paradigms” from ontological, epistemological, and methodological perspectives. They present a spectrum of ideological positions ranging from positivism, through postpositivism, critical theory, and constructivism, to participatory paradigms.

Hedrick (1994, p. 47) contrasts positivist and constructivist paradigms, associating the positivist paradigm with quantitative research and the constructivist paradigm with qualitative research. Charmaz (2000) identifies both “objectivist” (positivist) and constructivist methods within a single qualitative research tradition, grounded theory.

The positivist paradigm is characterised by a belief in an external, objective reality that can be known. Objective truth is established using scientific, largely quantitative, methods which seek to verify hypotheses (Lincoln & Guba 2000, p. 168). The researcher is portrayed as a neutral, unbiased observer who discovers data using a set of technical procedures (Charmaz 2000, p. 510). Postpositivism moves away from objective certainty and views reality as “only imperfectly and probabilistically apprehendable” (Lincoln & Guba 2000, p. 168). Charmaz (2000, p. 510) sees a move to postpositivism in grounded theory approaches where researchers “propose giving voice to their respondents, representing them as accurately as possible”, and “discovering and acknowledging that respondents’ views of reality conflict with their own”.

In terms of its positioning within the spectrum of research paradigms, the present study adopts a largely postpositivist position within the framework of Lincoln and Guba’s (2000) and Charmaz’s (2000) descriptions.

3.3.3 The Role of the Researcher

As the “primary instrument of data collection and analysis” (Merriam 1998, p. 7) and the main “measurement device” (Miles & Huberman 1994, p. 7) in qualitative research studies, the researcher plays a central and active role in constructing an understanding of the research environment. The researcher’s construction of reality interacts with the perspectives of the study participants on the phenomena being studied. Qualitative studies result in a product which is an “interpretation by the researcher of others’ views filtered through his or her own” (Merriam 1998, p. 23). With this focus on the researcher’s subjective interpretations, it is important that the “biases, motivations, interests or perspectives of the inquirer” (Lincoln & Guba 2000, p. 290) are made as explicit as possible throughout the research process.

Rew, Bechtel and Sapp (1993) elucidate the notion of the self as an instrument in the data collection and analysis process, and identify the attributes needed by qualitative researchers as: appropriateness, authenticity, credibility, intuitiveness, receptivity, reciprocity, and sensitivity. Strauss and Corbin (1990, pp. 41-47) emphasise the need for “theoretical sensitivity” as a key personal quality of the researcher. Theoretical sensitivity “refers to the attribute of having insight, the ability to give meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn’t” (Strauss & Corbin 1990, p. 42). Sources of theoretical sensitivity include the literature relevant to the phenomenon being studied, professional experience, and the analytic process of interacting with data (Strauss & Corbin 1990, pp. 42-43). In addition, Merriam (1998, pp. 20-25) identifies three main personal characteristics that qualitative researchers should possess: a tolerance for ambiguity, sensitivity to the context and the data, and good communication skills.

3.4 Review of Research Methodologies

In order to select an appropriate methodology for the current study, a review of research methodologies was undertaken. The methodologies to be included in the review were chosen on the basis of their potential relevance and applicability to the research focus of the study. The five methodologies reviewed were action research, sense-making, phenomenography, grounded theory and case study. In the context of the review it is important to make a distinction between the methodological approach and the research methods employed, such as interviewing and data analysis techniques, which may share common features across a range of qualitative methodologies.

3.4.1 Action Research

Action research is a methodology developed in educational research. It aims to create links between theory and practice by integrating the research act into the educational setting, with the ultimate aim of improving educational practices. In action research practitioners become researchers, engaging in a form of participatory and collaborative research (Kemmis 1994). Action research is seen as a way of bridging the gap between theory and practice, as “an action-grounded philosophy of practitioner-centred research” (McNiff 1988, p. xvii)

involving “a self-reflective spiral of planning, acting, observing, reflecting and re-planning” (McNiff 1988, p. 7). This notion of self-reflective practice has been extended to other professions by Schön (1987).

The idea of the teacher-researcher has obvious parallels with the notion of the librarian-researcher, and action research might be seen as a fruitful approach for practising librarians to adopt when conducting research. There are differences, however, between the context in which teachers and librarians work. Teachers are already situated in the environment they wish to study, having an ongoing relationship with a group of learners and the opportunity to engage with them in a participatory way. This is not the case with librarians, who often have difficulty gaining full participatory access to the educational environment. They are often not seen as part of this environment, or as professionally engaged in the same way as a teacher. It is also not usually possible for a librarian to establish an ongoing relationship with a group of learners; contact with librarians tends to be limited to short-term encounters at the reference desk or to one-off classes and workshops. These differences can make it difficult for librarians to participate in a learning environment to the extent that is required by an action research approach, which would preclude its application to the present study.

3.4.2 Sense-Making

Dervin’s (1992) sense-making approach to the study of the human use of information and information systems concerns itself with the ways in which people make sense of their experience. In this approach, information is conceptualised as “that sense created at a specific moment in time-space by one or more humans” (Dervin 1992, p. 63). It also assumes that information use “needs to be studied from the perspective of the actor, not from the perspective of the observer” (Dervin 1992, p. 64). Sense-making focuses on behaviour, and the steps that people take to “construct sense of their worlds” (Dervin 1992, p. 65) and to bridge “gaps” within their knowledge and experience. The idea of a gap or discontinuity is fundamental within this approach to developing methods of framing questions, interviewing, and analysis (Dervin 1992, p. 64). Methods focus on the “sense-making triangle” of (1) a situation, (2) a gap, and (3) the

help or use that information or information systems afford (Dervin 1992, p. 69). A typical interview method based on this model would be to ask interviewees to reconstruct a situation and to describe the three elements of the “triangle” from their perspective (Dervin 1992, pp. 70-73).

While this approach has a strong orientation towards the perspective of the user of information, its focus is narrower than that required for the present study, which seeks to explore a range of processes related to information and learning within the broader context of a learning environment. Some of the research techniques developed in the sense-making approach, such as methods of framing questions and conducting interviews, may however be applicable to the present study where data on participants’ information behaviour is sought at a more particular level.

3.4.3 Phenomenography

Phenomenography is a method which has been used for the discerning of patterns in conceptualisation (Miles & Huberman 1994, p. 7). Marton (1994, p. 4424) defines phenomenography as:

the empirical study of the limited number of qualitatively different ways in which various phenomena in, and aspects of, the world around us are experienced, conceptualized, understood, perceived, and apprehended. These differing experiences, understandings, and so forth are characterized in terms of 'categories of description', logically related to each other, and forming hierarchies in relation to given criteria.

It is a central contention of phenomenography that for any given phenomenon or situation, it is possible “to identify a limited number of qualitatively different and logically interrelated ways in which the phenomenon or the situation is experienced or understood” (Marton 1994, p. 4425). The main method for collecting data in this approach is the individual interview.

The phenomenographic approach has been applied in studies of conceptions of learning by Säljö (1979), Giorgi (1986) and Marton, Dall'Alba and Beaty (1993). Bruce (1997) has used a phenomenographic approach to understanding

different conceptions of information literacy. Limberg's (2000) study of the interaction between information seeking and learning outcomes also employed a phenomenographic methodology.

While the present study has an interest in cognitive processes and conceptualisation, particularly in relation to information and learning, it seeks to do this in the context of the dynamic relationships and interactions within a flexible learning environment (Thomas 1995). In seeking to explore such an environment, it may be premature to adopt a methodology which has its main application in exploring particular concepts and singular phenomena.

3.4.4 Grounded Theory

Grounded theory is a qualitative research method which aims at the inductive discovery of theory from data (Glaser & Strauss 1967, p. 1). Behrens (1993), for example, adopted a grounded theory approach to exploring lecturers' attitudes towards the need for library skills in students, and the teaching of such skills. From the analysis of interview transcripts, she identified several phenomena which affect lecturers' attitudes, including student background, the learning environment context, intervening conditions which may provide obstacles to library skills teaching, coping strategies which affect the teaching of skills, and the consequences of all these factors (Behrens 1993, pp. 14-20). Kuhlthau (1993) also applied a grounded theory methodology to studying the constructive process of information seeking. While the present study is exploratory, and does not seek to develop a theory as such, a number of techniques employed by the grounded theory approach, particularly in relation to interviewing and data analysis, may be applicable.

3.4.5 Case Study

The case study methodology has been applied extensively in the social sciences, particularly in educational settings (Merriam 1998; Bassey 1999). It is commonly used in exploratory studies, and offers some flexibility in the sources of evidence used and the level of participation by the researcher in the phenomena being studied.

There are a number of different views on what constitutes the case study method, and a range of ideological approaches. Merriam (1998, p. 27) argues that the process of conducting a case study is often conflated with the unit of study (the case) and the end product or outcome of this type of research.

Case study researchers such as Yin (1994) emphasise the research process aspect, and adopt a more positivist, scientific approach. As Hedrick (1994, p. 48) observes, “some qualitative case study researchers using nonnumerical data adopt the underlying logic of the scientific method ... and engage in hypothesis testing”. Yin (1994, p. 13) defines a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident”. He argues that the case study “allows an investigation to retain the holistic and meaningful characteristics of real-life events” (Yin 1994, p. 3).

Stake (1995, p. 2) focuses on the case as an object of study, derived from Smith’s (1979) notion of the case as a *bounded system*. The case is “an integrated system”, a “specific, a complex functioning thing” (Stake 1995, p. 2). For Creswell (1998, p. 61), a case study is an exploration of a bounded system which may be a program, an event, an activity, or a group of individuals. Similarly, Miles and Huberman (1994, p. 25) define a case as “a phenomenon of some sort occurring in a bounded context”. Merriam (1998, p. 27) supports Stake’s view, concluding that “the single most defining characteristic of case study research lies in delimiting the object of study, the case”.

Case study research also involves situating the research phenomena within their context: “The context of the case involves situating the case within its setting, which may be a physical setting or the social, historical, and/or economic setting for the case” (Creswell 1998, p. 61).

Merriam (1998, pp. 29-32) further characterises the case study as particularistic, descriptive and heuristic. Case studies are particularistic in that they “focus on a particular situation, event, program or phenomenon” (Merriam 1998, p. 29). They are descriptive in that they produce “a rich, ‘thick’ description

of the phenomena under study” (Merriam 1998, p. 29), and they are heuristic in that they “illuminate the reader’s understanding of the phenomenon under study” (Merriam 1998, p. 30).

Stake (2000, pp. 437-438) identifies three types of case study: (1) the *intrinsic case study* where the focus is on an individual specific case for its intrinsic interest, (2) the *instrumental case study*, where a particular case is examined “to provide insight into an issue or to redraw a generalization” (Stake 2000, p. 437), and (3) the *collective case study*, which is an instrumental case study extended to several cases. Individual cases within a collective case study “are chosen because it is believed that understanding them will lead to better understanding, perhaps better theorizing, about a still larger collection of cases” (Stake 2000, p. 437).

Case studies may thus be single or multiple. For the present study, the collective case study is particularly relevant, since it offers a way of exploring multiple flexible learning environments with a view to understanding phenomena related to learning and information in a number of different contexts. The collective case study also has the potential to enhance the transferability of study findings.

Unlike some other forms of research, the case study approach does not employ any particular methods of data collection or data analysis (Merriam 1998, p. 28), but uses a range of techniques appropriate to the given context. Multiple sources of information, including observations, interviews, documents and reports, may be used to analyse, describe and explore the case.

The case study methodology was selected as the most appropriate for the present study because of its ability to provide a richly descriptive picture of the flexible learning environment as a bounded system within a context, to utilise a variety of data collection techniques, and to focus on multiple participant perspectives. Data collection and analysis techniques commonly used in other qualitative research traditions such as phenomenography and grounded theory

may also be usefully employed within the overall framework of a case study approach (Merriam 1998, p. 28).

3.5 Research Design and Procedure

The development and application of an empirical research design based on the case study approach involved the processes of defining the case, selecting cases for study, selecting study participants, formulating case study questions, selecting methods of data collection, developing a case study procedure, and addressing ethical considerations.

3.5.1 Defining the Case

The case study methodology focuses on a bounded system within a context. The framework presented in *Figure 5* (p. 42) can be seen as a representation of the various elements comprising the bounded system of a flexible learning environment. In defining the case in the present study, a number of key elements or features were considered: (1) the context, (2) the nature of the flexible learning environment, (3) the subject or knowledge domain, and (4) participant perspectives.

(1) The context

The context in which a particular flexible learning environment operates can be very broad and complex. Contextual issues may include institutional policies and practices, levels of study, modes of delivery, modes of study, subject or knowledge domain, and the use of communications and information technology. These introduce a potentially complex array of variables into the case study equation.

The study was undertaken at a single educational institution, the University of Wollongong. By focussing on a single institution, common policy and infrastructure frameworks applied across study cases. As the researcher is familiar with the University of Wollongong environment, there were advantages in terms of accessibility to contextual information and study participants. While it is hoped that the results of the study will be sufficiently transferable as to be applicable to other educational institutions, a single-institution study will enable

the researcher to implement practical initiatives at his home institution which reflect the findings of the study.

(2) The flexible learning environment

Flexible learning environments may exhibit great variation in the level of flexibility they provide. Flexibility tends to be built into learning programs at the subject level. While some learning programs may be delivered wholly in flexible mode, such as in the case of distance education, the individual academic subjects will generally exhibit variation in the media used (print, video, CD ROM, Web etc.) and the modes of communication available. In most learning programs there will be a mix of flexible modes offered to students, and subjects may vary in the degree and type of flexibility which they afford. Given this degree of variation, it is unlikely that any two flexible learning environments will be exactly comparable. In order to capture some of this diversity it was decided to conduct a collective case study (Stake 2000, p. 437).

In order to accommodate this variation in degree and mode of flexibility it was proposed to define a flexible learning environment as *a single semester academic subject which offers some degree of flexibility in terms of the six dimensions of learner choice* previously identified (Section 1.3, p. 6). This definition assisted the identification of the flexible features of a particular learning environment, and allowed the study of interactions and processes at the more discrete level of an individual academic subject.

The study sought to explore rather than to set up an experimental comparison between traditional and non-traditional learning systems. This may raise the question as to how one can identify those aspects of learning and information use which are unique to flexible learning environments. It is likely that some aspects of learning and information use will be common across both traditional and flexible learning environments. In this sense, the activities and processes to be studied in a flexible learning environment could be regarded as a subset of those in all learning environments. If all learning systems can be seen as being on a continuum from closed to open (Rumble 1989), then implications derived

from a study of flexible learning environments may well be applicable to more traditional learning programs.

(3) The subject or knowledge domain

The subject or knowledge domain of a particular learning environment may be a significant factor in determining participant perspectives on learning and information. It is a well-known finding of information use studies, for instance, that users of information from different subject disciplines exhibit different information use characteristics (Garfield 1980; Lera, Cooper & Powell 1983; Wilberley & Jones 1989; Broadus 1990; Fulton 1991). While this study does not focus on a comparison of information use characteristics in different subject disciplines, it was considered useful to select flexible learning environments from a range of subject disciplines to reflect the diversity of subjects being offered in flexible mode. The selection of cases from multiple knowledge domains may also contribute to the greater transferability of findings.

(4) Participant perspectives

The subjects, or units of analysis, of the study are individual teachers and learners in flexible learning environments. The study focuses on the perspectives of teachers and learners, and specifically excludes librarians as subjects of study. This was seen as a way of breaking the librarian-centric position which can often accompany practice. It is a strategy to de-emphasise the librarian's perspective and to gain an understanding of teachers' and learners' perspectives without the influence or commentary of librarians.

The librarian, however, cannot be excluded completely, given that the researcher is also a librarian. Rather, there will be a muting of the voice of the librarian and a listening to the voices of teachers and learners. It is this perspective which will assist in developing library and information services which are more attuned to the needs of teachers and learners in flexible learning environments.

3.5.2 Selection of Cases for Study

The selection of flexible learning environments for study raises issues concerning the representativeness of cases in relation to the total population of possible cases (Stake 2000, p. 446). Case studies, and qualitative research generally, however, do not aim to be statistically representative in the manner of the formal random samples typical of quantitative studies. Rather, case studies “draw a purposive sample, building in variety and acknowledging opportunities for intensive study” (Stake 2000, p. 446). Purposive sampling, or criterion-based selection, (Maxwell 1996, p.70; Ritchie, Lewis & Elam 2003, pp. 78-80) bases the selection of study settings and participants on features and characteristics that will enable the researcher to gather in-depth information on the areas of research interest. This form of sampling is therefore purposeful and strategic (Maxwell 1996, p.70), with considerations of convenience and ease of access to study situations and participants given only secondary importance. Typical case sampling, in which cases that are representative of a larger group are selected for detailed study, is a particular type of purposive sampling which is relevant to the present study. The opportunity existed to draw on the advice of educational consultants in the University of Wollongong’s Centre for Educational Development and Interactive Resources (CEDIR), who were familiar with the full range of flexible learning developments across all faculties, to recommend examples of academic subjects which embodied current typical practice in flexible learning implementation.

Sample sizes for qualitative studies are generally small. As analysis progresses, there will be a point beyond which little new evidence is obtained from increasing the sample size (Ritchie, Lewis & Elam 2003, p. 83). This feature of qualitative research has been termed *theoretical saturation* or *sampling to the point of redundancy* (Glaser & Strauss 1967; Lincoln & Guba 1985; in Kuzel 1999, p.41). Since qualitative research is also not focussed on statistical significance, there is no requirement that samples be of sufficient scale to achieve this (Ritchie, Lewis & Elam 2003, p. 83). Sample sizes also need to be kept reasonably small to do justice to the rich evidence provided by qualitative studies, and to make best use of the resources available for intensive research (Ritchie, Lewis & Elam 2003, pp. 83-84).

For the present study, it was considered that three or four cases across a range of subject disciplines would provide some degree of variation between learning environments, while being sufficiently manageable in terms of resources and time to allow in-depth study. Selection of cases was based on the following criteria: (1) the extent to which the academic subject embodied typical flexible learning practice, (2) the modes and levels of flexibility offered in the academic subject, (3) representation of a range of subject disciplines, (4) the willingness of subject coordinators and students to participate, and (5) the accessibility of subject participants for study. After initial consultation with CEDIR educational consultants about suitable examples of flexible learning subjects, subject coordinators from a range of disciplines were approached about their willingness to participate. Following discussion with a number of coordinators, four academic subjects taught in Autumn Semester 2000 were selected for study. The four subject coordinators (3 female and 1 male), as the primary teachers of their respective programs, were thus selected as teacher participants in the study. The subject discipline, level of study, and faculty affiliation for each case are indicated in *Table 2*.

| Case | Subject Discipline | Level of Study | Faculty |
|---------------|------------------------------|-------------------------|---------------------------------|
| Case A | Australian Literature | Undergraduate 200 level | Arts |
| Case B | Public Health Nutrition | Undergraduate 300 level | Health and Behavioural Sciences |
| Case C | Management Accounting | Undergraduate 200 level | Commerce |
| Case D | Educational Research Methods | Postgraduate | Education |

Table 2: Selected Cases

3.5.3 Selection of Study Participants

Considerations of the representativeness and size of a sample are also relevant to the selection of study participants. Teacher participants were selected by default as part of the case selection process. The main criteria used to select

student participants were: (1) that student participants be members of the population of students studying in selected academic subjects, and (2) that students be willing to volunteer to participate in the study. The participant selection process also attempted to include a balance of male and female students. As the study does not aim to be statistically representative, however, and in keeping with the research focus of the study, data were not analysed to determine if males and females had different perspectives on information and learning.

The small-scale, in-depth nature of the study, which required lengthy engagement with participants through means such as interviews, meant that it was not practically feasible to include all students from each case in the participant group. In view of the large amounts of data likely to be collected with this approach, and the time required for thorough data analysis, the study aimed to include about five student participants from each case, in addition to the subject coordinator. The agreed participation of the teacher or subject coordinator was the key to securing the participation of students.

A number of strategies for contacting students and asking for their participation in the study were trialled with Case A. In consultation with the subject coordinator, an email message was sent to all students in Case A informing them of the purpose of the study and asking for their participation. Students were also offered a \$20 University bookshop gift voucher as an incentive for their participation. The initial approach using email was not successful, with no students responding.

A second approach to soliciting student participation involved the researcher attending a face-to-face class to explain the purpose and scope of the study, and to invite participation. A sign-up sheet was circulated and interested students could indicate whether they wished to participate and provide contact details. Since all the cases studied included a face-to-face component, this approach to recruiting student participants was employed for all case studies.

The final selection was made by choosing names at random from the pool of volunteers and contacting them to gain their final consent. An attempt was also made to ensure that male students were represented, but of the 39 students who volunteered across the four case studies, only 4 male students indicated their willingness and availability to participate in the study. In total, 20 students participated in the study. This total included 4 students (3 female and 1 male) from Case A; 5 students (5 female) from Case B; 6 students (4 female and 2 male) from Case C; and 5 students (4 female and 1 male) from Case D. All student participants were given a \$20 University bookshop gift voucher.

In order to protect privacy and maintain confidentiality, all participants were assigned a code according to the scheme indicated in *Table 3*.

| Case | Teacher Participant | Student Participants |
|--------|---------------------|------------------------------|
| Case A | AT | AS1, AS2, AS3, AS4 |
| Case B | BT | BS1, BS2, BS3, BS4, BS5 |
| Case C | CT | CS1, CS2, CS3, CS4, CS5, CS6 |
| Case D | DT | DS1, DS2, DS3, DS4, DS5 |

Table 3: Participant Coding

3.5.4 Key Case Study Questions

A number of case study questions were formulated to guide data collection, based on the key areas of research interest (Section 1.7, pp. 18-19). Each case study explores three major elements: the context of the case, participant perspectives on areas of research interest associated with learning, and participant perspectives on areas of research interest associated with information. *Appendix A* (pp. 152-153) lists the key questions identified for gathering contextual information and for eliciting participant perspectives on the areas of research interest. These provided an initial framework for the design of data collection instruments such as questionnaires and interviews, and for data

collection generally.

Stake (Stake 1995, p. 20) makes a distinction between issues or questions which are derived from the researcher, and those which arise from the participants in the case study. He terms researcher issues as *etic issues*, which are brought to the cases study by the researcher “from outside”. The issues of the case study participants are *emic issues*, which emerge “from the inside” as the study progresses. Researcher questions can thus only provide an initial framework “to help structure the observations, interviews, and document review” (Stake 1995, p. 20).

3.5.5 Methods of Data Collection

The case study methodology typically uses multiple sources of information to analyse, describe and explore the case. The aim is to produce a rich, “thick” description of the case or cases (Merriam 1998, p. 29), thereby enhancing the transferability of the findings. In order to build this rich description in the present study, data were collected on (1) the context in which the flexible learning environment operates, (2) the demographic and information behaviour characteristics of participants, and (3) participant perspectives on learning and information. The present study adopts a predominantly qualitative approach to data collection, but some forms of data such as the demographic and information behaviour characteristics of participants were more appropriately gathered using a quantitative approach. The three main sources of evidence used in the study were (1) a contextual review, (2) questionnaire responses, and (3) interviews.

Data collection for all case studies took place during Autumn Semester 2000, in the period March to June. A standardised case study procedure was developed to identify the various steps involved in conducting each case study, and to provide a consistent framework for conducting the study across multiple cases. Yin (1994, p. 37) states that a standardised procedure or “protocol” is an important element in ensuring the dependability of case study findings. The various steps in the case study procedure are indicated in *Appendix B* (p. 154).

(1) Contextual data

Contextual data were gathered through a document review and an initial interview with the subject coordinator. The document review examined all relevant documentation which could be used to describe the case.

Documentation included subject outlines, student information resources such as subject notes and reading lists, web sites, and online course materials. Following initial contact and agreement to participate, all relevant available documentation was requested from the subject coordinator. Relevant information on the institutional context such as educational and administrative policies was also gathered from the University of Wollongong web site and staff in relevant support units. The initial, relatively informal, interview with the subject coordinator sought to gather information on the subject aims, objectives and structure; forms of flexibility; resources provided for students; and number and characteristics of students enrolled in the subject.

(2) Data on participant characteristics

Data on participant characteristics was gathered from responses to a questionnaire. The questionnaire contained questions on demographic characteristics such as age, gender, and mode of study; on information use behaviour such as information resources used; on patterns of library usage; and on methods of communication used. Two similar questionnaires (*Appendix C*, pp. 155-158), one for teachers and one for students, were administered prior to interviews. This allowed cross-matching of data from the interviews and the questionnaires. The questionnaire instruments were trialled with teacher AT and student AS1 from Case A. No changes were made to the questionnaires as a result of the trials.

(3) Data on participant perspectives

The most commonly used method of case study data collection is the interview, and this was the principal method adopted for the present study. Interviews sought to elicit participant perspectives on learning and information, based on the key questions identified in *Appendix A* (pp. 152-153). A number of interviews of various types were conducted at different stages of the teaching period.

- (A) The *first interview with the teacher* (*Appendix D*, p. 159) was conducted in the early stages of the teaching period, and focussed on the teacher's perspectives on learning and teaching, and the flexible learning environment. The set of questions for the first interview was trialled with teacher AT from Case A. Some minor adjustments were made to the order of the interview questions, and some of the wording clarified, in response to teacher AT's feedback. The teacher questionnaire was administered immediately prior to the first interview.
- (B) The *second interview with the teacher* (*Appendix D*, p. 160) was conducted towards the end of the teaching period and focussed on the teacher's perceptions of the nature of information and its use in the flexible learning environment. The set of questions for the second interview was trialled with teacher AT from Case A. Some minor adjustments were made in response to teacher AT's feedback.
- (C) The *interview with students* (*Appendix D*, pp. 161-162) was conducted towards the end of the teaching period and focussed on their perceptions of the nature of learning, the flexible learning environment, and information and its use. The set of questions for the interview was trialled with student AS1 from Case A. No changes were made to the interview questions as a result of the trial. The student questionnaire was administered immediately prior to the interview.

Interviews (B) and (C) were conducted near the end of the teaching period so that participants had accumulated experience of participating in the flexible learning environment under study. Interviews were semi-structured, with standard sets of questions developed for teacher participants and for student participants (*Appendix D*, pp. 159-162). These standard sets of questions were applied across all participants and case studies to ensure consistency. Using the standard set of questions as a framework, there were opportunities during

the interview process to elaborate and to seek clarification. Interviews were recorded on audiotape.

All recorded interviews were transcribed into electronic text format by a professional transcriber employed by the researcher. Each line of the electronic transcript was numbered, and interviewer and participant statements separately identified. All individual transcripts were then checked for accuracy against the original recordings by the researcher, and identified errors corrected. Interview data from student CS6 was not transcribed due to difficulties understanding the student's speech. Student CS6 was thus excluded from Case C, reducing the total number of student participants to 19.

3.5.6 Final Selection of Cases for Analysis

In the process of collecting data for Case D it became evident that it exhibited characteristics which were significantly unlike those for the other three cases. In particular, it did not exhibit the same range or degree of flexibility, adopting a largely traditional format of face-to-face seminars. While it had some online components such as a discussion group, these were little used. Case D might have value as the basis for a negative case analysis (Lincoln & Guba 1985, pp. 309-313; Miles & Huberman 1994, pp. 269-275), but it was considered to be more productive to focus the analysis on Cases A, B and C. The degree of similarity between these three cases, or the extent to which they exhibit "typicality" (Merriam 1998, pp. 211-212), will have value in relation to the transferability of findings. By excluding Case D, the total number of participants was reduced to 17, comprising 14 students (11 female and 3 male) and 3 teachers (3 female).

3.5.7 Ethical Considerations

The main ethical considerations associated with the study were the obtaining of informed consent, the need to ensure the privacy of study participants, and the maintenance of the confidentiality of participants' records.

Participation in the study was voluntary. Study participants were required to sign a consent form which briefly outlined the aims and procedures of the study.

The privacy of study participants was respected, and they were not required to reveal personal information beyond what was required in the study questionnaires and interviews.

Formal ethics approval was sought and obtained from the University of Technology, Sydney, Human Research Ethics Committee and the University of Wollongong Human Research Ethics Committee. The purpose and participation requirements of the study were explained to all participants, and they were each supplied with an information sheet prior to signing the consent form.

Study participants were informed that they will not be named in any reported findings of the study. The researcher is able to identify particular individuals (from letters of consent and interview and questionnaire findings), but these records are only accessible to the researcher and his supervisors. All information about study participants will remain confidential, and all records associated with the study are stored in a locked filing cabinet or stored electronically in secure access computer files.

3.6 Data Analysis

Merriam (1998, p.178) describes data analysis as “the process of making sense out of the data”. Data analysis involves consolidating, reducing and interpreting the data to generate the meanings which will constitute the findings of the study (Merriam 1998, p. 178). Each of the forms of data gathered in the study required an appropriate method of analysis.

3.6.1 Contextual Analysis

Information gathered on the context from institutional and subject documents, and initial interviews with subject coordinators, was reviewed and analysed to identify key descriptive characteristics.

At the institutional level, these characteristics included: information on the historical development of flexible learning and teaching programs, teaching and learning strategic plans, statistics on online subject development, and staff training and development programs to support flexible learning. A summary of

the key descriptive characteristics of the institutional context was created to provide a framework in which to view the findings from individual case studies.

At the level of the individual flexible learning environment, contextual characteristics included: faculty and subject discipline, level of study, number of students enrolled, place of offering, delivery modes, subject aims and objectives, subject structure and assessment, forms of flexibility, forms of communication, and information resources provided. Summaries of the key descriptive characteristics of the flexible learning environment were created as part of each case study.

3.6.2 Questionnaire Analysis

The frequency and ranking of participant responses to particular categories within each questionnaire component was recorded and displayed in tabulated form. The questionnaire components were: mode of study, gender, age, self-rating of knowledge of information resources, use of library, use of other libraries, ranking of information resources used, and ranking of communication methods used. The tabulated data, together with a written summary, was included in the findings documentation for each case study.

3.6.3 Interview Analysis

The approach to the analysis of interview transcripts was largely derived from the methods developed in the grounded theory qualitative research tradition (Glaser & Strauss 1967; Strauss & Corbin 1990; Strauss & Corbin 1998). Transcripts were the core data for understanding participants' perspectives on the areas of research interest under study and, as such, most of the time spent on analysis was devoted to this process. The challenge of the analysis process involved making sense of large amounts of data (c. 600 pages of transcript material) by reducing it to comprehensive and representative conceptual categories, but without reducing its richness.

Early in the analysis process the decision was made to use manual coding techniques rather than employ specialised qualitative analysis software. A number of reviews (Merriam 1998, pp. 166-177; Weitzman 2000) identify

various types and functions of such software, including data management, text retrieval, coding, and conceptual mapping. As Merriam (1998, pp. 169-170) notes, some of these functions, particularly data management and text retrieval, may also be performed by standard office software such as word processing programs. Although qualitative analysis software has undoubted value in saving time and providing new ways of structuring and interacting with data, some concerns have been expressed about the potential for software to impose a preconceived structure on the process of analysis, and to distance the researcher from the data (Merriam 1998, pp. 172-175). In the present study, where the aim was to understand participants' perspectives, the interpretation of the nuances of meaning of data within their context was particularly critical. In order to provide the maximum scope for the researcher to work closely with the data, a manual approach to the initial coding and categorisation of data was preferred. As the researcher was also new to the analysis process it was considered that a manual approach would also provide greater opportunity for exploring a range of analysis and data display options.

The analysis of transcripts began with the process of *open coding*, defined by Strauss and Corbin (1990, p. 61) as the "process of breaking down, examining, comparing, conceptualising, and categorizing data". Creswell (1998, p. 155) notes that "what is called *open coding* in grounded theory is similar to ... *categorical aggregation* in case study research". The coding process begins with the identification of *concepts* or *conceptual categories* which the researcher generates in the process of analyzing and classifying the data. A concept is a "labeled phenomenon"; it is "an abstract representation of an event, object, or action/interaction that a researcher identifies as being significant in the data" (Strauss & Corbin 1998, p. 103). Each concept has a descriptor, variously termed as either a *name*, *label* or *code* (Strauss & Corbin 1998, p. 103).

Printed copies of interview transcripts were manually annotated to identify significant participant statements and to apply labels or codes for conceptual categories. Conceptual categories were named using terms largely derived from the participants' own statements, referred to as *in vivo* codes (Strauss &

Corbin 1998, p. 105). An example of an *in vivo* code derived from a transcript statement by teacher BT from Case B is illustrated below.

| Transcript Statement | Conceptual Category (<i>in vivo</i> code) |
|---|---|
| BT: ... and so to me information is data that has been packaged for a particular purpose which may be covert or it may be overt (BTB: 31-32) | INFORMATION IS PACKAGED DATA |

Central to the coding process is the *constant comparative method* of data analysis (Glaser & Strauss 1967, pp. 101-115; Strauss & Corbin 1990, pp. 62-63; Merriam 1998, p. 159), whereby statements sharing common characteristics are given the same code (Strauss & Corbin 1998, p. 105). The method is one of classifying like with like, and separating out that which is perceived as dissimilar (Strauss & Corbin 1998, p. 105), ensuring that statements with similar semantic content are coded with the same label. A particular unit of data should fit into only one conceptual category (Merriam 1998, p. 184), with the researcher creating categories which are mutually exclusive. As Merriam (1998, p. 159) notes, this method has been used by many researchers who, as in the present case, “are not seeking to build substantive theory” as they might in a traditional grounded theory approach.

The constant comparative method was applied within individual transcripts, and across transcripts within each case. An example of the application of the method applied across transcripts from Case B is illustrated below.

| Transcript Statement | Conceptual Category |
|--|---|
| BT: ... and so to me information is data that has been packaged for a particular purpose which may be covert or it may be overt (BTB: 31-32) | INFORMATION IS PACKAGED DATA |
| BS2: ... concepts or ideas or data that has been like you know arranged and it's there in some kind of format and you have to - and you can put it into your mind if you want to, or some times it can accidentally go in there depending on how - um - which format it's in (BS2: 679-682) | INFORMATION IS PACKAGED DATA |

Following the manual coding of printed transcripts, identified conceptual categories and associated transcript statements for each case were arranged in a tabular form using word processing software. An example from Case B, displaying the conceptual categories *learning is constructing knowledge*, *learning is the acquisition of knowledge and skills*, and *learning is challenging and questioning ideas*, together with associated transcript statements, is illustrated in *Appendix E* (pp. 163-164). This form of data display enabled cross-referencing to the original transcripts using participant codes and transcript line numbers. Participant codes and the number of participants expressing a particular conceptual categories were noted on the data display. Conceptual categories were also identified as *teacher* (expressed by teachers only), *student* (expressed by students only) or *common* (expressed by both teachers and students).

The process of identifying conceptual categories was an iterative one, applying the constant comparative method across individual transcripts, and across transcripts within each case, to ensure that categories were consistent and reliably representative of the data. Merriam (1998, pp. 183-184) identifies several guidelines for assessing the efficacy of categories derived from the constant comparative method: (1) categories should reflect the purpose of the research; (2) categories should be exhaustive, covering all relevant data; (3) categories should be mutually exclusive; (4) categories should be sensitizing, or as sensitive as possible to what is in the data; and (5) categories should be conceptually congruent, exhibiting the same level of abstraction at the same level.

At the next level of analysis, the conceptual categories for each case were grouped into higher-order categories or *themes*. Conceptual categories related to the same phenomenon, action, idea, or condition were grouped into thematic clusters. The themes identified across all case studies were: (1) concept of learning, (2) concept of flexible learning, (3) the flexible learning environment, (4) the teacher, (5) the learner, (6) the learning process, (7) methods of communication, (8) concept of information, (9) information and learning, (10) information and knowledge, (11) information presentation, (12) using

information, and (13) the librarian. An example from Case B of the grouping of conceptual categories under a single theme (*concept of learning*) is illustrated in *Appendix E* (p. 164).

A cross-case analysis using the constant comparative method was also conducted at both the conceptual category and thematic levels. This called for further application of Merriam's (1998, pp. 183-184) guidelines for assessing the efficacy of categories. The constant comparative method was thus applied at a number of levels of analysis: (1) at the level of the individual transcript, (2) at the level of all transcripts within a case, (3) at the level of identifying themes within each case, and (4) at the level of comparing conceptual categories and themes across cases. This analysis formed the basis for the presentation of study findings in the following chapter.

3.7 Establishing Trustworthiness

A frequent criticism levelled at qualitative research is the subjectivity of its findings and the potential for the findings to be influenced by the preconceptions of the researcher. A key question for researchers is how to establish that the results of qualitative research are credible and trustworthy.

Lincoln and Guba (1985, p. 290) identify four main concerns in relation to the trustworthiness of research findings:

- (1) The *truth value* of findings: the extent to which findings reflect the "reality" of the study subjects and their context.
- (2) The *applicability* of findings to other contexts: the extent to which findings from one study can be applied to other situations.
- (3) The *consistency* of findings: the extent to which findings can be replicated with the same or similar subjects and context.
- (4) The *neutrality* of the researcher: the extent to which findings are determined by the study subjects and their context and not by the preconceptions of the inquirer.

Lincoln and Guba (1985, p. 290) argue that the traditional research paradigm, which is positivist and largely quantitatively based, equates these four concerns with the criteria of *internal validity*, *external validity*, *reliability* and *objectivity* respectively. They propose a reconceptualisation of these criteria to be more congruent with the philosophical approach of the postpositivist, or “naturalistic”, research paradigm. Others such as Merriam (1998, pp. 198-212) retain these traditional terms but reinterpret them to be more consistent with a qualitative approach. In relation to truth value, for instance, Lincoln and Guba (1985, pp. 294-296) argue that the traditional criterion of internal validity requires a correspondence between research findings and an objective reality, which is impossible to confirm and can only be tested through the process of falsifying rival hypotheses. In the alternative naturalistic paradigm, however, there are “multiple constructed realities” (Lincoln & Guba 1985, p. 295) made by human beings and accessible to those who make them. In order to demonstrate the truth value of research findings, the naturalistic researcher must show that these multiple constructions of reality have been represented adequately, that they are “credible to the constructors of the original multiple realities” (Lincoln & Guba 1985, p. 296). *Credibility* thus becomes the naturalistic truth value criterion. Similarly, Lincoln and Guba (1985, pp. 296-301) propose naturalistic equivalents for external validity (*transferability*), reliability (*dependability*) and objectivity (*confirmability*). Transferability thus depends on the degree of similarity between the sending and receiving contexts (Lincoln & Guba 1985, pp. 296-298). To establish dependability, the researcher must take into account factors of instability and factors of phenomenal or design induced change (Lincoln & Guba 1985, p. 299). In relation to confirmability, the question must be asked as to whether the characteristics of the data are confirmable or not confirmable (Lincoln & Guba 1985, p. 300).

Lincoln and Guba's (1985, pp. 294-301) four criteria for establishing trustworthiness provide useful guidelines for evaluating the findings of qualitative research studies. Various strategies and techniques for establishing trustworthiness have also been identified by a number of researchers (Lincoln & Guba 1985, pp. 301-331; Miles & Huberman 1994, pp. 262-280; Merriam 1998, pp. 201-212).

A number of strategies were employed throughout the research design, data collection, and data analysis phases of the study to ensure the trustworthiness of the findings within the framework of Lincoln and Guba's (1985, pp. 294-301) four criteria. In a discussion of the traditional concepts of validity and reliability within the case study framework, Merriam (1998, pp. 199-200) identifies the key areas of concern as (1) the study's conceptualisation, (2) the way in which data are collected, analysed and interpreted; and (3) the way in which the findings are presented.

3.7.1 Credibility

In qualitative research, what is being observed are "people's constructions of reality – how they view the world" (Merriam 1998, p. 203). Credibility is concerned with the extent to which the findings adequately represent the participants' multiple constructions of reality (Lincoln & Guba 1985, pp. 295-296). Strategies and techniques used to enhance credibility include triangulation (Lincoln & Guba 1985, pp. 305-307; Miles & Huberman 1994, pp. 266-267; Merriam 1998, pp. 204-205), peer examination or peer debriefing (Lincoln & Guba 1985, pp. 308-309; Merriam 1998, pp. 204-205), clarifying the researcher's biases (Merriam 1998, pp. 204-205), and referential adequacy (Lincoln & Guba 1985, pp. 313-314).

The present study has used two main data sources in the form of participant questionnaires and interviews. The questionnaire findings have given support to some of the interview findings, particularly in relation to information use and methods of communication. These sources were supplemented by reviews of policy and subject documentation. In a small-scale way, multiple data sources and methods have thus been used to confirm emerging findings (Merriam 1998, p. 204). As the discussion of the findings demonstrates, many of the findings were also confirmed and supported by the relevant research literature in information science and education. The use of these multiple data sources contributes to establishing the credibility of the findings.

In peer examination or peer debriefing, colleagues or peers are asked to comment on emerging findings. In the present study, this role was performed by

a senior library colleague who reviewed at an early stage the process of data analysis and the presentation and discussion of the findings. Due to the practical difficulties of following up with students over a period of time, emerging findings were not checked with participants. Copies of the findings and the completed thesis will however be made available to teacher participants. The assumptions and potential biases of the researcher have been acknowledged in the presentation of the conceptual and theoretical framework for the study, and in the discussion of the role of the researcher. Referential adequacy involves the retention of raw data so that others may conduct referential tests of the credibility of the findings. Data from the present study have been archived in electronic format so that others may consult them as required.

3.7.2 Transferability

The transferability of findings depends on the degree of similarity between the sending and receiving contexts (Lincoln & Guba 1985, p. 297). The extent to which the findings from the three case studies can be generalised to other situations will be a judgement made by readers. Some strategies to enhance transferability include rich, thick description (Lincoln & Guba 1985, p. 316; Merriam 1998, p. 211), typicality or modal category (Merriam 1998, pp. 211-212), and multi-site designs (Merriam 1998, p. 212).

The present study has aimed to present a richly descriptive picture of participant perspectives by giving prominence to their own voices in the presentation of findings, and in describing the context for each case study. The description of each case study learning environment will allow readers to make judgements about the typicality of each case in relation to others within the same general class of flexible learning environments. This has been done through classifying the features of each case study learning environment, and highlighting the similarities and differences between participant perspectives in each environment. The multiple case research design of the study, and cross-case analysis of data, allows results to be applied to a greater range of situations than would be possible for a single case study. In this way, the potential transferability of the findings is enhanced.

3.7.3 Dependability

Dependability is concerned with the extent to which the findings can be replicated with the same or similar subjects and context (Lincoln & Guba 1985, p. 290). In order to demonstrate dependability, Lincoln and Guba (1985, p. 299) argue that the qualitative researcher should aim to take into account “factors of instability” and “factors of phenomenal or design induced change”. Strategies for enhancing dependability include explaining the investigator’s position (Merriam 1998, pp. 206-207), triangulation (Lincoln & Guba 1985, p. 317; Merriam 1998, p. 207), and the audit trail (Lincoln & Guba 1985, pp. 317-318; Miles & Huberman 1994, p. 278; Merriam 1998, p. 207).

In explaining the researcher’s position, the present study has elucidated the conceptual and theoretical framework for the study, explained the basis for selecting cases and participants, and described the context in which data were collected, so that readers can make judgements about the dependability of findings. The strategy of creating an audit trail involves the notion of an independent auditor examining the process and product of the inquiry (Lincoln & Guba 1985, p. 318). In providing a detailed and explicit description of data collection methods, the process of deriving conceptual categories from data, and the ways in which decisions were made throughout the study, the present study provides a basis for such an audit trail.

3.7.4 Confirmability

Similarly, the major technique for establishing confirmability is the audit trail (Lincoln & Guba 1985, pp. 318-327). The audit trail allows the auditor to make judgements about the extent to which the findings are determined by the perspectives of the participants and their context, rather than by the perspective of the researcher. The presentation of the findings in a manner which includes the natural voice of the participants is an example of the way in which the study seeks to clearly communicate their perspectives to the reader, and to make a clear distinction between participant perspectives and the interpretations of the researcher.

In these ways, the study incorporates various means for ensuring the trustworthiness of the findings, and provides reasonable assurance that they meet the criteria of credibility, transferability, dependability and confirmability.

Chapter 4

Findings

4.1 Introduction

This chapter presents the findings from the three case studies. Section 4.2 provides an overview of the context for flexible learning at the University of Wollongong, and Section 4.3 presents the context for each of the individual academic subjects which comprise each case study. Section 4.4 presents a summary of findings derived from questionnaires on participant demographics, information use, and methods of communication. Section 4.5 introduces the findings from the cross-case analysis of interview transcripts, which focus on participant perspectives on flexible learning (Section 4.6), information (Section 4.7), and learning (Section 4.8).

4.2 The Institutional Context

The findings from the case studies must be viewed in the context of policy and practice in relation to flexible learning at the University of Wollongong. During the 1990s there was a gradual evolution of the University's involvement in flexible forms of teaching and learning. This involvement included the development of distance education programs through Open Learning Australia, the PAGE (Professional and Graduate Education) Consortium, its own Wollongong OnLine unit, and a number of faculty-based initiatives. A number of individuals and departments experimented with web-based course management systems for the delivery of educational programs. An international educational facility was established in Dubai (United Arab Emirates), and the University also established small satellite centres in Sydney and at Berry on the South Coast of New South Wales. Courses were also offered outside Australia through a number of partnership arrangements with educational institutions in Hong Kong, Singapore and Malaysia.

The University's *Learning and Teaching Strategic Plan* (University of Wollongong 1999) identified strategies for achieving teaching and learning objectives which included the development of flexible programs offering a

choice in entry levels, structure and delivery methods to cater for diverse student needs and build upon prior experience.

The *2000-2003 Academic Staff Enterprise Agreement* (University of Wollongong 2000) explicitly acknowledged the influence and impact of flexible delivery methods and online learning (Part 33), and noted that:

Flexible delivery means an approach to education which allows duration, intensity, place, method, delivery, and media of instruction to change to reflect the learning objectives, the needs of the student, the subject and course requirements and the judgement of the teacher. The aim of flexible delivery is to enhance the educational experience and to increase participation in it.

In late 1999, an online learning management system, WebCT, was selected to provide a standardised interface for the delivery of web-based subjects. The number of subjects being offered using this technology has increased from 205 subjects in 2000, to 640 in 2001, 830 in 2002, and 860 in 2003. All three of the case study learning environments used WebCT in its first year of implementation to a greater or lesser extent.

A further impetus for the implementation of web-based delivery mechanisms was the establishment of a new campus at Nowra and education centres at Batemans Bay and Bega at the beginning of 2000. Two of the case studies (A and C) were part of these developments.

4.3 The Case Study Context

The three cases chosen for study exhibited similarities and differences in relation to subject discipline, subject content, methods of teaching, forms of flexibility, information resources, and methods of communication. The main features of each case study academic subject are shown in *Table 4* (p. 81) below.

| | Case A | Case B | Case C |
|---------------------------------|--|---|--|
| Faculty | Arts | Health and Behavioural Sciences | Commerce |
| Subject Discipline | Australian Literature | Public Health Nutrition | Accounting |
| Level of Study | Undergraduate 200 level | Undergraduate 300 level | Undergraduate 200 level |
| No. of Students Enrolled | 30 | 45 | 200 |
| Study Period | Autumn Semester 2000 (13 weeks) | Autumn Semester 2000 (13 weeks) | Autumn Semester 2000 (13 weeks) |
| Place of Offering | Wollongong Campus | Wollongong Campus | Wollongong Campus Shoalhaven Campus (7 students) |
| Delivery Modes | Four modules of three weeks' duration each. A module comprised 1 x 1 hour lecture plus 1 x 2 hour seminar every 3 weeks. Online discussion via WebCT (in two-week period between lectures/seminars). | Six study modules. On-campus: 7 x 2 hour seminars, 3 x 2 hour tutorials. Web-based: via WebCT | Twelve study modules comprising 2 x 1 hour lectures plus 1 x 1 hour tutorial per week. Online resources, discussion and quizzes via WebCT. |
| Attendance Modes | Attendance at all lectures and seminars was compulsory. Seminar presentations and online discussion compulsory. Two compulsory posts (150-300 words) required each week. | Students can choose either on-campus, web-based, or a combination of both modes. Attendance at seminars and tutorials not compulsory. | Lecture attendance not compulsory. Attendance at tutorials compulsory. Six compulsory postings (<i>e-cussions</i>) to WebCT bulletin board. |
| Communication Methods | Via WebCT bulletin board and non-WebCT private email. 454 bulletin board postings (average 15 per student) as at 20 June 2000. | WebCT bulletin board (not compulsory) and non-WebCT private email. 31 bulletin board postings (average <1 per student) as at 16 June 2000. | WebCT bulletin board and non-WebCT private email. 1204 bulletin board postings (average 6 per student) as at 19 June 2000. |
| Learning Resources | Printed book of readings. Lecture notes via WebCT. Links to electronic databases and web sites via WebCT. | Print and web-based subject outlines, study guides, and case studies. Videos shown in seminars and via web. Textbook and reading lists, and links to web resources. | Subject outline, lecture notes, and tutorial solutions provided via WebCT. Link to textbook publisher's web site via WebCT. |
| Assessment Methods | 2 x 2000-2500 word essays (80%). Contribution to seminar presentations and leading online discussions (15%). Participation in seminars and online discussion (5%). | Internet resources review (10%). Mid-semester exam (30%). Case study assignment (40%). Professional practice assignment (20%). | Essay (10%). Online quizzes (18%). Workshop <i>e-cussions</i> (6%). Tutorial preparation and participation (6%). Final exam (60%). |

Table 4: Features of Case Study Academic Subjects

The Case A subject aimed to introduce students to Australian literature and to explore its cultural and ideological background through reading, analysing and discussing a number of texts taken from a wide variety of genres. The subject was also concerned with developing students' skills in critical analysis, accessing research resources including electronic texts, effective group work, and writing in a variety of styles and genres.

The Case B subject examined the area of public health nutrition from the perspective of a practitioner in the field, and was designed to develop professional skills. It aimed to develop an understanding of the different approaches that aim to improve the nutritional status of the population, and of the social and political context of nutritional issues.

The Case C subject focussed on different costing systems in accounting, and planning and control mechanisms. The subject also aimed to develop communication skills through written literacy in essays and workbook questions, verbal literacy through participation in tutorials, and computer literacy through online delivery, workshops and quizzes.

4.4 Questionnaire Findings

The questionnaire data provided quantitative findings on participant demographics, information use, and methods of communication. Questionnaire findings for each case study are summarised below.

4.4.1 Case Study A

Participants in Case A comprised the subject coordinator (coded as AT) and four students (coded as AS1, AS2, AS3, and AS4). All four student participants were studying full-time and were in the 18-21 age group. One of the student participants was male.

Participants rated their knowledge of information resources average and above, and indicated that they used the University Library from *every few days* to *monthly*. The teacher and one student (AS2) also used resources at other libraries. The most highly ranked information resource was the printed subject

notes and readings. Two students (AS1 and AS2) also gave the WebCT bulletin board the highest ranking as an information resource. Books were also highly ranked. Electronic resources were well used, with all participants using electronic databases and the World Wide Web.

The participant group exhibited a slight preference for email communication over direct, face-to-face communication with three participants rating it the most important method of communication.

4.4.2 Case Study B

Participants in Case B comprised the subject coordinator (coded as BT) and five students (coded as BS1, BS2, BS3, BS4 and BS5). Two student participants (BS3 and BS4) were studying part-time. Three students were in the 18-21 age group, one student (BS5) was in the 22-25 age group, and one student (BS4) was in the 26-30 age group. All of the of the study participants, including the teacher, were female.

Participants rated their knowledge of information resources average and above, and indicated that they used the University Library from *every few days* to *monthly*. The teacher and one student (BS5) also used resources at other libraries. The most highly ranked information resource was the printed subject notes and readings, with all participants giving this category the highest ranking. Books were also relatively highly ranked. The World Wide Web was used by all participants, as were the subject-based videos. Other electronic resources such as databases and electronic journals were less well used.

The participant group exhibited a strong preference for direct, face-to-face communication with five participants rating it the most important method of communication. Email and telephone communication were ranked equally second.

4.4.3 Case Study C

Participants in Case C comprised the subject coordinator (coded as CT) and five students (coded as CS1, CS2, CS3, CS4 and CS5). All five student

participants were studying full-time. Four students were in the 18-21 age group and one student (CS4) was in the 26-30 age group. Two of the student participants were male.

Participants rated their knowledge of information resources average and above, and indicated that they used the University Library from *every few days* to *occasionally*. None of the participants used libraries other than that at the home campus. The most highly ranked information resource was books. Electronic resources were well used, with all participants using electronic journals and the World Wide Web. Electronic databases were also used by all but one of the participants.

The participant group exhibited a preference for direct, face-to-face communication with four participants rating it the most important method of communication. Email communication was ranked second.

4.5 Interview Findings

This section presents findings from the cross-case analysis of interview transcripts, arranged under themes or areas of research interest. The interview findings reflect some of the quantitative findings from the questionnaire, particularly in relation to information use and methods of communication, but provide a much richer picture of participants' qualitative experience.

The interview findings are presented in a way that gives prominence to the actual statements and voices of participants so that their perspectives can be appreciated more fully by the reader. The total number of participants was 17 (comprising 3 teachers and 14 students), and the number of participants (n) expressing a particular perspective is indicated where appropriate. Extracts from interview transcripts include participant codes (see *Table 3*, p. 63) and transcript line numbers. The codes A and B after teacher participant codes (e.g. ATA, BTB or CTA) refer to the first and second interviews with teachers respectively. As one would expect, some participants were more articulate than others, with teachers generally more able to clearly express their responses to interview questions than students. In some cases, repetitions and vocal

stumbles have been elided from transcript extracts for grammatical clarity. Square brackets have been used occasionally to indicate where the researcher has inserted text to complete the sense of participant statements.

4.6 Perspectives on Flexible Learning

4.6.1 Concepts of Flexible Learning

Flexible learning was seen by both teachers and students (n=14) as providing more effectively for the individual needs of students. Students saw flexibility chiefly in terms of the time, place and pace of study:

Flexible as in not a ... classroom situation but, you know ... at your own pace and your own time, when you feel comfortable and really - once you've read the material - you can ... make a response, you can go online and check it all out, that's all flexible (AS4: 76-80)

It gives you ... the opportunity to - well you don't have to go to the classes to learn it. You can ... suit it to your needs. ... one week you might decide to just use the website and not go to the classes and you can submit assignments by the web if that's what you wanted to do, and so it gives you more options (BS5: 47-51)

... just having fewer classes and being able to learn at your pace and in your own time, rather than always having to be somewhere and soak it in - you know - one thirty to two thirty - you can look at it later at night if you prefer to study then (CS3: 105-108)

More broadly, flexible learning was seen by two of the teachers as providing more equitable access to members of the community who may have found it difficult because of their life situations to adapt to traditional educational delivery. Teacher AT saw flexible learning as opening up "the spectrum of the people who are able to study", such as "single parents, ... working parents, ... but also people studying at a distance" (ATA: 395-398). For teacher CT, flexible learning "increases equity... across the board" (CTA: 762-763), particularly for "students with ... physical problems" (CTA: 758).

Flexible learning was also perceived by participants (n=10) as catering for students who learn in different ways. From the pedagogical viewpoint of the teacher, the learning environment can be structured to provide a range of

learning opportunities for students. For teacher AT, flexible learning “offers more variety to the students and gives more opportunity for the students to use different learning situations” (ATA: 171-173). Teacher BT commented that in a “flexibly delivered subject ... you are able to cater to the needs of the students more effectively” (BTB: 385-386), and that “you are actually more effectively meeting the needs of different students, whereas in a traditional lecture situation you don’t often have that opportunity” (BTB: 397-399). For teacher CT, flexible learning can offer various modes of learning to suit individual student needs:

... some students will learn through one mode and other students will learn through other modes. ... I found that some students really like face-to-face lectures, and others ... just can’t wait to get away from it. ... So to some extent it’s what suits their own learning ... concept (CTA: 178-182)

Students (n=6) also expressed an awareness of the variety of learning modes and situations as being characteristic of flexible learning:

... flexible learning in ... maybe a different environment, it’s not necessarily in a classroom situation. ... I mean here in this case it’s on the net (AS4: 64-66)

Different modes of learning, and allowing students to be able to participate and choose the way that they’re learning, not having a regimen of learning (BS4: 50-52)

Two students in Case A (AS1 and AS4) described flexible learning as being more interactive, in contrast to traditional learning which was seen as more passive:

... interaction possibly between other people, that sort of kind of learning - ... kind of like a round table learning instead of oration (AS1: 97-98)

... it’s not ... the usual modes of learning as in a lecture - sit passively taking notes, that kind of thing - ...possibly more involving interactivity (AS4: 62-64)

Such comments may reflect the mode of teaching used within these students' particular case study environment (Case A), which encouraged interactive discussion through both face-to-face and email communication.

4.6.2 The Flexible Learning Environment

The single most commonly expressed perception (n=12) of the flexible learning environment was that it was characterised by less frequent face-to-face classes, and that fewer students attended the face-to-face classes that were offered:

I think it was interesting that we didn't have a face-to-face class every week and ... we haven't experienced that before. We had one ... class every three weeks In the two weeks in between we didn't actually come to Uni and we were on the Internet, so I guess that was flexible, different to what I'd already experienced in class (AS4: 72-76)

You can be off campus, you can complete the whole subject via the Internet, submit the assignments, you really don't have to attend lectures at all. Don't necessarily think that's a wonderful thing, but you can ... choose to do it (BS4: 60-63)

Teacher CT estimated that over half the students enrolled in subject C never attended lectures (CTA: 223-227) but participated solely through the online environment.

Six students from cases A and B saw face-to-face classes as forums for discussion, encouraging interaction and positively enhancing their learning:

It was a lot more interactive than a formal sort of lecture ... you know, when you can talk about things ... but I think that was more sort of flexible as opposed to other classes that I have had at other times (AS4: 87-89)

Probably the best thing about the subject is ... that there is a lot of discussion, like it's not really a normal lecture, that's probably the best part about it The class is a good size to be able to do that - so you can ask questions and say what you think as well, ... which I think is a good way to learn (BS2: 109-115)

Many of the students (n=10) from all three case studies saw the online environment as facilitating communication and access to information by

providing integrated, one-stop access to communication tools and information resources such as lecture notes, web sites and publisher support materials:

It's really flexible because ... she has all the study notes and case studies on the Internet if you want to use it that way. It would be really good if you were ... a distance learner. ... a lot of our assignments are using the ... Internet (BS3: 60-64)

... just being able to communicate, I guess, with the staff and stuff through the web rather than always having to go to the consultation areas made it a lot easier for us to be flexible, I would perceive that as being flexible (CS3: 135-138)

Teacher CT saw the flexible access to subject content provided by the online learning environment as releasing students from the need to attend lectures, since students “should be able to do the whole subject and satisfactorily complete all the assessment even if they didn’t attend lectures, because I believe there’s enough information there” (CTA: 193-195).

Two students from Case A (AS1 and AS2) saw the online component of their subject as creating a continuous class, with ongoing discussion not bound by the time constraints of the traditional classroom situation:

... and then for the other two weeks it's all done via WebCT, or by email, so you have a list of all these people's ideas on a screen in front of you, and you can go back to each one and you can look at an entire dialogue of the course from the very beginning, and it kind of transforms the course. ... I thought ... at the beginning of the course that it only happens once every three weeks and instead it's a course that's constant. Like you can wake up at three a.m. on a Saturday night, and go to the computer and the class is still going on there, because there's always new people putting up new ideas and instead of limiting it to your classroom experience, it's kind of like a semester-long, twenty-four-hours-a-day class where you can learn as much as you want, whenever you want, keep it going (AS1: 110-121)

4.6.3 The Teacher

Perspectives on the role of the teacher varied across the three cases. In particular, the different emphases in teachers' perceptions of their role can be

seen as reflecting the different subject content and approach to teaching within each case study learning environment.

Teachers AT and BT saw their role primarily as guides and facilitators of learning:

I suppose I think my job as a teacher is to encourage the students to think dialectically and by that I mean encouraging students to think of each other as ways of learning how to modify their own ideas, learning how to temper their own thinking, learning how to discipline their own thinking, by listening to the ideas of others who oppose them ... or criticise, critique, ... their ideas. So as a teacher I would like to think of myself in that way as traffic control, encouraging students to engage with each other and with the texts, rather than as a kind of magisterial approach to learning which I've heard ... described as ... 'sage on the stage' - that I have the ideas. ... So I'm not really interested in giving them my ideas and my answers (ATA: 498-513)

Facilitating learning, providing an environment within which people are exposed to new ideas and concepts, but also providing a sounding board so that they can test out the new knowledge (BTA: 124-126)

Teacher AT also saw her role, in part, as a mediator of student discussion and communication:

I talk to them face-to-face in a lecture situation and I also mediate discussion in a tutorial situation. So I go from sort of the sage on the stage thing which I resist, by asking them to ask questions of me, and themselves - ... to also sort of traffic control person I was talking about (ATA: 834-838)

Teacher AT also saw herself as setting the agenda by determining the content, structure and assessment methods for the subject: "they can't pick and choose ... in a lot of ways because I set the agenda" (ATA: 181-182). In this context, teacher AT felt that it was her responsibility "to cater to all of those students...and get as many of them thinking in terms of what they want out of their learning, in terms of their ... learning objectives" (ATA: 125-130).

Student AS1's perceptions of teacher AT reinforced the roles of guide and facilitator of learning, and of mediator of student discussion and communication, seeing her "more as a colleague, ... more as someone that's there to talk with, someone there to exchange ideas with ... - that seems to be the focus" (AS1: 181-183). Other student perceptions (n=3) of teacher AT saw her as enthusiastic, technologically innovative, and "very much engaged in the text that we were reading, very much involved in ... covering ... the subject" (AS4: 117-118).

Teacher BT saw her teaching role as focussing on conceptual issues rather than knowledge or subject content *per se*, encouraging students to think strategically, and to challenge and question:

... it's challenging people's perception of what their role as a health professional is, how they can increase their effectiveness and the sorts of things that they need to change, and how they can do that (BTA: 363-366)

Teacher BT expected students "to be able to act independently as learners" (BTA: 249-250), and that "in reality I can't assume anything in particular" (BTA: 245) because "there's a range of backgrounds that students come with" (BTA: 238-239).

Case B student perceptions of teacher BT saw her as knowledgeable (n=3), and as a mediator of student discussion and communication (n=2):

I think that she is very knowledgeable. She knows what she is talking about and she has a lot of experience which is very important actually We respect her knowledge (BS2: 213-215)

I think she's really good actually, as a lecturer because ... she's really good at getting a discussion going, and she doesn't go off the point too much (BS3: 115-117)

Teacher CT saw her role as transmitting information and communicating the subject content in such a way that it is clearly understood by students:

I try to pass on information to my students in such a way that they receive it as I mean them to. ... I try to pass it on through lectures, I try to pass on through things that I put on the web, I try to pass it on when I answer email to students when it comes in (CTB: 76-85)

Teacher CT placed greater emphasis on responding to the student focus on assessment, but in this context also encouraged understanding rather than simple rote learning:

I look at it from a student's perspective, they want to know what's examinable. ... their bottom line is 'I want to get through my exam'. ... I have to indicate to them ... what are we trying to do? ... and how will this be tested? and how will this be assessed? (CTA: 99-107)

I shouldn't want students to just rote learn anything, because I think that anything you rote learn doesn't end up having any kind of effect on you (CTA: 160-162)

Teacher CT was seen by students in Case C as knowledgeable and able to communicate the subject content (n=3):

The lecturer was excellent, she must have a teaching degree because out of all the lecturers at the uni she's the one that could teach the most. ... a lot of lecturers they try to teach but they don't ... effectively teach to you, whereas [teacher's name] was just brilliant. She was the best teacher I've had here. She was really good (CS2: 122-130)

Student CS2 attributed the effectiveness of teacher CT's teaching to her adoption of a step-by-step approach:

She explained it in a way that was coherent and simple enough for us to understand, but complex enough to get it across. ... and she broke things down step-by-step and didn't assume that we knew too much (CS2: 146-148)

For the teachers involved in the study, an important aspect of learning was their pedagogical practice. All three case study teachers had no particular theory of learning that they systematically applied. A number of learning theorists were explicitly referred to, however, in the context of Biggs' (1987) study of deep and surface approaches to learning (ATA: 139), Freire's (1972) approach to practice

and the purpose of learning (BTA: 84-109), and Bloom's (1964) taxonomy of educational objectives (CTA: 28-40).

Teacher BT acknowledged her unfamiliarity with learning theories, but saw pedagogical practice as more broadly based:

There are conceptual areas that encompass teaching and learning, and philosophies which are behind that, which ... is a broader, broader concept in my mind (BTA: 106-109)

There was a recognition on the part of the case study teachers that learning is an ongoing or lifelong process, and that skills development and the application of knowledge to real-life situations are important components of this:

I think learning is not static, learning is ongoing. ... We can learn from courses and through subjects, but we learn from experience as well, so I think to learn one has ... to participate in some way or another (CTA: 22-25)

I suppose the idea ... of knowledges and skills and lifelong skills as I was talking about before ... I'd like to think that the way that I teach my students is that they think what they're getting is the knowledge, and that the other skills that they're acquiring along the way they're getting without realising it (ATA: 532-536)

For teacher AT, the learning needs and objectives of students were a primary pedagogical concern, where "the focus should be on their learning rather than on my teaching" (ATA: 62-63). Coupled with this approach was a recognition that people learn in many different ways, most explicitly expressed by teacher BT:

... there's a huge array of ways of learning, ... both formally and informally. ... Some people will learn by experience; some people learn by hearing things; some people learn by visually observing things; some people have to do something before it's internalised and taken on board. Some people need to create what they call concept maps around information so that they consciously try and fit it in with their existing knowledge bank, other people probably do that subconsciously (BTA: 65-71)

4.6.4 *The Learner*

A range of teacher and student perspectives on the role of the learner, and the learnings gained in each case study environment, were expressed. Teacher AT argued that “you have to differentiate between different students with different learning objectives” (ATB: 160-162), anticipating that she will “have students who fall loosely into ... a few clusters with different learning objectives” and “in that regard I ... try and cater for a variety of different students” (ATA: 72-74). She identified three main groups of students: (1) “self-motivated learners ... who have a very clear idea about what their learning objectives are” (ATA: 80-86); (2) students “at the other end of the spectrum” whose “learning objectives are to learn as much as they possibly can to get away with what they need to get away with” (ATA: 92-95); and (3) “a bunch of students that sort of fall in between those two things” who have “a fuzzy idea about what their learning objectives are, but also not wanting to do more than they have to” (ATA: 112-119). The different clusters of students “prefer different learning situations” (ATA: 161), with students who “find that face-to-face classes are better” tending to be “in the bottom cluster because they can fly by the seat of their pants a bit better, they don’t have to be quite as well prepared, ... they think they can bluff, they think they can fudge, and they think they can rely on their raw knowledge a bit better” (ATA: 161-166). The “students on the top end”, however, “find the student-centred learning strategies quite useful, but they also appreciate having the opportunity to really read each others’ ideas carefully and engage with them” (ATA: 167-170).

Teacher BT perceived “three main groups” (BTA: 368) of students with different approaches to learning. The first group comprised the “young naïve nutrition science student who really needs to get shaken out of their view of nutrition as a physical or biochemical science” (BTA: 327-329); the second comprised “the older professional who has come back to study” who is “not as confident as the young bucks coming through” (BTA: 340-342); and the third comprised “a group of professionals who have got work experience under their belt” but who are “set in a particular way of thinking of themselves as a health professional” (BTA: 353-355). Teacher BT saw her role as engaging with each of these groups in a

different way to ensure positive learning outcomes, and “getting the students to think about how this subject will add to their employability” (BTA: 372-373).

Teacher CT perceived her students more in terms of the skills that they possessed or required, observing that students “don’t know how to research”, (CTA: 663) and “we’ve got students that have never written an essay, they have never had to research from the library” (CTA: 670-671). Commenting that “we need to gather information from different sources” (CTA: 688-689), she argued that students “still have to get a reading and be able to analyse it, but they have to know where to go to find things and how to search for things” (CTA: 691-692). Note-taking was also identified as one of “the skills that are missing” (CTA: 703), since students “don’t seem to have reached the concept of being able to listen and take notes” (CTA: 708-709). Flexible learning was however seen to make “students more independent, more responsible for themselves, they do have ... a say in their learning” (CTB: 395-397).

Many of the student participants (n=11) saw themselves in their role as learners acquiring and applying knowledge in relation to their subject content:

...my job as a student was to just sort of embrace it all and to take it on and to see ... different reading strategies and that kind of thing (AS4: 100-102)

I’ve learnt lots about ... what the role that a nutritionist or a health professional plays in the community, ... and that sort of thing - and I guess how policies and information and that sort of thing are linked in with that (BS5: 133-136)

... the various techniques, and we use formulas associated with applying management accounting to production of an organisation, ... working out various costs and budgets, revenues and figures (CS1: 198-201)

Some students (n=8) also expressed views which were reflective of broader approaches to learning. These included the view that “it’s the student’s job to challenge other students’ ideas and then at the same time interreact [sic]” (AS1: 144-145), “participating in the subject, in the discussions, getting people fired up and arguing if it’s necessary to sort things out” (BS4: 136-137), “to

participate actively” (CS1: 158), “being attentive and enthusiastic and ... just doing your best to learn” (CS3: 147-148), and the perception that “I definitely learnt to challenge ... what I read, not just to take things at face value, definitely learnt to question and analyse” (AS4: 152-153).

The result of active participation, and the challenging and questioning of ideas, was perceived by some students (n=3) in cases A and B as gaining multiple perspectives and appreciating others’ viewpoints:

I learned a lot about ... how other people's views can affect the way you learn. It affects your views as well instead of just having to rely on your own train of thoughts, to come up with new ideas you can borrow from people and have other people spark little bits of knowledge for you too (AS1: 219-224)

... it's more to do with ... perspectives of how you see things or how you see issues, or is learning about what goes into it, and I mean that's quite an important thing (BS2: 280-282)

Students (n=5) in cases B and C placed greater emphasis on assessment tasks as a motivating factor in learning, with student BS1 seeing her primary role as a student as “keeping up with the material so I can pass” (BS1: 210). For student BS2, “I’m sure most of what I’ve learnt is ... when I’ve been doing the assessments because that is probably when I’ve done most of the work” (BS2: 263-265), and when time is limited “just deciding that I’ve just got to memorise this and put it into my head to pass this exam” (BS2: 970-971). Student CS5 saw his responsibility as a student as being “to pass the exam” and “in order to do that I must understand where things come from” (CS5: 161-162), while student CS2 saw her role as “to take the information in, and to understand it, and then be able to sort of reproduce it in an exam” (CS2: 99-100).

4.6.5 Methods of Communication

The interview findings in relation to methods of communication reflect the questionnaire findings, with individual participants expressing preferences for online or face-to-face communication. Some students preferred online communication “because it’s easier for people to contact each other through

email” (AS2: 274-275) and “because it’s always there so you can go back and check what a person’s said before” (AS2: 309-310). As well as ease and convenience, email communication also offered privacy for individual communication:

email was the best thing we had for each other because we didn’t see each other outside, didn’t cost anything, and you could privately email someone ... if you didn’t agree with what they were saying (AS3: 413-416)

For students who preferred face-to-face communication, various reasons for their preference were expressed. In Case B, the face-to-face contact provided by seminars and tutorials was preferred “because it has lots of structure, otherwise if I leave it to myself all the time I won’t be motivated enough to do it” (BS1: 98-100), and because “it forces me to concentrate” (BS2: 405-406). As well as these motivational aspects, attendance at face-to-face classes was important to students in Case B to ensure that they weren’t “missing out on anything that went on in the lectures” (BS5: 173-174) and because it “helps me to get the information that was going on with the subject” (BS2: 407-408). There was also a perception that communication is less restricted in the face-to-face environment and “you get more out of it that way and ... I can understand what they are talking about more and what they mean” (BS2: 594-595):

you have an opportunity to say more - like no one could be bothered typing what we actually say because it would end up being a lot. ... And there are a lot of little things aren’t words that you don’t say - like there’s you know body language and just other things that you can get meaning from (BS2: 620-628)

The motivational and informational aspects of attendance at face-to-face classes were reiterated by students (n=4) in Case C, who attended lectures because “I need that sort of thing to go over it again” (CS1: 142-143), “to make sure I sort of heard the information once” (CS2: 69-70) and “knew what was going on” (CS2: 81). Teacher CT, however, did not think that “lectures are very good communication” or that “having a mass of students is the way to do things” (CTA: 453-454). She saw lectures as an opportunity to “rave on and give examples” (CTA: 465) and to “chat with them as a lecturer” (CTA: 470).

In Case A, face-to-face communication in the form of interactive discussion was more highly emphasised. For student AS1, an important aspect of face-to-face communication was the fact that “everyone can come together and put the faces to the people on the Internet ... because to me it’s still more solid and I like to be able to look at people when I’m talking to them and know those ideas” (AS1: 317-320). Student AS4 observed that the richness of face-to-face interaction cannot be replicated using computers:

Everyone’s there, everyone’s interacting, everyone’s sort of laughing and talking and ‘Ah, but then this’, and then sort of everyone’s chucking in ideas and that kind of thing as well, and you sort of come away from it after a few hours going ‘Wow’ I think I feel like I’ve really sort of learnt something, digested a lot of ... things, and interaction with other people as well is better than a computer I feel (AS4: 249-255)

4.7 Perspectives on Information

4.7.1 Concepts of Information

Some study participants, especially students, found it difficult to articulate their concepts of information. This may be due to the fundamental, unanalysed nature of the concept, as expressed by one student who commented that it’s “a very difficult question” and “I think it’s something very basic” (BS2: 639-640). Participants did not necessarily express a single concept of information. Rather, they expressed multiple concepts in relation to a variety of contexts in which the term is used.

(1) There are many forms of information

There was a widespread recognition by participants (n=11) that there are *many forms of information*, with some students observing that “there’s a whole range of information out there” (BS3: 254) and that “information can come in any form” (AS1: 379). These forms can include “information from journal articles, information from media, information from videos ... all sorts of different sources” (BS4: 382-384), and:

... everything really - verbal, from your friends, formal from the university and teaching environments, ... obviously across the computers, plus the Internet, on the radio, the newspapers, magazines (CS1: 349-351)

The variety of forms of information prompted student BS5 to observe that “there are so many different types I don’t think there is any one thing that characterises it as information” (BS5: 279-281).

(2) Information is everything perceived through the senses

Some participants (n=2) saw information very broadly, as *everything perceived through the senses*:

... everything that you see and hear and touch and smell and all those things ...
everything's all sort of information that you're putting into your system (AS2: 331-333)

Similarly, student AS1 observed that “you are constantly being fed information, take any form” (AS1: 382-383). Related to this idea is the perception that information is “a whole heap of unorganised material” (CS3: 353), “disorganised ... stuff that isn’t sorted, and you have to take it all in and then sort it yourself” (CS3: 341-342).

(3) Information is organised data

From another perspective, information was seen by four participants as *organised data*, with student CS2 observing that data is “stuff that you have to analyse before you can get the information out” (CS2: 413-414). Teacher BT’s view that “information is data that has been packaged for a particular purpose” (BTB: 31-32) was reflected in student BS2’s description of information as “concepts or ideas or data that has been ... arranged and is there in some kind of format” (BS2: 662-663), and in student BS4’s reference to her recent lecture content in which information was presented as “a processed form of raw material” (BS4: 368).

(4) Information is facts

Two students associated information with *facts*, with student AS2 seeing information as “basic facts” (AS2: 319). In making a distinction between information and knowledge, student AS4 described information as “more factually based” (AS4: 276-277).

(5) *Information is that which informs*

With a view of information closely related to its original etymological meaning (Latin *informatio*), five participants expressed the concept of information as *that which informs*. In this conception, information was seen as “anything that helps inform” on “pretty much any subject whatsoever” (AS1: 370–371), with an emphasis on the communicative aspects of “being informed and informing” (ATB: 26). Teacher CT’s “first thought” in relation to the concept was of “being informed and keeping in touch” (CTB: 29). Student CS1 described information as “something ... you didn’t know about, ... but once you receive it you can use it to communicate” (CS1: 341-343), and student CS4 stated that “I generally think information is news” (CS4: 233).

(6) *Information is knowledge, or a bit of knowledge*

Some participants (n=4) expressed their concept of information in terms of *knowledge*, either equating the two as in “information is knowledge” (CTB: 37), or describing a relation in which information was seen as “bits and pieces - ... a bit of knowledge” (AS4: 293). Information was also seen as contributing to the creation of new knowledge for the learner, as “stuff that you want to know or you find out, ... new knowledge, new facts – that sort of thing” (CS2: 420-421) or as “anything that’s there to be used ... to provide insight into something” (AS1: 362-363).

(7) *Information can be interpreted in different ways*

Another characteristic of information perceived by participants (n=3) was that it can be *interpreted in different ways*. Student AS3 observed that “the way you perceive what someone is saying is completely different from the next person, so that’s your own way of ... taking in that information whatever way you want. ... No one else can take it in the same way” (AS3: 477-481). Similarly, student AS2 saw information as “a very broad word” involving “the interpretation of the facts, the opinions people have of the facts, ... also how different people would interpret those facts as well” (AS2: 320-322). As part of her subject content and teaching practice in Case B, teacher BT explicitly acknowledged the multiple interpretations that can be applied to information by presenting the idea that

“information is just a particular view of the world, and data have been presented in a particular way to present a view of the world” (BTB: 40-41).

4.7.2 Methods of Presenting Information

A variety of modes of information presentation were exhibited in the case studies, and participants expressed a range of preferences for particular presentation formats. In Case A, teacher AT saw herself as presenting information “in the same discursive mode” (ATB: 388), proceeding through discussion and questioning, regardless of whether the information was being presented in a lecture, on the web, or in a tutorial. Information was presented as “something to be engaged with” (ATB: 283-284), accompanied by “a series of questions which the students are encouraged to ask of themselves” (ATB: 305-306). A number of students in Case A (n=3) acknowledged the “discussion process” (AS2: 452) as the most effective way of presenting information:

... the discussion of that information - ... that would actually probably be the most effective. The discussion of it, sort of the questioning and the working through it with other people and finding out what other people thought of it, how they interpreted it, then ... me presenting my way of interpreting it and then sort of discussing it (AS2: 442-447)

Similarly, student AS3 commented that “one of the most ... intriguing ways to learn ... is through other class mates speaking on a specific topic” (AS3: 614-615), and student AS4 observed that “it’s important to be able to discuss it ... to be able to talk about it, and ask questions and that kind of thing” (AS4: 457-459).

In Case B, teacher BT saw herself encouraging students “to think critically about the information by presenting a whole range of perspectives and a whole range of media” (BTB: 277-279) including a book of readings, textbooks, and web links. She was also “trying to get them ... to develop some skills in presenting information themselves” through “verbal presentations, written media articles, reports to managers, as well as reviews of Internet sites” (BTB: 279-282).

Teacher CT also stressed the active engagement with information, stating that “the most effective way of presenting information is when you involve the audience” (CTB: 345-346), although this feature of the Case C learning environment received less emphasis than in cases A and B.

Students expressed various preferences for information presentation formats, with student BS2 acknowledging that “people might learn in different ways” and that a range of media “might appeal to different people” (BS2: 863-865). Student AS4 also recognised that “there’s lots of different forms of information presentation as in books, images, spoken words, Internet, that kind of thing” (AS4: 460-462).

Six students expressed a preference for print format in the form of books or written information. As student AS1 observed:

... I still feel like holding ... a book right in front of me and having ... a hard copy and actual texts is probably the easiest thing for me to learn, just because that’s always the way I’ve done it (AS1: 560-563)

Allied to the preference for the print format was an expressed aversion (n=5) to reading material on a computer screen, so that “even if I did have something on the web, I’d prefer to print it off and then read it – I don’t like reading it on the screen or anything” (BS1: 592-593). Student CS3 liked “books and things that are written on paper ... I hate trying to read and learn off computer screens. ... I never feel like information has actually sunk in ... when you’ve just read it off a computer screen” (CS3: 489-497). For student BS5, “even if something is on the web ... I really need a hard copy of it to be able to go through it and underline things” (BS5: 380-383).

Some students (n=6) expressed a preference for visual information in the form of pictures, diagrams, and moving images such as animations or videos:

I think a picture that’s concise is remembered easier than a paragraph of words telling you how to do it - ... for me it is (CS2: 560-561)

I think it makes more of an impression in being able to stick if you can visually see it, as opposed to words being spoken at you (AS4: 446-447)

For student BS5, “diagrams can be helpful ... mainly in explaining processes, ... and I guess relationships between ... things” (BS5: 388-390). In the case of student BS2, “moving pictures of real people, or like the world which ... looks pretty similar to what we actually see when we walk around”, help him to “relate to my own life more” and make it “real and relevant” (BS2: 680-687). Student BS3, however, expressed a somewhat contrary view:

Videos are alright and ... they are interesting, but it’s a bit hard to ... learn from videos a lot of knowledge because it’s all presented to you really quickly (BS3: 441-443)

One student (BS4) also commended the use of analogies to present information in a way that will “bring it down to an understandable language” (BS4: 553-554). She spoke of a lecturer who “used really simple analogies to describe complex chemical processes” which “made the whole thing make perfect sense” (BS4: 551-553).

4.7.3 Using Information Resources and Services

A common feature of the case study learning environments was that the teachers actively encouraged students to use a wide range of information resources, often making the use of particular resources a compulsory component of the subject. As student BS2 observed, “you are forced to be active because you have to ... do the assignments” (BS2: 167-168).

Teacher AT expected her students to “use the library to its full capacity, ... to use databases, ... to use the ... catalogue effectively, ... to use the web, and in various different stages during the subject I ... make them feel obliged to do so” (ATA: 931-934). She was also “encouraging them to find out their information on their own because that’s the next step they need to take” (ATB: 532-533), and tending “to push them towards electronic resources” (ATB: 542-543) in the online learning environment.

Teacher BT provided a large number and range of information resources for her students, using resources to “challenge them” and deliberately “overload them” (BTB: 470). This was done purposefully “because the subject material is very complex”, and “another way that people learn is just through overload and trying to sort through the complexity that they are confronted with in a way that is meaningful to them, and with this particular subject that’s the way I tend to approach it” (BTB: 427-433). This approach was reflected in student BS2’s comment that the subject had “heaps more reading than any other subject I’ve had before” (BS2: 498), yet there was also appreciation that “the provision of resources is really excellent compared to other subjects” (BS3: 669-670).

In Case C, teacher CT stated that her students “are supposed to use the library to do research and I’ve told them that they need to have a minimum of six journals, ... so I expect them to use that” (CTA: 371-373). She also “encouraged them to use ... databases in the library, as well as ... the shelf journals, and search words to help them” (CTA: 373-375).

A number of participants (n=7) contrasted the active use of information in flexible learning environments with a more passive approach in traditional learning environments. For student AS2, “it’s more active involvement, ... we are more involved with the information” (AS2: 503-504), and for student AS3:

you have to ... adapt to a different type of learning, it’s not like you are just going to class everyday or every week and taking a whole bunch of notes and listening to the lecture, listening to your tutorial. You yourself have to like make the effort to be a positive contribution to the class, so in that way it’s definitely different I would say (AS3: 639-644)

The online discussion environment also gave students “a chance to sort of read it - if I wanted to respond to it I could, but if I didn’t want to respond I could leave it for a while, ... so I had time to digest it and process it, which was perhaps a little different from the traditional lecture” (AS4: 473-480). “On the computer”, student AS4 found that she was “able to sort of take a step back, think about it, sort of touch on a few other subjects, go back to the readings” and “by the end

of the week I feel I've learnt so much more than if I had just sort of like post a response and that was it ... it was really high quality discussion because people were sort of really engaging in [it]" (AS4: 487-506).

Teacher BT reflected that flexible learning environments may enable students to be more actively engaged with information because "there is that added dimension of being able to meet the different needs of different students more effectively by having a variety of media and presenting things in a variety of ways" (BTB: 408-410). Teacher CT also saw the online environment as encouraging more active participation by students because "they have got things that they're doing, rather than just turning up ready to write" in a lecture situation, and that "even the sense of going in and downloading notes, they are taking a certain interest in something" (CTB: 430-432).

All three teachers expressed the perception that information tends to be used passively in traditional learning environments. This is in part related to the teacher adopting a "magisterial position" (ATB: 472) as "the keeper of all knowledge and the answerer of all questions" (ATB: 485-486). Teacher BT acknowledged that it may be possible to "present information flexibly in a traditional learning environment" (BTB: 296-297) through challenging students and "getting different perspectives presented to them", but that the familiarity of the lecture situation may cause students to receive information in a "predefined way" (BTB: 300-304). Similarly, teacher CT characterised the traditional learning environment as one where "the lecturer knows it all", with students "sitting listening there" trying to "write enough notes and copy them from overheads" (CTB: 416-417). Teacher CT was critical of this approach, arguing that "it's engaging the hand – I don't think it's engaging the brain" (CTB: 420-421).

From a student perspective, student BS2 questioned the educational value of the traditional lecture situation where "lecturers ... just ... tell you all the information" (BS2: 909):

... you know, they just say it and have things written up there We are copying down and so we sort of get all of that at once, and I think that's a completely separate process to learning because I don't see how that's always easy to learn in that sense because you are doing two things at once (BS2: 909-913)

A number of students (n=7) commented on their active use of electronic information resources such as the online library catalogue, databases, and the Internet. Student AS2 linked her use of the Internet to the fact that she was participating in an online learning environment:

... because this is all an online subject, you kind of think of going into the Internet before you actually think of going to the library because you're at home and sort of been doing this at home (AS2: 531-533)

Student BS3 observed that "I use the database to find journals ... but I use the Internet in general ... - even if an assignment doesn't concern using the Internet I now tend to go to the Internet as a source" (BS3: 519-522), and student BS5 stated that "I've used the web ... to increase my access to information" (BS5: 415-417). In describing their approach to gathering information for assignments, students in Case C (n=3) reported that "I did an electronic search on the databases from the library" (CS2: 810-811), and "I started off researching it by going through one of the electronic databases" (CS3: 695-696).

Two students from Case A commented on the benefits of exchanging information with other students in an interactive learning environment where "you use the information that you get from other students in the class much differently" (AS1: 589-590), and where "you are kind of presenting them to the class, and the rest of the class is probably thinking about all the information that you have got from the resources" (AS2: 544-555). This way of using information to learn was contrasted with the traditional learning environment:

If you're sitting in a classroom that's being taught in a traditional manner all the dialogue from the students is directed towards the teacher - there's no interaction between the students. It's all ... directed up front and the teacher answers that question, so you're basically only learning from one person (AS1: 590-594)

Teacher CT also observed that using the WebCT online bulletin board for discussion of questions was “a way of getting other students to give other students information” (CTB: 306-307).

While some students (n=5) perceived that making use of information was essentially the same in traditional and flexible learning environments, there was also a perception (n=6) that “you have different access to information” (BS3: 471) in the flexible learning environment:

I think the materials are going to be the same, the actual information given or solutions provided, the lecture notes are going to be the same. The only difference I can see is to be able to attain that information on the more flexible basis at different times (CS1: 585-589)

Access to information in the flexible learning environment “was a lot easier, and the information was correct and it was always there” (CS2: 578-579).

Most participants (n=15) expressed satisfaction with the information resources available to them for their respective case study subjects, either through the University Library or available online. Where dissatisfaction with available information resources was expressed, some of the criticism focussed on the need for “more current stuff” (BS1: 873), “we don’t have the things that I want” (CS3: 544), “it’s a bit limited in my subject area” and “we should have a lot more journals” (BS3: 576-577), and the fact that “not all the journals are going to be there, so it means having to mainly do some travelling at some stage” (BS5: 430-432).

Teacher AT commented that online tutorials on topics such as “using databases ..., using the catalogue ... in an advanced way, ... using citation indexes” (ATB: 932-937) would be useful additional information resources to support flexible learning.

4.7.4 *The Librarian*

Some participants had no “set image on what a librarian does” (AS1: 729), recognising that “they’re all different types and ages ... just normal people” (BS1: 814-824), that “anyone can be a librarian ... – there’s lots of young librarians and ... both sexes, all ages” (CTB: 606-607), and that there used to be “some kind of stereotype of librarians but now it’s just another job really” (BS2: 1141-1142). Participants had “different kind of experiences” (AS3: 776-777) of librarians depending on the individual and the context. There were some isolated negative perceptions expressed by participants related to their current experience of librarians, with student CS3 finding them “quite nasty and very unhelpful” (CS3: 586).

Despite an awareness of the librarian stereotype – “the bun, the glasses, the shush” (AS4: 584) – most participants generally had positive images of the role of librarians. They were perceived by participants (n=9) as being helpful and having a strong service orientation, described as “very helpful when I ask for help” (AS1: 742), “very friendly all the time” (CS4: 483), and “any interaction I have with the librarians has been very positive, they have all been very helpful” (AS4: 572-573).

The primary form of help provided by librarians was perceived by participants (n=10) as facilitating access to information:

... how to find stuff, ... how to encourage students to find stuff, in how to use this new bit of information, ... that’s how I see them (ATB: 726-728)

... assisting people to tap into the range of information that is ... now just blossoming and being available for people (BTB: 506-508)

Students saw librarians assisting by “finding alternate resources through the computer system” (AS1: 753-754), “helping find things and stuff like that” (BS1: 768-769), knowing “where to get the information from and what people are after” (BS2: 1144-1145), “assisting in getting information” (BS4: 792), providing “help with where to go to find certain information” (BS5: 456-457), and helping

students to obtain “general information on accessing the various databases for this subject ... and finding things within the library” (CS1: 685-689).

Another aspect of the helping function was the librarian’s perceived educative role in teaching students “how to use different programs, like the database searches” (BS1: 847-848), and conducting “tutorials ... to educate students in using the library by themselves” (BS3: 660- 661). One student (CS2) also acknowledged the formal information literacy program at the University of Wollongong ILIP100 (www.library.uow.edu.au/helptraining/workshops/ilip/), stating that “with the literacy program here, you get introduced to how to use the library for yourself” (CS2: 724-725).

Teachers AT and BT explicitly acknowledged the librarian’s educative role, with teacher AT observing that “I always think about librarians as wanting to make us better users ... of the library – it’s almost religious zeal” (ATB: 756-757). Teacher BT saw this aspect of the librarian’s role as critical to the success of flexible learning:

... if your reason for flexibly delivering subject material is to encourage problem-solving, to encourage ... more responsibility on the part of the student for their own learning, obviously part of that is that they should be going off and seeking the data that they need, and librarians are obviously critically important there (BTB: 738-742)

Teacher BT also saw a role for librarians in subject planning and design, where they “can assist the individual students, but also as part of the planning should be able to direct the academic and provide advice in terms of incorporating that into the activities of the subject” (BTB: 744-747). She thought that librarians could also “be doing a lot more to challenge academics in their traditional way of doing it” (BTB: 764-765) and adopt a more strategic political role, recognising that “you’re the ones who hold access to information, and in terms of ... political analysis, the people who have access to the information, and control access to the information, are the ones who are normally the most powerful” (BTB: 725-729).

For teacher AT, the support provided by librarians is important because “in a flexible learning situation ... information needs to be delivered to all ... parts of the globe” (ATB: 845-846). While not involving librarians directly in the planning and design of her subject, she commented that “it would be interesting to consider the prospect of working with librarians in terms of designing the way in which the information is going to be presented” (ATB: 878-880). Similarly, teacher CT did not involve a librarian in the “direct planning and presentation” (CTB: 585) of her subject, but acknowledged that the librarian has a role in providing advice on relevant information resources since “the librarian has a lot more understanding of the resources and problems in taking this subject” (CTB: 637-638).

Despite the generally positive perceptions of the librarian, most participants had little or no communication with librarians in relation to their case study academic subjects. Any student contact with librarians was usually via the Library Information Desk:

I go to the Information Desk and tell them my question usually and they will go up to the library catalogue and help me out, and they will tell me where the best books, they have given me pamphlets, which are the best web sites to go to for that particular subject, so in that way I have the communication with them (AS3: 736-741)

Other students saw librarians at the Information Desk as a resource for obtaining information “at the beginning to find out the basics” (AS1: 704), gaining directions on how to use equipment such as “the microfilm and stuff like that” (AS2: 605-606), obtaining “passwords to access the journals, the database” (BS3: 553-554), showing “me where all the journals are” (CS5: 609), or assisting “when I borrowed ... from Closed Reserve” (CS5: 613). Student BS2 had “definitely not found it necessary to go to the Information Desk at all” (BS2: 1000-1001), while student CS2 observed that :

You don't really need to communicate with librarians - don't take this the wrong way - but with the catalogue system and the databases and accessing like the library catalogue from home ... via the web - I mean you don't have to - it's easier doing it that way. I mean if I've got a problem I will go down and see them, but I don't think I've

actually sort of spoken to a librarian to help in research ... except first week of first year
(CS2: 705-714)

4.8 Perspectives on Learning

4.8.1 Concepts of Learning

Various concepts of learning were expressed by study participants, with the most frequently expressed (n=14) being those which perceived it as *constructing knowledge* and/or the *acquisition of skills*.

(1) Learning is constructing knowledge

Learning as *constructing knowledge* includes the processes of acquiring new knowledge or information, and modifying existing knowledge:

I think gaining new information, but also altering the information that you already have - like the idea and the knowledge that you have already
(AS2: 45-46)

When someone learns ... I think they're taking on board new information, and that new information may either go into an empty receptacle area because there was no information about that particular issue previously, or it's modifying an existing bank of information (BTA: 41-44)

I guess you're finding out new things or building on what you already know, or maybe sort of changing something that you thought you knew (BS5: 34-36)

(2) Learning is the acquisition of skills

Learning as the *acquisition of skills* was often seen as involving the application of knowledge in a particular practical or professional setting (this was more common in cases B and C which had a more vocational orientation):

I mean you are obviously trying to hopefully ... hold onto that information and apply it later on (CS1: 66-67)

... learning is taking on board new knowledge and applying that knowledge in a meaningful way (BTA: 25-26)

Generally, however, learning as the acquisition of skills was expressed in combination with the notion of learning as the acquisition of knowledge. That is, the two concepts were often expressed simultaneously, as two conjoined aspects of learning:

I think it's useful to marry skills with knowledges so that at the same time that knowledges are being acquired skills are being acquired (ATA: 228-230)

I think it's ... where I increase my knowledge in a particular area and know how to use that knowledge in the future ... so it's important that the knowledge is useful and ... I think the practical side of it is quite important - ... in how to apply it to my future work or life (BS2: 25-29)

(3) Learning is gaining insight or understanding

A related concept to that of learning as constructing knowledge was that of learning as *gaining insight or understanding*. A small number of students (n=3) expressed their view of learning as gaining “an insight into what you’re actually learning” (CS1: 80) or “an understanding in a particular area or discipline” (CS3: 21-22).

(4) Learning is challenging and questioning ideas

Some students in cases A and B (n= 3) also perceived the *challenging and questioning of ideas*, involving critical thinking, as an important element of learning:

I'm questioning things I suppose. Questioning what I, what knowledge I already have and sort of adding some more things to it, but always questioning, always questioning (AS2: 62-64)

... and also I think there's critical thinking. Why something is - you know - why it's said and it's there in that fashion - that type of thing - and basically just trying to work out what the whole thing is (BS3: 30-32)

(5) Learning is appreciating others' ideas or points of view

For some students (n=2), a related aspect of learning was the *appreciation of others' ideas or points of view*:

I'd say that ... learning is ... realising other people's ... thoughts and ideas and kind of ... incorporating them with your own and just ... at least recognising that they're out there (AS1: 26-29)

4.8.2 The Learning Process

Participants expressed various perspectives on the processes and activities associated with learning, and of the ways in which they learn and study.

(1) Learning through memorising

Memory was seen as having a key role in the process of learning by five out of six participants in Case C, perhaps reflecting a greater emphasis on the rote learning of material for exams in that academic subject. Students in Case C placed emphasis on retaining and storing knowledge for the purpose of passing exams, with one student stating that “I might be a bit warped, but my mind says ‘will I remember this for the exam?’ ” (CS5: 46-47).

Two students in Case B expressed a reliance on rote learning of factual information in the sciences, with one student seeing the process of “memorising things” as “really important in my area of studies” (BS3: 28-29). Another student placed written and coloured memory prompts around her flat “just to try and see things over and over again, and read it and try to memorise it, and go away and try and memorise the view of them” (BS2: 444-445). Participants in Case A placed less emphasis on rote learning, but one student expressed a criterion for having learnt something as “when I can remember what it is” (AS4: 340), and another that “when you learn something ... you either remember or you don’t” (AS3: 52-53).

(2) Learning through a step-by-step approach

Learning was seen as a step-by-step process by teacher CT and some of her students (n=3). Teacher CT referred to Bloom’s (1964) taxonomy of educational objectives in her description of the stages of learning:

... you have to learn how to recall it first before you move into the analysis and the synthesis, but there is set procedures to work their way through (CTA: 30-36)

The views expressed by students in Case C may in part reflect the approach taken by teacher CT in this subject. For student CS3, learning involved breaking material down into comprehensible parts:

... try to sort of summarise the whole of the material, ... breaking it down into logical parts - ... think of headings and keywords and things like that. ... and just kind of get it into some logical order because I know in research and stuff there's information ... all over the place, and it's simpler trying to break it down into blocks of things, and things that actually make sense (CS3: 52-57)

(3) Learning through practice

Students (n=7) in cases B and C emphasised the importance of learning through practice or practical application, perhaps reflecting the more vocational orientation of these academic subjects and teacher CT's view that "students learn best by doing" (CTA: 856). Learning was seen as being more effective and easier "if you have some sort of practical application" (BS1: 44) where one is "actually applying information rather than ...having to sort of rote learn it" (BS5: 329-330). Practice was seen by student CS3 as a way of gaining understanding:

you have to ... put it to use and put it into practice, and I find that when you do that you just tend to begin to understand it without actually having to read or write and everything like that (CS3: 433-436)

(4) Learning through making connections

Learning through making connections and seeing relationships was seen by some participants (n=3) as essential to understanding a subject or topic, which was contrasted with memorising. Teacher CT characterised learning as "seeing linkages that I didn't see before", where "I can see the relationships much more" (CTA: 83-87). Student BS2 observed that more conceptual (as opposed to factual) subjects involved "linking things together" (BS2: 953) and that "once you have got that knowledge or that understanding of the concept you will be able to put it down in different words and it won't have to be the exact same words ... which is used for memorising" (BS2: 475-478). Similarly, student CS5 contrasted understanding with memorising:

Learning is ... the intaking of information, being able to not just regurgitate it but to actually understand it. Like - I did maths for first semester last year and I could learn the formulas but that wasn't learning. ... learning would have been understanding the formulas (CS5: 29-33)

(5) Learning through interaction with others

A feature of Case A was that all participants commented on the importance of learning through interaction with other people in the class. These perceptions were reflective of the flexible learning environment created by teacher AT, with its emphasis on participation in both online and face-to-face discussion.

Teacher AT visualised students as “tennis players batting ideas around” (ATA: 1093-1094), and student AS1 saw “the setup of the class” as “a forum where you can learn from each other” (AS1: 155-156). This form of learning arose from questioning and appreciating others' points of view:

... we are learning through discussion, we have been questioning other people and they're questioning me and ... that's how we learn (AS2: 139-141)

This way of learning was contrasted with traditional methods where “the potential for learning from ... other people and other people's ideas is much less” (AS1: 595-597). Student AS3 explicitly acknowledged the conscious design of the Case A learning environment when she observed that the teacher “made it that way”, and “everyone had their own view on everything, ... and you learn something from that instead of everyone just doing what the teacher wanted you to say, ... which may have come in a classroom” (AS3: 174-178).

Interactive peer learning was also a recognised, though less prominent, feature of Case B with student BS1 engaging in informal “group study sessions” (BS1: 271) with other students and observing that “you learn things when talking to the students” (BS1: 595). Student BS2 stated that “talking with other students” is “probably how I've learned best” (BS2: 174-176), because “when you get the chance to explain things to each other you can look at the things that you don't quite understand” (BS2: 181-182).

(6) Learning requires interest

Participants from across the case studies, including five students and one teacher (CT), expressed the view that it is easier to learn when the subject has interest or relevance for the learner:

I find that when you are actually interested in the subject or ... find interest in parts of the subject, then you'll be more interested in learning it, and it seems easier to understand it and retain the knowledge (CS3: 93-96)

Interest or relevance was also linked to memory, with student BS5 observing that "if it's more relevant to you or means something more ... then you are more likely to remember it and take it in" (BS5: 304-305).

(7) Learning through study activities

Students engaged in a number of study activities including reading, writing notes, thinking, and revising as part of the learning process. In using information resources to learn, student AS4 stated that she liked to "think about it, and read it, and let it sit for a while, and come back to it" (AS4: 525-526). Studying was described by two students in Case C as a process whereby they "go through ... lecture notes" and "try and cover everything we've done" (CS1: 238-240) or where they "look through the text book and the lecture notes" (CS4: 156). Being able to "do something with the information" such as "write and read notes" was seen as helpful (BS5: 187-188), and student BS3 stated that "I mainly read" and "run over and see if I can remember what I've read later, and sometimes make little notes" (BS3: 162-163). While it was recognised that learning occurred "through a combination of different means" (BS1: 42-43), reading was seen by some students (n=5) as the "the major way that we're supposed to learn" (BS2: 700). Reading was also seen by two students in Case A as the basis for thinking and developing one's own opinions, where "I like to do all the reading and everything before the class, and then ... have my own sort of opinions on it" (AS2: 237-238).

(8) Learning requires certain environmental conditions

A number of students (n=5) commented on the need for certain environmental conditions to learn and study effectively. These included the need for a “quiet environment, away from all the distraction” (AS4: 192-193), a preference for studying alone [“I have to be by myself” (AS3: 345-346); “I usually study by myself, I don’t study in groups” (BS3: 156-157)], being able to work “at my own pace when I feel I have to” (AS1: 240), and even the influence of physical conditions such as “how hungry I am” or “if I’m really tired” (BS2: 729-730).

4.8.3 Information, Learning and Knowledge

Participants expressed a strongly cognitive conception of learning, emphasising close conceptual associations between information, learning and knowledge. As student BS4 observed, information “enables you to learn, ... it enables you to ... facilitate learning” (BS4: 391-397).

Many of the participants (n=13) perceived information as the basis for knowledge, seeing it as “the driving force behind knowing” (AS1: 542) that “allows you ... the potential to know whatever you want” (AS1: 535-536). The essential connection between information and knowledge was recognised in statements such as “you can’t know it without the information” (BS1: 504-505), “it’s pretty essential because you can’t know anything without information” (BS2: 800-801), “if you don’t have enough information, then you can’t know something” (CTB: 241-242), “it ... gives you a base for determining something” (CS1: 481), “you need to be given information before you can say you know about it” (CS2: 468-469), “information is kind of like the raw materials that you use” (CS3: 448), and “information is the basis of knowledge” (CS5: 399-400).

Information was seen as having the potential to reinforce existing knowledge and to open connections to new areas of knowledge, as that which “helps you increase your knowledge base and reduce ignorance” (BS3: 276-277). It “can either reinforce something that you may have thought you knew, or it could also ... provide new information ... that you didn’t know” (BS5: 337-339).

Information was also seen as revealing ignorance, with teacher AT observing that information helped her to “know what I don’t know – which is an important knowledge to have” (ATB: 256-257).

For teacher BT, information and knowledge were perceived as “very interrelated” (BTB: 216-217), with knowledge conceived as “an understanding of the different ways that people package the units [of information] for what purposes” (BTB: 208-210), and as “constructed in particular ways for particular purposes” (BTB: 190-191).

Some participants also perceived the capacity of information to effect changes in cognitive processes having a more personal dimension. Student AS3 stated that “your mind will change with ... the different information that you experience” (AS3: 599-600), and student BS3 observed that it “allows you to think differently... about all different types of issues” and “if I open my knowledge base by using other types of information I think I would be a much [more] interesting person” (BS3: 287-291).

Some participants in Case C (n=3) spoke in general terms of “different ways of processing the data” (CTB: 280-281) to create knowledge. Information is “like the raw materials” and “you have got to put them through this process and you come out with the finished goods, which is your knowledge” (CS3: 448-452). Processing information involves an active *doing something* with information:

... once you are given the information, do something with it - like use it, read it, practise it - whatever the information happens to be, ... and then I guess you could say you know (CS2: 473-475)

Participants identified a number of processes associated with using information to learn and to know. Learning and knowing were closely correlated, with many of the processes identified by participants in relation to using information to learn also being identified in relation to using information to know. The main processes identified were:

- (1) engaging with information (n=4)
- (2) absorbing information (n=10)
- (3) sorting information (n=8)
- (4) analysing and evaluating information (n=9)
- (5) synthesising information (n=7)
- (6) storing information (n=6)
- (7) applying information (n=7)

(1) Engaging with information

In relation to the process of engaging with information, teacher AT observed that “engaged active students with really clear learning objectives” (ATB: 170) are more highly motivated. She saw less motivated students as engaging with information “in a fairly superficial, shallow way” (ATB: 207-208). Motivated students “actively engage with the stuff”, taking “an active and motivated approach to reading ... and then thinking” (ATB: 183-186). Student AS4 described the process as one where “you need to interact with it in some way, sort of engage with it and remember it” (AS4: 330=331), and that the interaction may involve iterations where “you have to maybe see it, see it again, maybe ... even in another form or be reminded of it somehow” (AS4: 329-330).

For student BS1, the process of engagement involved reading, writing and drawing diagrams:

... read the textbook and then I had to go through a lot of the processes in my head ...
- some of them it took ages to get it straight in my head and to understand it - ... and
then I wrote it out like in - not necessarily my own words - but created diagrams and
different things that I could probably get my thoughts straight so they all made sense
(BS1: 472-477)

(2) Absorbing information

Absorbing information involves “taking it all in” (AS2: 366), “absorbing everything” (AS2: 363), “gathering the relevant bits” (BS5: 287), “taking in information” (AS4: 321; BS2: 158), and “receiving the information” (CTB: 167). Student AS2 linked the process of “absorbing information” to becoming “more

knowledgeable” (AS2: 430-431). A variety of ways of absorbing information were recognised:

... you can sort of read it, and you can sort of see it on the news, ... I mean, we've got so many ways of taking in information (AS4: 319-321)

Student CS2 thought that more information is absorbed when there are “different ways that you sort of see it, or hear it, or read it and that sort of thing” (CS2: 447-448).

(3) Sorting information

Sorting information is focussed on the activities of “sorting through it all” (AS2: 363-364) and “discarding whatever is not relevant” (AS2: 366): “you have to be able to sift through the information that’s not necessary” (AS1: 553-554) and “find what you feel’s valid” (AS1: 549-550).

The sorting process involves the application of criteria such as relevance or usefulness. For student BS1, sorting information involved knowing “what I have to look for, and then I will go to the literature and look for what I’m looking for” (BS1: 453-455). For other students, it involved “deciding to put the information into our minds” (BS2: 723), and “a process of picking out what information to commit to memory, what information to endeavour to understand” (CS5: 343-344). From the perspective of student CS3:

You start off with this sort of pile of stuff and you kind of - you know - sort it, and then just gradually take out the bits that are really important (CS3: 464-466)

(4) Analysing and evaluating information

The process of analysing and evaluating information was most explicitly identified by teachers AT and BT, and by some students in cases A and B. For teacher BT, a critical approach to examining how information embodies “different views of the world” was central to her teaching aims:

I look at ways that people have packaged data to present a particular view of the world, and how that fits with other people’s views of the world, and from that

presenting back analyses of those different positions, so that people can then be better informed about the different views of the world and why there are different views of the world, and what that means for them developing their own ideas, and their own views of the world (BTB: 62-68)

This view was reflected in the perspectives of student BS4 who acknowledged the need to be “thinking about what you do in a critical way” (BS4: 424-425), and observed that “there’s always ‘why?’ behind it - ... what interest is in it for them in collecting information” (BS4: 420-421). The processes of questioning or thinking critically were seen as helping one to know:

... it helps me to know ... mainly through the questioning process - ... questioning what I thought before and what I think now that I have all the information That would be how it would help me to know (AS2: 431-435)

... it really helps you to think, think about all sides of an issue, consider all sides of issues. ... I think it makes you a more intelligent person ... because it helps you to think basically, it teaches you how to think (BS3: 374-377)

For students in Case A, evaluating information involved “analysing it, discussing it, looking at it from different angles” (AS1: 409-410) and “questioning what I’ve stored” (AS2: 365). Evaluating information may also involve a comparison of sources and gathering as much information as possible to enable this comparison to take place:

... for an essay I'd read a few different sources and if they all sort of agree then I'd take it to be oh well that you know - fair enough that's correct, ... and I think ... the more information you can get the better (CS2: 487-490)

(5) Synthesising information

Synthesising information is the process of making connections between pieces of information and putting them together in a coherent way. It involves “taking one particular piece of information” and trying to “form a concept and maybe some kind of picture of what it means and how it relates to other things” (BS2: 710-713), or “combining it with other bits of information to make it more relevant” (BS5: 294-295). The process of synthesising is also related to the

interests of the user of information, who is “trying to see links between books containing information and what’s related to what I’m doing ... or what my interests are” (BS3: 313-315).

The process of synthesising information can involve repeated engagement with information, of “going over the stuff again” (CS1: 528), in an attempt to see connections which assist understanding. To “understand it”, one must “go through it a few times” (CS2: 429). In this perception, “interacting with information is a process of actually understanding”, of seeing linkages where “this happens, then this happens – so you can just go back” (CS5: 355-356).

Synthesising information also typically has an end in view, where you “take information from ...all different areas” to use “to develop ... your opinion” (BS1: 431-433), “find some stuff then put it together and relate it to how you want it to look” (BS1: 720-721), or “turn it into something - a written form or an assignment to get assessed” (BS2: 724). These views of students from Case B may reflect teacher BT’s emphasis on information as packaged data.

(6) Storing information

A number of participants (n=6) commented on the role of memory in the process of storing information as an aspect of learning and knowing, where learning involves “storing the things that I think are important” (AS2: 364). For student AS4, a criterion for knowing something was “when it sticks in my mind” (AS4: 430) or when “it can be recalled” (AS4: 435). For student BS5, the process of knowing involved “memorising it and incorporating it into something you know” (BS5: 362-363).

(7) Applying information

Some participants (n=7), mostly from cases B and C, identified the process of applying information as an important aspect of using information to learn and to know. This may reflect the more vocational emphasis in those academic subjects. Teacher CT saw the “need to take the information and go and do something with it” (CTB: 172-173). From the perspective of student CS1, one can “apply it”, “refer back to it”, or “pass it on to someone else” (CS1: 384-387).

Student CS5 saw understanding arising through “the process of using that information until you ... don’t have to refer back to the original information source” (CS5: 424-425). More broadly, teacher BT saw herself as tending to “focus more on the process” of information use, rather than on “information, knowledge, data ... as a concrete thing” (BTB: 97-103). This was related to the professional education of her students where “different ways of using information mean different things for their work as a professional” (BTB: 121-122).

For some participants, the process of applying information helped them to know. For student BS4, it was important “to practise every day something that I am going to use”, otherwise “you can read something and it just goes in the file back there until you actually get out and use it” (BS4: 513-521).

* * *

The findings, as derived from contextual data and as expressed by participant voices, provide a rich, cumulative picture of teacher and learner perspectives on information and learning within the case study learning environments. This holistic picture provides the basis for the discussion of the findings in the following chapter.

Chapter 5

Discussion of Findings

5.1 Introduction

This chapter discusses the study findings in the context of the theoretical and empirical research literature to ascertain to what extent the findings confirm, contradict, supplement or extend what is already known in relation to perspectives on learning and information in flexible learning environments. Findings from a range of previous studies using a variety of methodologies and theoretical approaches have been confirmed or supported by the findings of the current study. This mutual confirmation across different methodological disciplines and theoretical perspectives adds weight to the credibility of the findings. The discussion of the findings is organised around participant perspectives on flexible learning (Section 5.2), information (Section 5.3) and learning (Section 5.4).

5.2 Perspectives on Flexible Learning

5.2.1 *Concepts of Flexible Learning*

Learner choice over the time, place and pace of study, and choice of learning modes, were the dominant perceptions of what was meant by *flexible learning*. These were seen as positive features, and such perceptions are consistent with the literature, emphasising several of the key dimensions of flexible learning (Collis & Moonen 2001, p. 9; Ling et al. 2001, p. 3).

It may be asked to what extent participant responses to questions about flexible learning were influenced by the rhetoric of institutional policy statements and course prospectuses. During the period of the study (March – June 2000) students were still coming to terms with what was meant by *flexible delivery*, given that this was the first year of implementation of WebCT. Academic subjects were identified as being offered in flexible delivery mode in course prospectuses, but it is clear from the findings that some students were not fully aware of what this entailed. Given that students were interviewed towards the end of the teaching session, it is reasonable to assume that their responses

were largely derived from their experience of the subject, and that some of their statements may have been influenced by institutional or teacher-based terminology. From the teacher point of view, the University's *Learning and Teaching Strategic Plan* (University of Wollongong 1999) and the *2000-2003 Academic Staff Enterprise Agreement* (University of Wollongong 2000) explicitly acknowledged flexible learning principles. This, coupled with the introduction of WebCT and the establishment of a new campus and education centres in 2000, put flexible learning high on the teaching agenda. The teachers who participated in the case studies could also be regarded as early adopters of flexible learning approaches. While the teachers could thus be considered to be more informed about flexible learning principles, they were also in a position of learning through practice and during a period of early implementation.

5.2.2 The Flexible Learning Environment

The findings suggest that student perspectives on learning and information are influenced by the nature of the subject discipline and the pedagogical design of the flexible learning environment. The primary characteristics of the flexible learning environment as perceived by participants in all three case studies included less frequent face-to-face classes, more interactive modes of communication, and the facilitation of communication and access to information in the online environment. Different emphases, however, were placed on aspects of learning and information in the three case study environments.

Cases A and B exhibited the features of constructivist learning environments, with their emphasis on communication, problem-solving and evaluative performance, as described within the typology of learning environments developed by Collins, Greeno and Resnick (1994, p. 3298). Both cases adopted a discursive mode of presentation, with the teacher acting in the role of facilitator or mediator of student discussion and communication. These learning environments encouraged critical thinking, engaging in dialogue with others, and understanding the viewpoints of others.

The approaches adopted in cases A and B are in part a reflection of the subject discipline, with Case A involving the critical analysis and discussion of literature,

and Case B encouraging a questioning attitude to health information and the role of health professionals. By way of contrast, Case C, with its emphasis on the learning of accounting procedures, could be more readily characterised as an information transmission, training, and recitation and testing learning environment. The Case C learning environment focussed on the transmission of an existing body of knowledge and prepared students for assessment tasks which tested the extent to which they could apply that knowledge. Teacher CT saw her role as being “to pass on information” (CTB: 76), and students were engaged in practice exercises and quizzes which tested their ability to apply accounting procedures. There was also greater emphasis on rote learning and memorisation on the part of students in Case C.

5.2.3 The Role of the Teacher

Teachers AT and BT saw their roles primarily as guides and facilitators of learning, and as mediators of student discussion and communication. Teacher CT saw her role as one of transmitting information and communicating the subject content. As the primary designer of the learning environment, the teacher determines the subject content and assessment methods, selects information and learning resources, and directs the modes of interaction with students. The teacher’s approach to teaching and learning thus has a major influence on the design of the learning environment and the extent to which it encourages an information transmission or constructivist approach to learning.

In their study of the role of the teacher in facilitating online learning, Youngblood, Trede and Di Corpo (2001, p. 274) found that the structure of the online components of courses tended to reflect the teacher’s view of learning, and that “the design of each online course reflected the lecturer’s own philosophy of teaching to a large extent” (Youngblood, Trede & Di Corpo 2001, p. 276).

The relationship between the pedagogical design of the learning environment and student perspectives on learning and information is most clearly expressed in Case A, where the structure of the subject required students to engage in extensive online and face-to-face discussion, and encouraged the active use of

electronic information resources. Conceptions of learning such as *challenging and questioning ideas* and *appreciating others' ideas or points of view*, and the learning processes of *learning through making connections* and *learning through interaction with others*, for instance, were more commonly expressed in Case A. Students also saw themselves as engaging more actively with information through the use of electronic information resources and interaction with other students, although this perception was not exclusive to Case A. Similar relationships between subject design and perceptions of learning and information could be demonstrated for cases B and C.

A study by Swan (2001) explored the relationship between course design features and student perceptions, and pointed to three factors that contribute significantly to the success of online courses: a clear and consistent course structure, an instructor who interacts frequently and constructively with students, and a valued and dynamic discussion. These factors in turn support interaction with course content, interaction with instructors, and interaction with classmates, which together support the “development of online communities of inquiry” (Swan 2001, p. 327). Youngblood, Trede and Di Corpo (2001, pp. 277-279) found that the role of the facilitator is critical to the success of online learning, whatever teaching style is adopted, and identified four major facilitator tasks: setting the scene, monitoring participation, facilitating critical thinking, and promoting student collaboration.

The three case study learning environments exhibited varying combinations of pedagogical approach, flexibility, teacher facilitation, and interactivity. Of the three, Case A most fully exemplified the factors identified in Swan's (2001) and Youngblood, Trede and Di Corpo's (2001) studies in its approach to design and implementation. The findings for all case studies do however point to significant correlations between the nature of the subject discipline, the pedagogical design of the learning environment, and student perspectives on learning and information.

5.2.4 Communication

Participants valued both face-to-face and online communication, either through personal preference or because they saw each of these modes as suited to particular forms of communication. Face-to-face communication was still of major importance to students since it provided a way of engaging with the teacher and other students which could not be replicated in the online environment. These findings highlight the need for flexible learning environments to provide multiple modes of communication to accommodate individual preferences and to offer a range of communication experiences. A learning environment which limits communication to an email discussion group, for instance, may provide time and place flexibility, but can severely reduce flexibility in terms of modes of communication.

Participants in the study found that the online environment facilitated communication and offered forms of interaction which complemented the face-to-face classroom situation. Similarly, participants in the study by Ryan, Hodson Carlton and Ali (1999) saw the positive benefits of web-based learning in terms of communication, interaction, flexibility and convenience (Ryan, Hodson Carlton & Ali 1999, p. 276). Negative perceptions included a feeling of isolation and the sense that web learning modules “did not facilitate the same feeling of connectedness as the classroom method” (Ryan, Hodson Carlton & Ali 1999, p. 276). These findings also reflect concerns expressed by a number of critics of online education about the disembodiedness that it can engender (Beckett 1998; Brabazon 2002).

In a study of student interaction in virtual learning environments, Thomas (2001) found that richer modes of communication were displayed in the traditional face-to-face environment, particularly when the social and emotional dimensions of communication were involved. Some students found online communication to be impersonal, alienating, and inadequate compared to face-to-face interaction, and tended to use online communication as “a means of information exchange rather than a forum for collaboration” (Thomas 2001, p. 184). Thomas (2001, p. 186) suggests that mixed mode education, which utilises the “strengths of technology in relation to information exchange” in

combination with face-to-face learning situations which “build meaningful learning partnerships”, offers the most effective way of overcoming some of the perceived deficiencies of the virtual learning environment.

From the learner’s perspective, therefore, a model of flexible learning which includes some face-to-face contact would appear to be superior to one that excludes this mode of communication completely. In the present study, Case A perhaps most fully exemplifies the successful combination of face-to-face and online communication in its use of seminars and structured online discussion group activities. The ways in which modes of communication are arranged and used within a learning environment appears to be a major factor in students’ perceptions of the success of their learning. Swan’s (2001) study of design factors in online courses, for example, found a significant relationship between levels of interaction between students and levels of learning and satisfaction. Her findings “point to the importance of creating opportunities for interaction among classmates in online courses” (Swan 2001, p. 317). Again, the effectiveness of student learning and the engagement with information is closely linked to the design of aspects of the learning environment.

5.3 Perspectives on Information

5.3.1 Concepts of Information

The main concepts or ideas about information expressed by study participants were:

- (1) There are many forms of information
- (2) Information is everything perceived through the senses
- (3) Information is organised data
- (4) Information is facts
- (5) Information is that which informs
- (6) Information is knowledge, or a bit of knowledge
- (7) Information can be interpreted in different ways

The findings give support to, and are cognate with, concepts of information developed by theorists in information science. The correspondences with the

concepts of information identified by Debons (1988, pp. 2-3) and Buckland (1991, p. 3), for example, are illustrated in *Table 5*.

| Study Participant Concepts | Debons (1988, pp. 2-3) | Buckland (1991, p.3) |
|--|-----------------------------------|---|
| (1) There are many forms of information | Information as energy | Information-as-thing |
| (2) Information is everything perceived through the senses | Information as energy | No corresponding concept |
| (3) Information is organised data | Information as data | Information-as-thing |
| (4) Information is facts | Information as facts | Information-as-thing; Information-as-knowledge |
| (5) Information is that which informs | Information as communication | Information-as-process |
| (6) Information is knowledge, or a bit of knowledge | Information as knowledge | Information-as-knowledge |

Table 5: Concepts of Information

These strong correspondences suggest that there are a limited number of qualitatively different ways in which people experience and conceptualise information, as postulated in the phenomenographic research tradition (Marton 1994, p. 4424). The concepts or ideas expressed by participants are suggestive of “the qualitatively different ways in which people perceive and understand their reality” (Marton 1981, p. 177). In light of Dervin’s (1992, p. 63) comments that “the way in which information is conceptualised” is fundamental to the “study of human use of information and information systems”, a phenomenographic study of conceptions of information may therefore be an important avenue for further research.

The concept of information as *a bit of knowledge* is reminiscent of Brookes’ (1980, p. 131) notion of information as a “small bit of knowledge”. Further, the

seventh concept expressed by study participants, *information can be interpreted in different ways*, acknowledges the influence of existing cognitive structures on the ways in which information is processed and used. Such a perspective gives support to the cognitive viewpoint in information science, which contends that states of knowledge and belief mediate the processing of information (De Mey 1977, pp. xvi-xvii; Belkin 1990, pp. 11-12).

The difficulty that some of the participants experienced in expressing their conceptions of information may in part be due to the fact that the term needs to be understood in context, as both Debons (1988, p. 2) and Buckland (1991, p. 3) point out.

The concepts of information expressed by the participants also exhibit a hierarchical arrangement, from lower to higher levels of meaning and organisation, consistent with Debons' (1988, pp. 4-6) "knowledge spectrum" and Nitecki's (1985) "information-knowledge continuum". The continuum moves from sense data, through to organised data and facts which inform and are interpreted by recipients, to the construction of knowledge. The findings thus give support to "the notion of information-knowledge as a continuous process of integrating newly received perceptions into previously established systems or relations" (Nitecki 1985, p. 395). Nitecki (1985, pp. 398-403) argues that the use of information in the active construction of knowledge has implications for the practice of librarianship, going beyond the traditional task of "arranging and classifying the library material", to a vision of librarians as "information-knowledge, process-oriented consultants".

5.3.2 Information Presentation

The case study learning environments which displayed active engagement with information, particularly cases A and B, encouraged this through discussion, critical thinking, and interpreting and evaluating information. This finding suggests that librarians could also foster such active engagement with information by adopting a more critical, interpretive, and evaluative approach to information literacy instruction and the reference interview. Bodi (1988; 1992; 1995), for instance, has been a long-term advocate for an enhanced role for

librarians in promoting critical thinking as part of the information research process.

Study participants expressed a variety of preferences in relation to the ways in which they engage with information and the formats in which it is presented. These findings imply that a learning environment which incorporates multiple modes of information presentation (print, video, web, graphics etc.) is more likely to accommodate the range of individual preferences and hence provide more flexibility to students in the ways they can choose to use information to learn.

5.3.3 Using Information

Students in the case studies were perceived both by themselves and their teachers as being more actively engaged with information than in traditional learning environments. This type of engagement involved students in actively constructing their own knowledge through the use of a wide range of information resources including electronic databases and web materials, and through interaction with other students. Active engagement was also encouraged through subject-based tasks, as well as discussion and critical thinking, particularly in cases A and B.

The active construction of “goals, problems, meanings, information, and criteria of success” is a feature of constructive learning environments, characterised by Collins, Greeno and Resnick (1994, p. 3298) as *communication environments*. This is contrasted with *information transmission environments*, where learners “participate in discourse through receiving information” (Collins, Greeno & Resnick 1994, p. 3298). Participants in the present study expressed the view that information tends to be used passively in traditional learning environments. The traditional lecture situation for instance, often involves the lecturer passing on information which students must record, memorise and reproduce. The ways in which students engage with information would again appear to be a function of the pedagogical design of the learning environment, and individual conceptions of learning and information.

A major positive perception of the online learning environment among the study participants was its ability to provide access to an integrated set of information resources which might include lecture notes, readings, and web resources and links. This feature of online learning environments has been highlighted in a number of other studies. Beattie and James (1997, p.192) see the major value of electronic communication technologies lying in “improved communication and access to information”. Ward and Newlands (1998, p. 178) reported that one of the most important perceived advantages of a system of computer-based lectures was “richer learning resources”, and as McPherson (2001, p.173) observes, the key terms employed to describe the technology being used to create future online learning environments are “integration and convergence”.

The ability of online learning environments to provide integrated, one-stop access to information resources does not necessarily translate into active engagement with information. In the present study, for instance, students in Case C tended to use the repository of information resources mainly to download and print lecture notes. While this provided convenience for students, the net effect was not much different from lecture notes being distributed in a traditional lecture. Similarly, the study by Ward and Newlands (1998) found that students used a computer-based system mainly to download a copy of the lecture notes, with students “replicating the conditions of a traditional lecture system” (Ward & Newlands 1998, p. 182). A majority of students in Ward and Newlands’ (1998, p.182) study also did not use recommended Internet links or conduct Internet searches for themselves. The key to encouraging active engagement with information is to make learning environments which are more interactive to stimulate learning (Ward & Newlands 1998, p. 182), and which embody a constructivist, communication view of participation rather than an information transmission view.

5.3.4 The Librarian

Librarians were not seen as an integral part of the flexible learning environment but were generally perceived in positive terms by study participants. These findings reflect some of the concerns expressed in Beagle’s (2000) study about

the marginalisation of libraries and librarians in the new learning environments. Given that the primary learning relationship is between teacher and learner, however, it is perhaps not surprising that librarians are perceived in a less prominent role.

The challenge for librarians is to engage with the new learning environments in a way that ensures that information resources are used effectively and that students gain the skills necessary to navigate a rapidly changing information environment. All three case study teachers acknowledged the expertise that librarians can provide in educating students about information, selecting resources, and in the planning and design of the information components of an academic subject. That the teachers did not avail themselves of this assistance in the case study learning environments highlights the need for librarians to take a more proactive approach to involvement in subject development and implementation. The “networked learner support” strategies identified by Fowell and Levy (1995, pp. 275-277) and Levy (2002) provide a basis for developing such programs.

As the primary designer of the learning environment, the teacher is the key to engagement in the subject design process. The findings of the present study indicate that each learning environment exhibits a unique combination of learning elements determined by the teacher, including subject content, approach to teaching, assessment methods, information resources, modes of delivery, and methods of communication. The engagement by librarians in the new learning environments could therefore benefit from a direct relationship with individual teachers which acknowledges this uniqueness. While generic library support for flexible learning programs undoubtedly has value, the subject-specific approach affords a deeper level of engagement with the learning process. This approach is of course familiar to librarians, who have long recognised the value of integrating information literacy instruction into subject curricula (Warmkessel & McCade 1997; Schilling et al. 1995).

5.4 Perspectives on Learning

5.4.1 Concepts of Learning

The main concepts or ideas expressed by study participants in relation to learning were:

- (1) Learning is constructing knowledge (acquiring new knowledge; modifying existing knowledge)
- (2) Learning is the acquisition of skills
- (3) Learning is gaining insight or understanding
- (4) Learning is challenging and questioning ideas
- (5) Learning is appreciating others' ideas or points of view

A comparison of these concepts with the six “categories of description” used by Marton, Dall'Alba and Beaty (1993) to characterise conceptions of learning, reveals correspondences as shown in *Table 6*.

| Study Participant Concepts | Marton, Dall'Alba and Beaty (1993) |
|--|-------------------------------------|
| (1) Learning is constructing knowledge | Increasing one's knowledge |
| (2) Learning is the acquisition of skills | Applying |
| (3) Learning is gaining insight or understanding | Understanding |
| (4) Learning is challenging and questioning ideas | Seeing something in a different way |
| (5) Learning is appreciating others' ideas or points of view | Seeing something in a different way |

Table 6: Concepts of Learning

Marton, Dall'Alba and Beaty's (1993, pp. 286-287) second conception, *memorising and reproducing*, was not identified as a distinct conception of learning in the present study but was seen as one of the processes involved in

learning. Marton, Dall'Alba and Beaty's (1993, pp. 292-294) sixth conception, *changing as a person*, was also not identified as a separate conception in the present study. Marton, Dall'Alba and Beaty (1993, p. 284) suggest that their first conception, *increasing one's knowledge*, "is the conception from which all the other conceptions develop" and is "both prior and superordinate to the other conceptions". This suggestion resonates with the findings of the present study, where *learning is constructing knowledge* was identified as the most frequently expressed concept of learning. The present study set out to explore concepts of learning as one phenomenon amongst a broader range of phenomena within the context of flexible learning environments, and did not seek to focus on conceptions of learning in the manner of a phenomenographic study. The isomorphism of concepts expressed by participants in the present study with findings from phenomenographic studies, however, suggests that similar conceptions are being described.

5.4.2 *The Learner and the Learning Process*

Student participants in the study exhibited a variety of approaches to learning characterised by different levels of engagement with the subject material, degree of interaction with other students, and types of learning strategies adopted. Surface and deep approaches to learning (Biggs & Telfer 1987, pp. 149-150; Ramsden 1992, pp. 38-61) were clearly evident in the study group.

Study participants identified a number of processes, activities and conditions associated with learning:

- (1) Learning through memorising
- (2) Learning through a step-by-step approach
- (3) Learning through practice
- (4) Learning through making connections
- (5) Learning through interaction with others
- (6) Learning requires interest
- (7) Learning through study activities (e.g. reading, writing notes, thinking and revising)
- (8) Learning requires certain environmental conditions

These descriptive categories indicate the variety of learning strategies adopted by participants and reflect the nature of the subject discipline, the nature of the learning environment, and individual approaches to learning. *Learning through memorising, learning through a step-by-step approach, and learning through practice* were most commonly expressed in Case C where the emphasis was on learning accounting procedures. The Case C learning environment was more practice-oriented, with regular quizzes testing understanding of concepts and processes. The practice orientation was also an element in Case B where the subject had a professional development focus. The first three categories were less commonly expressed in Case A, where there was more emphasis on *learning through making connections* and *learning through interaction with others*.

In cognitive and information processing views of learning, memory is a key component of all learning. Biggs and Telfer (1987, pp. 45-52) identify three memory systems involved in processing information: (1) the *sensory register*, in which sensory impressions are stored for very short periods of time, (2) *working memory*, involving more elaborate processing of material for longer term retention, and (3) *long-term memory*, involving the storage of processed information for later recall. Two kinds of processing take place: rehearsal and coding (Biggs & Telfer 1987, p. 51). Rehearsal is used in developing physical skills, in verbal tasks where the material has no intrinsic structure, or where the learner wishes to learn the material verbatim. Rehearsal in the latter sense is used in rote learning. Coding is used where the information has structure and the learner “has the relevant background knowledge to make use of that structure” (Biggs & Telfer 1987, p. 51). Coding thus relates new information to existing knowledge structures, and is the basis for meaningful learning. The structuring and ordering of material to be learned in the *step-by-step approach* could be seen as an example of the coding process at work.

The distinction between rote learning and meaningful learning (Ausubel 1968, pp. 107-115; 2000, pp. 53-59) is important to note within the context of the present study because participants’ recognition of the importance of memory for learning cannot always be equated with a rote learning approach.

Learning through practice has affinities with Marton, Dall'Alba and Beaty's (1993, pp. 287-288) conception of *learning as applying*, where what is learned is conceptualised as "the ability to apply some knowledge or procedure" (Marton, Dall'Alba & Beaty 1993, p. 287). Applying means "retrieving what has been learned (and stored) and using it" (Marton, Dall'Alba & Beaty 1993, p. 288). Practice and application thus involve the activation of "output processes" involving the retrieval and recall of learned material stored in long-term memory (Biggs & Telfer 1987, pp. 52-59). The concept of learning through practice also contains the notion that repetitive practice reinforces one's learning.

Learning through making connections and *learning through interaction with others* involve the relating of new information to existing knowledge structures through the coding processes typical of meaningful learning (Biggs & Telfer 1987, p. 51), either at an individual level or through the process of communication with others. Such strategies put greater emphasis on understanding rather than rote learning, and are characteristic of a deeper approach to learning.

Student approaches to learning can be characterised as either *surface* or *deep* (Biggs & Telfer 1987, pp. 149-150; Ramsden 1992, pp. 38-61). A surface approach is based on external motivation, with a focus on the demands of assessment. This approach is associated with a quantitative conception of learning (Van Rossum & Schenk 1984; Biggs 1994), using rehearsal-based procedures such as memorising discrete parts of the learning task rather than seeing it as a whole. A deep approach is based on intrinsic interest in the subject, and the intention is to understand in an holistic way, relating new knowledge to existing knowledge and meanings. This approach is associated with a qualitative conception of learning (Van Rossum & Schenk 1984; Biggs 1994). In expressing the category *learning requires interest*, study participants exhibited a deep approach, associating inherent interest in the subject with positive learning outcomes in terms of understanding and the retention of knowledge.

A range of activities, conditions and strategies associated with learning were expressed in the categories *learning through study activities* and *learning requires certain environmental conditions*. These are approach-neutral in the sense that study activities such as reading, writing notes and revising could be undertaken in either a deep or surface way.

Van Rossum and Schenk (1984) have shown that there is a strong relationship between learning conceptions, approaches to learning, and learning outcomes. Similarly, Dart et al. (2000) found strong associations between conceptions of learning and approaches to learning, and linked qualitative conceptions and deep approaches to learning with learning environments which had high levels of personalisation and the use of investigative skills and strategies. The interaction of all these factors is exhibited in the present study. The differing combinations and emphases of the conceptual categories expressed by participants in the three case studies indicate that the nature of the subject discipline and the pedagogical design of the learning environment may have an influence on the learning strategies used by students, and can encourage a deep or surface approach to learning.

5.4.3 Information, Learning and Knowledge

In expressing their perceptions of the ways in which they use information to learn and to know, participants exhibited a strongly cognitive view of these phenomena. The processes identified by participants in using information to learn and to construct knowledge included:

- (1) Engaging with information
- (2) Absorbing information
- (3) Sorting information
- (4) Analysing and evaluating information
- (5) Synthesising information
- (6) Storing information
- (7) Applying information

While these can largely be thought of as cognitive processes, they may also have behavioural dimensions, such as the behaviours associated with engaging with, and applying, information.

These processes can be further grouped to highlight the various phases of information use in relation to phases of learning. Processes (1) and (2) can be thought of as *perceiving and receiving information*; processes (3), (4) and (5) as *processing information*; and processes (6) and (7) as *storing and applying information*. These groupings have correspondences with Shuell's (1990, pp. 541-543) phases of meaningful learning, and Biggs and Telfer's (1987, pp. 45-59) input and output stages of the learning process. *Table 7* illustrates these correspondences.

| Study Participant Concepts | Shuell (1990, pp. 541-543) | Biggs and Telfer (1987, pp. 45-59) |
|--|--|--|
| <i>Perceiving and Receiving Information</i> (1) Engaging with information (2) Absorbing information | <i>Initial Phase</i> Encountering facts and pieces of information that are isolated conceptually | <i>Attending</i> Scanning of input via the sensory register |
| <i>Processing Information</i> (3) Sorting information (4) Analysing and evaluating information (5) Synthesising information | <i>Intermediate Phase</i> Seeing similarities and relationships among conceptually isolated pieces of information | <i>Processing</i> Rehearsal and coding of information to ensure long-term retention |
| <i>Storing and Applying Information</i> (6) Storing information (7) Applying information | <i>Terminal Phase</i> Knowledge structures and schemata become better integrated and function more autonomously | <i>Storing</i> Input processed and available for recall (output process) |

Table 7: Phases of the Learning Process

Kuhlthau (1993) makes similar links to educational theory in seeing parallels between phases of learning identified by Dewey (1933), Kelly (1963) and

Bruner (1986), and stages of the information search process. Her elucidation of Bruner’s work (Kuhlthau 1993, pp. 23-31), in which she identifies the “interpretative task” as “central to the constructive process”, identifies five phases and associated definitions as illustrated in *Table 8*.

| Phase | Definition |
|-------------------|------------------------------------|
| <i>Perception</i> | Encountering new information |
| <i>Selection</i> | Recognizing patterns |
| <i>Inference</i> | Joining clusters and categories |
| <i>Prediction</i> | Going beyond the information given |
| <i>Action</i> | Creating products of the mind |

Table 8: Phases in Bruner’s Interpretative Task (Kuhlthau 1993, p. 25)

These phases and their associated definitions bear a clear resemblance to the phases and processes identified in the current study. Bruner’s perception phase is analogous to the processes of engaging with and absorbing information; the selection, inference and prediction phases are analogous to the cognitive processes of sorting, analysing, and synthesising information; and the action phase is analogous to the process of applying information.

The findings in relation to the phases of information use associated with learning can thus be situated within a rich, well-established theoretical and empirical framework. The present study has identified these phases and processes based on participant perceptions of their own cognitive activities. Further research will be necessary to confirm these descriptive categories across a wider sample population to ensure that they are exhaustive and representative. Some preliminary suggestions can be made, however, about the applicability of these findings to library and information services.

The identification of phases of information use in relation to learning could have important implications for the practice of librarianship, particularly in relation to the conduct of the reference interview, the development of information literacy programs, and the design of information services. Kuhlthau (1993, pp. 128-154) explores the role of librarians as mediators in the information seeking process, based on the perceived needs of users for assistance in access to resources and guidance in the “process of construction” (Kuhlthau 1993, p. 133). She distinguishes between “information-related mediation” which assists with access to information, and “process-related mediation” which assists with “learning from the use of information” (Kuhlthau 1993, p. 134). In relation to reference services, Kuhlthau (1993, pp. 137-145) identifies five levels of mediation: Level 1, the Organizer; Level 2, the Locator; Level 3, the Identifier; Level 4, the Advisor; and Level 5, the Counselor. In relation to the librarian’s educational or instructional role, she identifies five levels of education: Level 1, the Organizer; Level 2, the Lecturer; Level 3, the Instructor; Level 4, the Tutor; and Level 5, the Counselor (Kuhlthau 1993, pp. 145-154). A knowledge of the phases of information use in relation to learning identified in the current study could inform these roles and enable the development of resources and services which are more finely tuned to the information and learning needs of individuals and groups.

An understanding of the phases of perceiving and receiving information (involving engaging with, and absorbing, information), processing information (involving sorting, analysing, evaluating and synthesising information), and storing and applying information, as identified in the present study, could provide the basis for a framework to guide the design of information resources and services. In the context of the reference interview, for example, the framework could be used to assess the learner’s position in relation to the phases of information use and to guide appropriate responses. In the case of the design of instructional programs such as face-to-face workshops or online tutorials, these phases could be built into the structure of the program to provide students with a graded experience which would model the process of using information to learn. At a broader level, the phases framework could also be used to guide the design of the information resources component of

constructivist learning environments, as in Jonassen's (1999, pp. 230-236) model incorporating the instructional activities of modeling, coaching and scaffolding.

Chapter 6

Conclusions and Implications

6.1 Introduction

The present study has been exploratory in nature, seeking to understand the perspectives of teachers and learners in relation to information and learning within the context of a flexible learning environment. As such, the findings of the study are suggestive of ways in which libraries and librarians might be more fully engaged in the learning process. Section 6.2 of this chapter presents the main conclusions of the study and explores the implications of these for academic libraries and information services. The chapter concludes with recommendations for further research in Section 6.3.

6.2 Conclusions and Implications

The study conclusions are derived from the analysis and discussion of case study findings. The typicality of the case studies, and the transferability of the findings and conclusions to other contexts and learning environments, will be a judgement made by others in relation to their own situations. As the study conclusions have been based on case studies at the University of Wollongong, the strongest implications will be for the University of Wollongong Library. The implications are stated in a sufficiently general way, however, to ensure that their transferability to other contexts can be assessed. The implications also suggest a number of strategies for action, and confirm many of the directions that libraries are already taking in response to flexible learning.

The four main conclusions of the study are presented below, together with a discussion of their implications. The first two conclusions and associated implications are largely concerned with a change in conceptual approach which reconceives the role of information, and hence libraries and librarians, in the learning process. The last two conclusions are concerned more specifically with flexible and online learning environments, and the roles that librarians might play in the design and provision of information resources and services.

Conclusion 1

The ways in which information and learning are conceived are central to understanding information use as part of learning, or emerging learning processes.

The study findings indicate that there are significant relationships between the ways in which teachers and learners conceive of information and learning, and the ways in which they think about and use information as part of the learning and teaching process. From the student perspective, the variety of factors that can influence the way information is used as part of the learning process lie along continua that include active versus passive engagement with information, quantitative/surface versus qualitative/deep approaches to learning, the skills acquisition versus knowledge acquisition aspects of learning, factual versus critical and interpretative views of information, and the creation of communication versus information transmission learning environments.

From a teacher's perspective, the ways in which he or she conceives of information and learning have a profound influence on the way in which the learning environment is constructed, which in turn influences student approaches to information and learning. All of the factors elucidated above in relation to the student perspective can in large part be manipulated by the teacher through pedagogical design.

If libraries and librarians are to be more deeply engaged with the learning process, several implications follow. Librarians must develop an awareness and understanding of the various perspectives on information and learning and how these may affect learning outcomes. This could be achieved both through the formal education process and through ongoing profession development. Some of the findings and conceptual linkages explored in this thesis, such as those between the cognitive view in information science and cognitive conceptions of learning, could provide a useful starting point for such programs. As far as possible, library programs and services should endeavour to encourage active engagement with information, qualitative/deep approaches to learning, and critical and interpretative thinking, and create communication environments in

which information is used as part of an active process of constructing knowledge. Such an approach could be applied at the individual, context-specific level of the reference interview, or more broadly at the level of subject-based and generic information literacy programs.

Conclusion 2

There are a number of identifiable processes or phases involved in using information to learn and to construct knowledge. These processes include perceiving and receiving information, processing information, and storing and applying information.

The phases of information use associated with learning, as identified in the present study, provide a framework for understanding how information resources and services might better be used to support learning. Interventions and mediations by librarians, such as through the traditional face-to-face reference interview, could benefit from an understanding of these phases. Is the student at the initial phase of gathering and absorbing information, involved in processing information to evaluate its relevance, or engaged in storing references in a computer-based bibliographic management program? The larger orientating frame of the phases of information use associated with learning should allow the librarian to see the reference interview as part of the larger learning process. Similarly, the application of the phases framework to information literacy programs, both face-to-face and online, could assist in structuring programs which model the learning process more closely, particularly if these programs are extended over a period of time with the same group of students.

The phases framework also provides a means for making judgements about the most appropriate resources to be used at particular phases of learning and information use. Catalogues, databases and search strategies are appropriate information tools and techniques for gathering information. Different tools, such as citation indexes, may be required for analysing and evaluating information. The application of the phases framework might also simply involve the asking of questions such as “How do you plan to use this information?”, “What stage are

you at in writing your essay?”, or “What resources have you already used?” while keeping the framework in mind.

Conclusion 3

The integration of information resources and communication mechanisms within a single, easily accessible location is a major benefit of the online learning environment.

The study findings confirm the importance of the movement towards online integration at various levels currently occurring in libraries and universities, and the impact this has on the student learning experience. From a student perspective, the integration of information resources and communication mechanisms was seen as providing time and place flexibility, and ease of access to resources. These perceptions have implications for the ways in which libraries (1) provide access to resources and communicate with clients in the online environment, (2) create linkages with online learning environments, and (3) integrate their systems with other online systems at the institutional level.

With the rapidly increasing availability of digital information from both commercial providers and the open access web, the challenge for libraries is to organise relevant information in such a way that it is easily accessible, navigable, and retrievable. The design of the online library interface is thus critical to making information accessible and ensuring that the resources to which libraries subscribe, often at considerable expense, are actually used by students as part of their learning. The development of online facilities such as customised portals and meta search engines can be seen as part of this process of making information more accessible, integrated, and manageable.

The online environment provides opportunities for libraries to communicate with their clients in ways which supplement and extend traditional face-to-face assistance and provide flexibility by offering multiple modes of communication. A range of communication tools such as asynchronous email, synchronous chat, and videoconferencing are currently being developed and used by libraries. These new modes of communication may require some rethinking of

the best ways to achieve effective librarian-to-client communication, as well as learning to use these tools to encourage active engagement with information and to provide timely, point-of-need assistance in the use of information resources. To achieve useful integration between communication and information access functions, the links between communication channels and online information resources must be clearly articulated in library interface design.

The relationship between library systems and other online systems related to student learning, particularly with learning management systems such as WebCT, is crucial to the creation of an integrated online information and learning environment. The incorporation of library information resources and communication services into online subjects can be achieved through the establishment of generic and subject-based links, developed by librarians in consultation with the subject coordinator. The cross-institutional integration of online systems such as the library, learning management, and student administration is important for ensuring that the student learning experience is as seamless as possible. There is a danger of creating parallel systems, potentially resulting in inefficient duplication or under utilisation of resources. Technically, such integration requires systems interoperability and compliance with data transfer standards so that data can be transferred easily between the various institutional functions.

Conclusion 4

The design of the flexible learning environment influences student approaches to learning and the use of information and learning resources.

The central learning relationship is between teacher and student. As the primary designer of the learning environment, the teacher is the key influence in determining how students approach learning and conceptualise and use information. In the present study, librarians were perceived positively as facilitators of access to information, but were not perceived as integral to the flexible learning environment. Librarians can have a more participatory role by building on the positive perceptions of their role as facilitators of access to

information. The study findings indicate that librarians need to raise their profile and become more actively engaged in the design and development of flexible learning environments. This may involve librarians in more political roles.

The findings suggest a number of roles for librarians, building on relationships with teachers, students, the information environment, and the broader institutional and political environment. Roles for librarians might include those as (1) participants in collaborative partnerships with teachers, (2) guides and facilitators of student learning and information literacy, (3) designers of information environments, and (4) advocates for the incorporation of information resources and services into flexible learning environments.

If librarians are to influence the way that information is used in flexible learning environments, then strong collaborative partnerships with individual teachers must be cultivated. While generic, faculty or discipline-based approaches to collaboration have undoubted value, the findings of this study indicate that a relationship at the individual teacher level is essential for integrating information resources and services more deeply into the learning process.

Roles for librarians in the design of flexible learning environments may include selection and evaluation of appropriate information resources, design of information literacy components, and assisting students with information seeking. In this sense, librarians can act as flexible learning design consultants or as designers of more generic suites of online resources and services such as online tutorials, collections of high quality subject-based web links, and email reference and chat services which can be linked to individual online learning environments. These design roles must be actively promoted, and ways sought to showcase what the library can do to further the pedagogical aims of the teacher and enhance the student learning experience.

In collaboration with other professionals such as architects and web designers, librarians have an important role to play in designing information environments which actively engage learners. Flexibility, in the sense of catering for the individual needs of learners, will be an important component of these

environments, accommodating individual learning styles and adopting a range of information presentation formats. True flexibility in learning requires the provision of multiple media and modes of communication to engage with the range of student preferences, and it will be a challenge for libraries to provide the full range of options in both face-to-face and online environments.

More broadly, libraries themselves can be conceived of as learning environments, both physically and virtually, and librarians seen as the primary designers of these environments. The physical design of libraries can be seen as an opportunity to create open and responsive environments which actively engage users of information. This broad aim can be translated into the way in which physical collections are presented and displayed, the way that library staff engage with clients, the range of facilities and equipment provided, and the types of spaces for individual and collaborative work. Similarly, the virtual environment can be designed in such a way as to encourage active engagement and integration with other online learning activities.

The findings of the study have thus highlighted the opportunities that librarians might explore in developing their roles as active collaborators and participants in the creation and implementation of flexible learning environments, and in presenting information as an essential component of all learning.

6.3 Further Research

The present study represents an initial exploration of perspectives on information and learning expressed by teachers and learners participating in flexible learning environments. Some of the findings, especially those concerned with concepts of information, concepts of learning, and the information use processes associated with learning, may be applicable to the broader learning context. The research project has touched upon areas where current knowledge appears to be limited, suggesting worthwhile avenues for further research. In particular, the current understanding of conceptions of information, and the correlations between conceptions of information and approaches to learning, would benefit from further study.

The study findings in relation to perspectives on information expressed by ordinary users of information reflect the typologies of concepts of information developed in a largely *a priori* way within information science and related academic disciplines. A study of conceptions of information from the user's point of view would have value in clarifying the variety of ways that information is conceived, and assist in developing the theoretical and empirical base for understanding the relationships between conceptions of information and approaches to learning. Just as phenomenographic studies have illuminated conceptions of learning, so too a larger scale phenomenographic study of conceptions of information would enable librarians and researchers to make more informed statements about information and its relationship to learning, and provide a useful framework for ongoing empirical studies within library and information science.

The study has provided a picture of teacher and student perspectives at a significant point in the development of flexible learning at the University of Wollongong. It forms a conceptual and methodological basis for further studies across a range of learning environments and contexts, which could contribute to creating a richer store of empirical data for building substantive theory in library and information science. As flexible learning environments develop and become more embedded in mainstream education, ongoing longitudinal studies could also assist in mapping potential shifts in participant perspectives on information and learning.

Appendices

Appendix A: Key Case Study Questions

| Case Study Element | Key Questions |
|---|---|
| The Context | |
| <i>Institutional context</i> | What are the relevant educational policies and documents? |
| <i>The flexible learning environment</i> | What forms of flexibility does the learning environment exhibit? What forms of communication and information technologies are used? |
| <i>Participant demographic and behavioural data</i> | What are the age, gender and mode of study of participants? What are their patterns of information use and communication? |

| Case Study Element | Key Questions |
|---|---|
| Areas of Research Interest Associated with Learning | |
| <i>Nature and characteristics of learning</i> | What does 'learning' mean to you? |
| <i>Nature and characteristics of flexible learning</i> | What does 'flexible learning' mean to you? |
| <i>Nature and characteristics of the flexible learning environment</i> | In what ways is this subject flexible? |
| <i>Role and characteristics of the teacher</i> | What is the role of the teacher? How do you perceive the teacher? |
| <i>Role and characteristics of the learner</i> | What is the role of the learner? How do you perceive the learner? |
| <i>Process of learning</i> | How do you learn? |
| <i>Methods of communication used in the flexible learning environment</i> | What methods of communication do you use in this subject? |

| Case Study Element | Key Questions |
|--|---|
| <i>Areas of Research Interest Associated with Information</i> | |
| <i>Nature and characteristics of information</i> | What does 'information' mean to you? |
| <i>Relationship between information and learning</i> | How do you use information to learn? |
| <i>Relationship between information and knowledge</i> | How does information help you to know? |
| <i>Methods of presenting information</i> | What methods of information presentation do you find most effective? |
| <i>Using information resources and services</i> | Which information resources and services do you use? |
| <i>Role and characteristics of the librarian</i> | What is the role of the librarian? How do you perceive the librarian? |

Appendix B: Case Study Procedure

Case Study Procedure

Step 1: Selection of Cases

Contact subject coordinator; outline purpose and methods of study; request participation of coordinator and students; agree on scheduling of meetings and interviews; request subject documentation

Step 2: First Interview with Subject Coordinator

Administer teacher questionnaire; conduct interview; record on audio tape; take notes; transcribe interview data

Step 3: Document Review

Gather relevant documentation; develop description of the context and flexible learning environment; clarify with subject coordinator if required

Step 4: Selection of Student Participants

Meet or communicate with students (with support of subject coordinator) regarding their participation in the study; request volunteers to be interviewed; arrange times to conduct interviews

Step 5: Second Interview with Subject Coordinator

Conduct interview; record on audio tape; take notes; transcribe interview data

Step 6: Interviews with Students

Administer student questionnaire; conduct interview; record on audio tape; take notes; transcribe interview data

Step 7: Data Analysis

Review and summarise contextual data; analyse questionnaire data; analyse interview transcripts

Step 8: Report on Case Study Findings

Synthesise findings from contextual analysis, questionnaire analysis and interview analysis

Appendix C: Questionnaires

FLEXIBLE LEARNING STUDY

TEACHER QUESTIONNAIRE

Faculty

Subject

Gender Male Female
Age 18-21 22-25 26-30 31-35 36-40
 41-45 46-50 51-55 56-60 61-65
 66+

1. What information resources did you use in preparing and presenting this subject?
Please tick appropriate boxes.

- Printed Subject Notes and Readings
- Books
- Printed Journals
- Electronic Journals
- Videos
- Audiotapes
- Multimedia CD ROMs
- Electronic Databases
- World Wide Web
- Other (please specify)

.....

2. How would you rank these information resources in order of importance for this subject? Please place a number in the appropriate box (1 = most important, 10 = least important).

- Printed Subject Notes and Readings
- Books
- Printed Journals
- Electronic Journals
- Videos
- Audiotapes
- Multimedia CD ROMs
- Electronic Databases
- World Wide Web
- Other (please specify)

.....

3. How would you rate your knowledge of information resources and services in your subject area?

poor below average average above average excellent

4. Have you used the University Library in preparing and presenting this subject?

- Yes No

If yes, how often have you used the Library in preparing and presenting this subject?

- daily every few days weekly fortnightly monthly occasionally

5. Have you used other libraries or information services in preparing and presenting this subject?

- Yes No

If yes, please indicate which ones:

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

6. In presenting this subject, which methods of communication did you use to communicate with your students?

- Direct, face-to-face communication
- Telephone
- Email
- Fax
- Mail
- Videoconferencing
- Other (please specify)

.....

7. How would you rank these methods of communication in order of importance for you in presenting this subject? Please place a number in the appropriate box (1 = most important, 7 = least important).

- Direct, face-to-face communication
- Telephone
- Email
- Fax
- Mail
- Videoconferencing
- Other (please specify)

.....

FLEXIBLE LEARNING STUDY

STUDENT QUESTIONNAIRE

Faculty

Subject

Level of Study Undergraduate Postgraduate

Mode of Study Full-Time Part-Time

Gender Male Female

Age 18-21 22-25 26-30 31-35 36-40

41-45 46-50 51-55 56-60 61-65

66+

1. What information resources did you use in studying this subject? Please tick appropriate boxes.

- Printed Subject Notes and Readings
- Books
- Printed Journals
- Electronic Journals
- Videos
- Audiotapes
- Multimedia CD ROMs
- Electronic Databases
- World Wide Web
- Other (please specify)

.....

2. How would you rank these information resources in order of importance for you in this subject? Please place a number in the appropriate box (1 = most important, 10 = least important).

- Printed Subject Notes and Readings
- Books
- Printed Journals
- Electronic Journals
- Videos
- Audiotapes
- Multimedia CD ROMs
- Electronic Databases
- World Wide Web
- Other (please specify)

.....

3. How would you rate your knowledge of information resources and services in your subject area?

- poor below average average above average excellent

4. Have you used the University Library in studying this subject?

- Yes No

If yes, how often have you used the Library in studying this subject?

- daily every few days weekly fortnightly monthly occasionally

5. Have you used other libraries or information services in studying this subject?

- Yes No

If yes, please indicate which ones:

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

6. In communicating with your teachers(s) and other students, which methods of communication did you use in studying this subject?

- Direct, face-to-face communication
 Telephone
 Email
 Fax
 Mail
 Videoconferencing
 Other (please specify)

.....

7. How would you rank these methods of communication in order of importance for you in this subject? Please place a number in the appropriate box (1 = most important, 7 = least important).

- Direct, face-to-face communication
 Telephone
 Email
 Fax
 Mail
 Videoconferencing
 Other (please specify)

.....

Appendix D: Interview Questions

FIRST INTERVIEW WITH TEACHERS

1. What does 'learning' mean to you? Are there any particular learning theories that you subscribe to?
2. How do you see your role as a teacher in this subject? (What is your 'job' as a teacher?)
3. How does your view of learning affect your view of teaching in this subject?
4. What do you think 'flexible learning' is?
5. In what ways is your subject 'flexible'?
6. What knowledge and skills do you assume your students have prior to enrolling in this subject, and what knowledge and skills should they have when they have completed the subject?
7. What images or thoughts come to mind when you think of your students as learners in this subject?
8. What types of information and communication technologies are used in this subject?
9. How do you communicate (both in a technical sense and as a philosophical approach to communication) with your students in this subject? Do you have any preferred methods of communication?
10. What information resources and services do you expect students to use, and what information resources are provided (books of readings, videos, Web sites etc.) in this subject?
11. In relation to students' knowledge of information resources and services, and their information skills, what level of understanding do you assume students have when they start this subject? What level of understanding do you expect students will have when they complete this subject?

SECOND INTERVIEW WITH TEACHERS

You've just completed a questionnaire, do you have any questions arising from this or is there anything further you'd like to add?

I'd like to ask you some questions about how you think about and use information. Some of the questions may be a little abstract, so please don't hesitate to ask for clarification or specific examples. There will also be time at the end of the interview to expand on anything that you feel was not sufficiently covered or explained earlier in the interview.

1. What do you think of when you hear the word 'information'? (What does the concept 'information' mean to you?)
2. How do you engage with information to learn?
3. How do you see your students engaging with information to learn?
4. In your view, how does information help you to know?
5. How do you present information in your teaching, and what in your view are the most effective methods of presentation?
6. Flexible learning environments are often distinguished from traditional learning environments (examples). Do you think information is used differently in a flexible learning environment than in a traditional learning environment? If so, in what ways?
7. How do you use information resources and/or services to assist your teaching in this subject?
8. What picture do you have of the information resources and services available to you through the University Library? At other libraries/institutions?
9. What communication, if any, have you had with librarians in the planning and presentation of this subject?
10. When you think about librarians, what kind of images come to mind?
11. Are you aware of any support that librarians can provide in the planning or presentation of a flexible learning subject?
12. How satisfied are you with the information resources and/or services available to you for this subject? How might availability be improved? Are there additional resources you might require for this subject?
13. Think of a time when you required information in the course of planning or presenting this subject. Can you describe the situation? What was required? How did you go about fulfilling this need? Who was involved?

Is there anything you would like to add, or to clarify, in relation to what we have discussed?

INTERVIEW WITH STUDENTS

You've just completed a questionnaire, do you have any questions arising from this or is there anything further you'd like to add?

I'd now like to ask you some questions about the subject you are studying, and how you think about and use information. Some of the questions may be a little abstract, so please don't hesitate to ask for clarification or specific examples. There will also be time at the end of the interview to expand on anything that you feel was not sufficiently covered or explained earlier in the interview.

1. What does 'learning' mean to you?
2. What do you think 'flexible learning' is?
3. In what ways is this subject 'flexible'?
4. How do you see your role as a learner in this subject? (What is your 'job' as a student?)
5. What images come to mind when you think of your teacher(s) in this subject?
6. What have you learnt and what do you hope to learn in this subject? (Any particular intellectual and technical skills?)
7. How do you prefer to study?
8. This subject is described as being 'flexible'. In what ways do you find studying in this subject different from that of a more traditionally presented subject?
9. How do you communicate with your teacher and other students in this subject? Do you have any preferred methods of communication?
10. What do you think of when you hear the word 'information'? (What does the concept 'information' mean to you?)
11. Could you describe how you see yourself interacting with information in order to learn?
12. Think of a situation in which your learning was effective. Describe the situation. How did you use information to learn in this situation?
13. In your view, how does information help you to know?
14. What methods of information presentation do you find most effective in helping you to learn?
15. Flexible learning environments are often distinguished from traditional learning environments (examples). Do you think you use information differently in a flexible learning environment than in a traditional learning environment? If so, in what ways?
16. How do you use information resources and/or services to assist your learning in this subject?
17. What picture do you have of the information resources and services available to you through the University Library? At other libraries/institutions?

18. What communication, if any, have you had with librarians in studying this subject?

19. When you think about librarians, what kind of images come to mind?

20. Are you aware of any support that librarians can provide to you in studying a flexible learning subject?

21. How satisfied are you with the information resources and/or services available to you for this subject? How might availability be improved? Are there additional resources you might require for this subject?

22. Think of a time when you required information in the course of studying this subject. Can you describe the situation? What was required? How did you go about fulfilling this need? Who was involved?

Is there anything you would like to add, or to clarify, in relation to what we have discussed?

Appendix E: Conceptual Categories and Themes (Examples from Case B)

CONCEPTUAL CATEGORY

INTERVIEW TRANSCRIPT STATEMENTS

**LEARNING IS CONSTRUCTING
KNOWLEDGE
(BT, BS1, BS5)
n=3
[Common Concept]**

When someone learns - um - I think they're taking on board new information, and that new information may either go into an empty receptacle area because there was no information about that particular issue previously, or it's modifying an existing bank of information, so it could be challenging current levels of info - of knowledge about a particular issue and adding to that and modifying it in some way, but certainly at University you will probably have a mixture of both and depending on the level of the student and the topic that mixture will be skewed one way or the other. So at Undergrad level, particularly in the earlier years you're predominantly providing more information to people to use, but of course some of that information will be adapted in relation to related knowledge banks, but it's probably dominated by new information about fields that they're interested in, whereas as people get students get, our older students and more advanced study will probably doing less of that and more of the modifying the existing knowledge bank and how people use that knowledge bank in their work lives, day-to-day lives and so on. (BTA: 42-58)

I: what do you think of when you hear the word learning?

BS1: Knowledge.

I: Knowledge?

BS1: um just increasing your knowledge basically. (BS1: 27-33)

I guess you're finding out new things or building on what you already know or maybe - sort of changing something that you thought you knew (BS5: 36-38)

CONCEPTUAL CATEGORY

INTERVIEW TRANSCRIPT STATEMENTS

**LEARNING IS THE ACQUISITION
OF KNOWLEDGE AND SKILLS
(BT, BS2, BS3, BS4)
n=4
[Common Concept]**

learning is taking on board new knowledge and applying that knowledge in a meaningful way (BTA: 25-26)

as I was saying with the learning there were two main areas, one of which was taking on board new knowledge, the other aspect was assimilating new knowledge with existing knowledge and trying to work out a fit basically - um and obviously using that knowledge in a whatever life-way they need to (BTA: 169-174)

Well certainly it is an approach, but within that approach there are some particular skill areas and there are also some knowledge areas - um - though the knowledge can be - it's knowledge of what types of things should, should they be cognisant of and where to get to the information about that from, rather than them regurgitating that knowledge, so in terms of monitoring and surveillance of public health nutrition issues, what sorts of questions do they need to ask, what sorts of indicators do they need to look for, where they can look for those indicators, and when they find those indicators how do they determine which ones are important and which ones are not important, then once they have got that package together the second half of the subject actually looks at - Well what do we do about that" and it's not necessarily what to - they just do about that, as a, as a professional in their own right, but it's also how do they work with community groups? How do they use their position of influence to influence policy decisions and so on, so it's not just a service delivery model, it's looking at their, the - um - circles of influence that they have in their own right and the status that they hold in the community, and how that can be used to influence decisions which then will impact on nutrition related matters. (BTA: 308-327)

I think it's - um - where I increase my knowledge in a particular area and know how to use that knowledge in the future - um - yeah so it's important that the knowledge is useful and - um - yeah I think the practical side of it is quite important - like you knowing how to apply into my future work or life. (BS2: 25-29)

I think it's just increasing your basic knowledge as well as developing skills in how to think. (BS3: 22-23)

You are gaining new skills, and new knowledge, perhaps better ways of doing things. (BS4: 32-33)

Try actually trying to put it into practice, yeah it's like trying to absorb what it is absorbing the content, see how it could benefit me down the track, actually in my worklife and in using the information actually. (BS4: 44-47)

CONCEPTUAL CATEGORY

INTERVIEW TRANSCRIPT STATEMENTS

**LEARNING IS CHALLENGING
AND QUESTIONING IDEAS
(BS3)
n=1
[Student Concept]**

and also I think there's critical thinking why something is - you know - why it's said and it's there in that fashion, that type of thing and basically just trying to work out what the whole thing is (BS3: 30-32)

Case B

THEME 1: CONCEPT OF LEARNING

**LEARNING IS CONSTRUCTING
KNOWLEDGE
(BT, BS1, BS5)
n=3
[Common Concept]**

**LEARNING IS THE
ACQUISITION OF KNOWLEDGE
AND SKILLS
(BT, BS2, BS3, BS4)
n=4
[Common Concept]**

**LEARNING IS CHALLENGING
AND QUESTIONING IDEAS
(BS3)
n=1
[Student Concept]**

Bibliography

Allen, BA 1991, 'Cognitive research in information science: implications for design', *Annual Review of Information Science and Technology*, vol. 26, pp. 3-37.

Arfield, J 1994, 'Flexible learning and the library', in Wade, W, Hodgkinson, K, Smith, A & Arfield, J (eds.), *Flexible learning in higher education*, Kogan Page, London, pp. 68-75.

Ausubel, DP 1968, *Educational psychology: a cognitive view*, Holt, Rinehart and Winston, New York NY.

Ausubel, DP 2000, *The acquisition and retention of knowledge: a cognitive view*, Kluwer, Dordrecht.

Babbie, E 1995, *The practice of social research*, 7th edn., Wadsworth Publishing Company, Belmont CA.

Barlow, JP 1994, 'A taxonomy of information', *Bulletin of the American Society for Information Science*, vol. 20, no. 5, pp. 13-17.

Barone, CA & Luker, MA 2000, 'The role of advanced networks in the education of the future', in Luker, MA (ed.), *Preparing your campus for a networked future*, Jossey-Bass, San Francisco CA.

Bassey, M 1999, *Case study research in educational settings*, Open University Press, Buckingham.

Beagle, D 2000, 'Web-based learning environments: do libraries matter?', *College and Research Libraries*, vol. 61, no. 4, pp. 367-379.

Beattie, K & James, R 1997, 'Flexible coursework delivery to Australian postgraduates: how effective is the teaching and learning?', *Higher Education*, vol. 33, no. 2, pp. 177-194.

Beckett, D 1998, 'Disembodied learning: how flexible delivery shoots higher education in the foot: well, sort of', *Electronic Journal of Sociology*, vol. 3, no. 3. URL: <http://www.sociology.org> [Accessed 23 October 2003]

Behrens, SJ 1993, 'Obstacles to user education for off-campus students: lecturers' attitudes to library skills', in Jacob, CJ (ed.), *The sixth off-campus library services conference proceedings*, Central Michigan University, Mount Pleasant MI, pp. 11-23.

Behrens, SJ 1994, 'A conceptual analysis and historical overview of information literacy', *College and Research Libraries News*, vol. 55, no. 4, pp. 309-322.

Belkin, NJ 1978, 'Information concepts for information science', *Journal of Documentation*, vol. 34, no. 1, pp. 55-85.

Belkin, NJ 1984, 'Cognitive models and information transfer', *Social Science Information Studies*, vol. 4, pp. 111-129.

Belkin, NJ 1990, 'The cognitive viewpoint in information science', *Journal of Information Science*, vol. 16, no. 1, pp. 11-15.

Belkin, NJ, Oddy, RN & Brooks, HM 1982a, 'ASK for information retrieval: part I. Background and theory', *Journal of Documentation*, vol. 38, no. 2, pp. 61-71.

Belkin, NJ, Oddy, RN & Brooks, HM 1982b, 'ASK for information retrieval: part II. Results of a design study', *Journal of Documentation*, vol. 38, no. 3, pp. 145-164.

Biggs, JB 1987, *Student approaches to learning and studying*, Australian Council for Educational Research, Hawthorn VIC.

Biggs, JB 1994, 'Student learning research and theory: where do we currently stand?', in Gibbs, G (ed.), *Improving student learning: theory and practice*, Oxford Centre for Staff Development, Oxford, pp. 1-19.

Biggs, JB & Telfer, R 1987, *The process of learning*, 2nd edn., Prentice-Hall, Sydney.

Bloom, BS (ed.) 1964, *Taxonomy of educational objectives: the classification of educational goals*, D. McKay Co., New York NY.

Bodi, S 1988, 'Critical thinking and bibliographic instruction: the relationship', *The Journal of Academic Librarianship*, vol. 14, no. 3, pp. 150-153.

Bodi, S 1992, 'Collaborating with faculty in teaching critical thinking: the role of librarians', *Research Strategies*, vol. 10, no. 2, pp. 69-76.

Bodi, S 1995, 'Scholarship or propaganda: how can librarians help undergraduates tell the difference?', *The Journal of Academic Librarianship*, vol. 21, no. 1, pp. 21-25.

Brabazon, T 2002, *Digital hemlock: Internet education and the poisoning of teaching*, UNSW Press, Sydney.

Broadus, RN 1990, 'The range of subject literatures used by humanities scholars', *Collection Management*, vol. 12, no. 1/2, pp. 61-68.

Brookes, BC 1980, 'The foundations of information science. Part I. Philosophical aspects', *Journal of Information Science*, vol. 2, pp. 125-133.

Bruce, C 1997, *The seven faces of information literacy*, Auslib Press, Adelaide.

Bruce, CS & Candy, PC 1995, 'Developing information literate graduates: prompts for good practice', in Booker, D (ed.), *The learning link: information literacy in practice*, Auslib Press, Adelaide, pp. 245-253.

Bruner, J 1986, *Actual minds, possible worlds*, Harvard University Press, Cambridge MA.

Bruner, J 1990, *Acts of meaning*, Harvard University Press, Cambridge MA.

Buckland, M 1991, *Information and information systems*, Greenwood Press, Westport CT.

Burke, L 2002, 'The future role of librarians in the virtual library environment', *The Australian Library Journal*, vol. 51, no. 1, pp. 31-45.

Caladine, R 1999, *Teaching for flexible learning: learning to apply the technology: MOLTA*, GSSE, Abergavenny, Monmouthshire.

Candy, PC 1991, *Self-direction for lifelong learning: a comprehensive guide to theory and practice*, Jossey-Bass, San Francisco CA.

Candy, PC, Crebert, G & O'Leary, J (eds.) 1994, *Developing lifelong learners through undergraduate education*, Australian Government Publishing Service, Canberra.

Charmaz, K 2000, 'Grounded theory: objectivist and constructivist methods', in Denzin, NK & Lincoln, YS (eds.), *Handbook of qualitative research*, 2nd edn., Sage Publications, Thousand Oaks CA, pp. 509-535.

Clark, J & Store, R 1998, 'Flexible learning and the library: the challenge', *The Journal of Library Services for Distance Education*, vol. 1, no. 2.

URL: <http://www.westga.edu/~library/jlsde/jlsde1.2.html> [Accessed 9 May 2003]

Collins, A, Greeno, JG & Resnick, LB 1994, 'Learning environments', in Husén, T & Postlethwaite, TN (eds.), *The international encyclopedia of education*, 2nd edn., Pergamon, Oxford, pp. 3297-3302.

Collis, B & Moonen, J 2001, *Flexible learning in a digital world: experiences and expectations*, Kogan Page, London.

Crawford, W & Gorman, M 1995, *Future libraries: dreams, madness and reality*, American Library Association, Chicago IL.

Creswell, JW 1998, *Qualitative inquiry and research design: choosing among five traditions*, Sage Publications, Thousand Oaks CA.

Darby, J 2002, 'Networked learning in higher education: the mule in the barn', in Steeples, C & Jones, C (eds.), *Networked learning: perspectives and issues*, Springer-Verlag, London, pp. 17-26.

Dart, BD, Burnett, PC, Purdue, N, Boulton-Lewis, G, Campbell, J & Smith, D 2000, 'Students' conceptions of learning, the classroom environment, and approaches to learning', *The Journal of Educational Research*, vol. 93, no. 4, pp. 262-270.

De Mey, M 1977, 'The cognitive viewpoint: its development and its scope', in De Mey, M (ed.), *International workshop on the cognitive viewpoint*, University of Ghent, Ghent.

Debons, A 1988, *Information science: an integrated view*, G. K. Hall, Boston MA.

Denzin, NK & Lincoln, YS 2000, 'Introduction: the discipline and practice of qualitative research', in Denzin, NK & Lincoln, YS (eds.), *Handbook of qualitative research*, 2nd edn., Sage Publications, Thousand Oaks CA, pp. 1-28.

Dervin, B 1992, 'From the mind's eye of the user: the sense-making qualitative-quantitative methodology', in Glazier, JD & Powell, RR (eds.), *Qualitative research in information management*, Libraries Unlimited, Englewood CO, pp. 61-84.

Dervin, B & Nilan, M 1986, 'Information needs and uses', *Annual Review of Information Science and Technology*, vol. 21, pp. 3-33.

Devlin, M, Larson, R & Meyerson, J (eds.) 2002, *The Internet and the university: Forum 2001*, EDUCAUSE, Boulder CO.

Dewey, J 1933, *How we think*, Heath and Company, Lexington MA.

Entwistle, N 1984, 'Contrasting perspectives on learning', in Marton, F, Hounsell, D & Entwistle, N (eds.), *The experience of learning*, Scottish Academic Press, Edinburgh, pp. 1-18.

Fosnot, CT 1996, 'Constructivism: a psychological theory of meaning', in Fosnot, CT (ed.), *Constructivism: theory, perspectives, and practice*, Teachers College Press, Columbia University, New York NY, pp. 8-33.

Fowell, S & Levy, P 1995, 'Developing a new professional practice: a model for networked learner support in higher education', *Journal of Documentation*, vol. 51, no. 3, pp. 271-280.

Freire, P 1972, *Pedagogy of the oppressed*, Penguin, Harmondsworth.

Fulton, C 1991, 'Humanists as information users: a review of the literature', *Australian Academic and Research Libraries*, vol. 22, no. 3, pp. 188-197.

Gagné, RM 1985, *The conditions of learning and theory of instruction*, 4th edn., Harcourt Brace Jovanovich, New York NY.

Garfield, E 1980, 'Is information retrieval in the arts and humanities inherently different from that in science?', *Library Quarterly*, vol. 50, no. 1, pp. 40-57.

George, R & Luke, R 1996, 'The critical place of information literacy in the trend towards flexible delivery in higher education contexts', *Australian Academic and Research Libraries*, vol. 27, no. 3, pp. 204-212.

Giorgi, A 1986, *A phenomenological analysis of descriptions of concepts of learning obtained from a phenomenographic perspective*, Department of Education, University of Göteborg, Göteborg, Sweden.

Glaser, BG & Strauss, AL 1967, *The discovery of grounded theory: strategies for qualitative research*, Aldine Publishing Company, New York NY.

Glazier, JD 1992, 'Qualitative research methodologies for library and information science: an introduction', in Glazier, JD & Powell, RR (eds.), *Qualitative research in information management*, Libraries Unlimited, Englewood CO, pp. 1-13.

Graham, PS 1995, 'Requirements for the digital research library', *College and Research Libraries*, vol. 56, no. 4, pp. 331-339.

Green, R 1991, 'The profession's models of information: a cognitive linguistic analysis', *Journal of Documentation*, vol. 47, no. 2, pp. 130-148.

Guest, SS 1987, 'The use of bibliographic tools by humanities faculty at the State University of New York at Albany', *Reference Librarian*, vol. 18, pp. 157-172.

Hedrick, TE 1994, 'The quantitative-qualitative debate: possibilities for integration', in Reichardt, CS & Rallis, SR (eds.), *The qualitative-quantitative debate: new perspectives*, Jossey-Bass, San Francisco CA, pp. 45-52.

Hopkins, R 1989, 'The information seeking behaviour of literary scholars', *Canadian Library Journal*, vol. 46, pp. 113-115.

House, ER 1994, 'Integrating the quantitative and qualitative', in Reichardt, CS & Rallis, SR (eds.), *The qualitative-quantitative debate: new perspectives*, Jossey-Bass, San Francisco CA, pp. 13-22.

Hughes, C, Hewson, L & Nightingale, P 1997, 'Developing new roles and skills', in Department of Employment, Education, Training and Youth Affairs (ed.), *Managing the introduction of technology in the delivery and administration of higher education*, Fujitsu Centre, Australian Graduate School of Management, University of New South Wales, Kensington NSW, pp. 49-79.

Ingwersen, P 1982, 'Search procedures in the library - analysed from the cognitive point of view', *Journal of Documentation*, vol. 38, no. 3, pp. 165-191.

Jacobs, NA 1996, 'Students' perceptions of the library service at the University of Sussex: practical quantitative and qualitative research in an academic library', *The Journal of Documentation*, vol. 52, no. 2, pp. 139-162.

Jonassen, D 1999, 'Designing constructivist learning environments', in Reigeluth, CM (ed.), *Instructional-design theories and models: a new paradigm of instructional theory*, 2nd edn., Lawrence Erlbaum Associates, Mahwah NJ, pp. 215-239.

Jones, C & Steeples, C 2002, 'Perspectives and issues in networked learning', in Jones, C & Steeples, C (eds.), *Networked learning: perspectives and issues*, Springer-Verlag, London, pp. 1-14.

Kellehear, A 1993, *The unobtrusive researcher: a guide to methods*, Allen and Unwin, St. Leonards NSW.

Kelly, GA 1963, *A theory of personality: the psychology of personal constructs*, W. W. Norton and Company, New York NY.

Kemmis, S 1994, 'Action research', in Husén, T & Postlethwaite, TN (eds.), *The international encyclopedia of education*, Pergamon, Oxford, pp. 42-48.

Kemp, DA 1976, *The nature of knowledge: an introduction for librarians*, Clive Bingley, London.

Kuhlthau, CC 1993, *Seeking meaning: a process approach to library and information services*, Ablex Publishing Corporation, Norwood NJ.

Kuzel, AJ 1999, 'Sampling in qualitative inquiry', in Crabtree, BF & Miller, WL (eds.), *Doing qualitative research*, 2nd edn., Sage Publications, Thousand Oaks CA.

Latham, S, Slade, AA & Budnick, C 1991, *Library services for off-campus and distance education: an annotated bibliography*, Canadian Library Association, Ottawa.

Laurillard, D 1993, *Rethinking university teaching: a framework for the effective use of educational technology*, Routledge, London.

Lera, S, Cooper, I & Powell, JA 1983, 'Information and designers', *Design Studies*, vol. 5, no. 2, pp. 113-120.

Levy, P 2002, 'Information specialists and networked learner support', in Steeples, C & Jones, C (eds.), *Networked learning: perspectives and issues*, Springer-Verlag, London, pp. 143-167.

Levy, P, Fowell, SP, Bowskil, N & Worsford, E 1996, 'NetLinkS: a national professional development project for networked learner support', *Education for Information*, vol. 14, pp. 261-278.

Lim, E & Van Dyk, MT 1997, 'Library support models for distance education: the Australian experience', in Snyder, CA & Fox, JW (eds.), *Libraries and other support services for distance learning*, JAI Press, Greenwich CN, pp. 57-91.

Limberg, L 2000, 'Is there a relationship between information seeking and learning outcomes?', in Bruce, C & Candy, P (eds.), *Information literacy around the world: advances in programs and research*, Centre for Information Studies, Charles Sturt University, Wagga Wagga NSW, pp. 193-207.

Lincoln, YS & Guba, EG 1985, *Naturalistic inquiry*, Sage Publications, Beverly Hills CA.

Lincoln, YS & Guba, EG 2000, 'Paradigmatic controversies, contradictions, and emerging confluences', in Denzin, NK & Lincoln, YS (eds.), *Handbook of qualitative research*, 2nd edn., Sage Publications, Thousand Oaks CA.

Ling, P, Arger, G, Smallwood, H, Toomey, R, Kirkpatrick, D & Barnard, I 2001, *The effectiveness of models of flexible provision of higher education*, Department of Education, Training and Youth Affairs, Canberra.
URL: http://www.dest.gov.au/highered/eippubs/eip01_9/eip01_9.pdf [Accessed 23 October 2003]

Macauley, P 1997, 'Distance education research students and their library use', *Australian Academic and Research Libraries*, vol. 28, no. 3, pp. 188-197.

Magee, B 1985, *Philosophy and the real world: an introduction to Karl Popper*, Open Court, La Salle IL.

Marton, F 1981, 'Phenomenography - describing conceptions of the world around us', *Instructional Science*, vol. 10, pp. 177-200.

Marton, F 1994, 'Phenomenography', in Husén, T & Postlethwaite, TN (eds.), *The international encyclopedia of education*, Pergamon, Oxford, pp. 4424-4429.

Marton, F, Dall'Alba, G & Beaty, E 1993, 'Conceptions of learning', *International Journal of Educational Research*, vol. 19, no. 3, pp. 277-300.

Marton, F, Hounsell, D & Entwistle, N (eds.) 1984, *The experience of learning*, Scottish Academic Press, Edinburgh.

Maxwell, JA 1996, *Qualitative research design: an iterative approach*, Sage Publications, Thousand Oaks CA.

McNiff, J 1988, *Action research: principles and practice*, Routledge, London.

McPherson, M 2001, 'Position or purpose: situating the library in a webbed world', *Australian Academic and Research Libraries*, vol. 32, no. 3, pp. 165-176.

Merriam, SB 1998, *Qualitative research and case study applications in education*, 2nd edn., Jossey-Bass, San Francisco CA.

Miles, MB & Huberman, AM 1994, *Qualitative data analysis: an expanded sourcebook*, 2nd edn., Sage Publications, Thousand Oaks CA.

Neill, SD 1982, 'Brookes, Popper, and objective knowledge', *Journal of Information Science*, vol. 4, no. 1, pp. 33-39.

Nikolova, I & Collis, B 1998, 'Flexible learning and design of instruction', *British Journal of Educational Technology*, vol. 29, no. 1, pp. 59-72.

Nitecki, JZ 1985, 'The concept of information-knowledge continuum: implications for librarianship', *The Journal of Library History*, vol. 20, no. 4, pp. 387-407.

Noble, DF 2002, 'Technology and the commodification of higher education', *Higher Education Monthly Review*, vol. March, pp. 26-40.

Oblinger, DG & Maruyama, MK 1996, *Distributed learning*, CAUSE, Boulder CO.

Orr, D, Appleton, M & Wallin, M 2001, 'Information literacy and flexible delivery: creating a conceptual framework and model', *The Journal of Academic Librarianship*, vol. 27, no. 6, pp. 457-463.

Orr, D & Wallin, M 2001, 'Information literacy and flexible delivery: are we meeting student needs?', *Australian Academic and Research Libraries*, vol. 32, no. 3, pp. 192-203.

Peacock, J & Middleton, M 1999, 'Mixed mode education: implications for library user services', *New Library World*, vol. 100, no. 1146, pp. 11-19.

Pernat, M 1999, 'Widening the net: Monash University Library's flexible, student-centred information services', *Australian Academic and Research Libraries*, vol. 30, no. 3, pp. 200-211.

Piaget, J 1970, *Structuralism*, Basic Books, New York NY.

Piaget, J 1977, *Equilibration of cognitive structures*, Viking, New York NY.

Popper, KR 1972, *Objective knowledge: an evolutionary approach*, Oxford University Press, Oxford.

Ramsden, P 1992, *Learning to teach in higher education*, Routledge, London.

Reichardt, CS & Rallis, SF 1994, 'The relationship between the qualitative and quantitative research traditions', in Reichardt, CS & Rallis, SF (eds.), *The qualitative-quantitative debate: new perspectives*, Jossey-Bass, San Francisco CA, pp. 5-11.

Rew, L, Bechtel, D & Sapp, A 1993, 'Self-as-instrument in qualitative research', *Nursing Research*, vol. 42, no. 5, pp. 300-301.

Ritchie, J, Lewis, J & Elam, G 2003, 'Designing and selecting samples', in Ritchie, J & Lewis, J (eds.), *Qualitative research practice: a guide for social science students and researchers*, Sage Publications, Thousand Oaks CA.

Rossmann, P 1992, *The emerging worldwide electronic university: information age global higher education*, Greenwood Press, Westport CN.

Rumble, G 1989, 'Open learning', 'distance learning', and the misuse of language', *Open Learning*, vol. 4, no. 2, pp. 28-36.

Ryan, M, Hodson Carlton, K & Ali, NS 1999, 'Evaluation of traditional classroom teaching methods versus course delivery via the World Wide Web', *Journal of Nursing Education*, vol. 38, no. 6, pp. 272-277.

Ryan, S, Scott, B, Freeman, H & Patel, D 2000, *The virtual university: the Internet and resource-based learning*, Kogan Page, London.

Säljö, R 1979, *Learning in the learner's perspective: some common-sense conceptions*, Department of Education, University of Göteborg, Göteborg, Sweden.

Schilling, K, Ginn, DS, Mickelson, P & Roth, LH 1995, 'Integration of information-seeking skills and activities into a problem-based curriculum', *Bulletin of the Medical Library Association*, vol. 83, no. 2, pp. 176-183.

Schön, DA 1987, *Educating the reflective practitioner*, Jossey-Bass, San Francisco CA.

Schunk, DH 1991, *Learning theories: an educational perspective*, Macmillan, New York NY.

Shuell, TJ 1986, 'Cognitive conceptions of learning', *Review of Educational Research*, vol. 56, no. 4, pp. 411-436.

Shuell, TJ 1990, 'Phases of meaningful learning', *Review of Educational Research*, vol. 60, no. 4, pp. 531-547.

Shuell, TJ & Moran, KA 1994, 'Learning theories: historical overview and trends', in Husén, T & Postlethwaite, TN (eds.), *The international encyclopedia of education*, 2nd edn., Pergamon, Oxford, pp. 3340-3345.

Slade, AL & Kascus, MA 1996, *Library services for off-campus and distance education: the second annotated bibliography*, Libraries Unlimited, Englewood CO.

Slade, AL & Kascus, MA 2000, *Library services for open and distance learning: the third annotated bibliography*, Libraries Unlimited, Englewood CO.

Smith, LM 1979, 'An evolving logic of participant observation, educational ethnography and other case studies', in Shulman, L (ed.), *Review of research in education* 6, Peacock, Itasca IL, pp. 316-377.

Stake, RE 1995, *The art of case study research*, Sage Publications, Thousand Oaks CA.

Stake, RE 2000, 'Case studies', in Denzin, NK & Lincoln, YS (eds.), *Handbook of qualitative research*, 2nd edn., Sage Publications, Thousand Oaks CA, pp. 435-454.

Strauss, A & Corbin, J 1990, *Basics of qualitative research: grounded theory procedures and techniques*, Sage Publications, Newbury Park CA.

Strauss, A & Corbin, J 1998, *Basics of qualitative research: techniques and procedures for developing grounded theory*, 2nd edn., Sage Publications, Thousand Oaks CA.

Swan, K 2001, 'Virtual interaction: design factors affecting student satisfaction and perceived learning in asynchronous online courses', *Distance Education*, vol. 22, no. 2, pp. 306-331.

Tait, A & Mills, R (eds.) 1999, *The convergence of distance and conventional education: patterns of flexibility for the individual learner*, Routledge, London.

Taylor, PG, Lopez, L & Quadrelli, C 1996, *Flexibility, technology and academics' practices: tantalising tales and muddy maps*, Department of Employment, Education, Training and Youth Affairs, Canberra.

URL: <http://www.dest.gov.au/archive/highered/eippubs/eip9616/96-16.pdf>

[Accessed 24 October 2003]

Thomas, D 1995, 'Learning to be flexible', in Thomas, D (ed.), *Flexible learning strategies in higher and further education*, Cassell, London, pp. 1-11.

Thomas, MJW 2001, 'Learning communities and the virtual university: the effects of computer-based learning environments on student interaction and learning', *Research and Development in Higher Education*, vol. 24, pp. 179-187.

University of Central Queensland Library 1993, *Library services for remote postgraduate distance education students*, University of Central Queensland Library, Rockhampton QLD.

University of Wollongong 1999, *Learning and teaching strategic plan*, University of Wollongong, Wollongong.

URL: http://www.uow.edu.au/about/teaching/LTStrategic_plan.html [Accessed 16 June 2003]

University of Wollongong 2000, *University of Wollongong (academic staff) enterprise agreement, 2000 to 2003*, University of Wollongong, Wollongong.

URL: http://www.uow.edu.au/admin/personnel/awards/ac_enterprise00.html [Accessed 16 June 2003]

Van den Brande, L 1993, *Flexible and distance learning*, John Wiley and Sons, Chichester.

Van Rossum, EJ & Schenk, SM 1984, 'The relationship between learning conception, study strategy and learning outcome', *British Journal of Educational Psychology*, vol. 54, no. 1, pp. 73-83.

Vygotsky, L 1978, *Mind in society: the development of higher psychological processes*, Harvard University Press, Cambridge MA.

Vygotsky, L 1986, *Thought and language*, MIT Press, Cambridge MA.

Wade, W 1994, 'Introduction', in Wade, W, Hodgkinson, K, Smith, A & Arfield, J (eds.), *Flexible learning in higher education*, Kogan Page, London, pp. 12-16.

Walton, G, Day, J & Edwards, C 1996, 'Role changes for the academic librarian to support effectively the networked learner: implications of the IMPEL project', *Education for Information*, vol. 14, pp. 343-350.

Ward, M & Newlands, D 1998, 'Use of the web in undergraduate teaching', *Computers and Education*, vol. 31, pp. 171-184.

Warmkessel, MM & McCade, JM 1997, 'Integrating information literacy into the curriculum', *Research Strategies*, vol. 15, no. 2, pp. 80-88.

Weitzman, EA 2000, 'Software and qualitative research', in Denzin, NK & Lincoln, YS (eds.), *Handbook of qualitative research*, 2nd edn., Sage Publications, Thousand Oaks CA, pp. 803-820.

Wilberley, SE & Jones, WG 1989, 'Patterns of information seeking in the humanities', *College and Research Libraries*, vol. 50, no. 6, pp. 638-645.

Wilson, TD 1984, 'The cognitive approach to information-seeking behaviour and information use', *Social Science Information Studies*, vol. 4, pp. 197-204.

Winter, A & Cameron, M 1983, *External students and their libraries: an investigation into student needs for reference material, the sources they use, and the effects of the external system within which they study*, Deakin University, Geelong VIC.

Yin, RK 1994, *Case study research: design and methods*, 2nd edn., Sage Publications, Thousand Oaks CA.

Young, P 1987, *The nature of information*, Praeger, New York NY.

Youngblood, P, Trede, F & Di Corpo, S 2001, 'Facilitating online learning: a descriptive study', *Distance Education*, vol. 22, no. 2, pp. 264-284.

Zhang, Y 1988, 'Definitions and sciences of information', *Information Processing and Management*, vol. 24, no. 4, pp. 479-491.