The Contribution of Knowledge Management to Learning:
An Exploration of its Practice and Potential in Australian and New Zealand Schools

Dissertation submitted by Mary E. Reynolds in partial fulfilment of the requirements for M.Ed. (CIE), University of Pretoria, 2005.

Supervisor: Professor Johannes Cronje

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This dissertation is dedicated to the memory of my father Leonard Hensman who brought me to South Africa 'to get an education' and to my aunt, Professor Bertha Hensman, Chairman of the Department of Western Languages and Literature, West China Union University, Chengdu, Szechuan, from 1937-1951, whose life of scholarship in the face of extreme adversity has always been an inspiration to me.

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*"A sailboat may rely on the tide or current to carry it to its destination or, sailing
into the wind, use the wind to steer its course in a desired direction."*

Ellyard (2001)

Summary

Knowledge management is a relatively new concept that challenges schools to consider their strategic functioning as learning organisations. Whilst the semantics of knowledge management are still uncertain, there is agreement that it embraces the human interactions of knowledge sharing and knowledge creation and that these are enhanced by information and communication technologies (ICTs). This study describes and analyses the practice of knowledge management in schools in Australia and New Zealand. It provides an overview of the range of interpretations that are given to knowledge management and attempts to clarify the definition of what constitutes knowledge management in a school environment. Literature from a variety of disciplines provides a theoretical grounding and focus is given by Todd (2001) and Todd and Southon (2002), academics in the teacher-librarianship field. The study investigates, from a teacher-librarian's point of view, how knowledge is shared in pursuit of learning at student, teacher and organisational level. It also investigates how ICTs enable knowledge management and its implications for teacher-librarians, to whom its practice defaults and finally, explores the concept of the 'knowledge-enabled school'. Rising interest in knowledge management in Australian and New Zealand schools determined the choice of those countries for the fieldwork. As a qualitative case study, semi-structured interviews were conducted with teacher-librarians in a small cross section of state, independent, monastic, co-educational primary and high schools.

The study provides a snapshot view of practices that contribute to or have the potential to contribute to knowledge management in schools and makes recommendations for further study. These practices include the development of social and ICT infrastructures to manage knowledge creation and sharing, the role of information literacy skills, administration systems with diagnostic capabilities that support individualised learning, the multi-faceted role of the teacher-librarian and the incorporation of knowledge management into systemic reform.

Keywords

Knowledge management

Teacher-librarianship

Information and Communication Technologies (ICTs)

Collaborative practice

Learning organisations

Knowledge creation

Information literacy

Educational reform

Australia – schools

New Zealand - schools

Chapter 1
Introduction

Introduction

The purpose of this study is to determine the contribution of knowledge management to learning in Australian and New Zealand schools. The outcome of the study will therefore attempt, through an exploration of its practice and potential in a small selection of schools, to provide a better understanding of the concept of knowledge management in schools.

Rationale

The concept of knowledge management within schools was almost unknown until recently. There is a plethora of literature on knowledge management in the corporate environment (Wilson, 2002 p.8) and there is some relevant to the tertiary education environment. Writings refer to the management of intellectual capital as a source of competitive advantage within the knowledge economy where managing intellectual assets has become the single most important task of business (Naidoo, 2002 p.46). For the corporate world, tacit knowledge or knowing what you know constitutes the company's intellectual capital and its most valued strategic commodity. References to knowledge management at tertiary institutions highlight the development of technology based methods for the creation, storage and distribution of knowledge – their key intellectual property (Reid, 2000 p.7) and their single product – in virtual environments (Leonard, 1999 p.9).

If knowledge management is to be applied in schools as learning organisations, it implies a paradigm shift from the isolation and protection of subject domains within classroom silos. In an open learning environment, transferring knowledge does not require the proprietary stamp of the expert teacher, but becomes an altogether different process.   Knowledge management requires strategic emphasis to be placed on how knowledge is generated, shared and stored rather

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than on the fabric of the institution i.e. the bricks and mortar.   Knowledge management implies placing a value on learning and sharing rather than productivity alone (Carroll, Choo, Dunlap, Isenhour, Kerr, McLean & Rosson, 2001:5).

> *Knowledge management is about taking the human face of information …*
> *and the documentary face of information … and finding structures and*
> *systems to bring together this wealth of intellectual capital in order to*
> *maximize the information-knowledge environment of the school for*
> *knowledge construction and knowledge use* (Todd, 2001 p.5*).*

What is important for Todd is that practices and structures need to be integrated to support learning, learning in its broadest sense: organisational learning, teachers as learners, student learning, and community learning.   Knowledge management is about learning. Todd's definition gives clarity to the concept and provides a focus for this study which attempts to understand how knowledge management contributes to learning and to describe both its practice and potential in Australian and New Zealand schools.

Background

My fascination with the idea of knowledge management arose when I first encountered the concept at a corporate symposium some eight years ago. I subsequently found literature on knowledge management related to the corporate or tertiary world, but little that related to pre-tertiary education. My premise was that with a school's prime function being the acquisition and transfer of knowledge i.e. learning and understanding, then there had to be a role for knowledge management in a school.

Secondly, I had misgivings about the balance between information and communication technologies (ICTs) and the information conveyed by the ICTS. These misgivings were based on the well-recognised *'pipes and water scenario'*.

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The plumber or technology specialist provides the pipes or infrastructure, the water is the educator's responsibility.   However, if water is analogous to information, it is only an ingredient in the knowledge process.   What else was needed to nurture the mind in order for it to thrive in the 21st Century? How could technology be used to advance the development of curriculum and thereby enhance student learning?   How could knowledge be shared by teachers to address the challenges of Inclusion, Curriculum 2005 and the Information Age? How could teachers work together to gain new skills and incorporate new strategies?   These were amongst the many questions that pre-occupied my mind.

Through personal contacts and the OZTL_Net electronic mailing list I became aware that the Australian School Library Association (ASLA) Biennial Conference in October 2001 offered Knowledge Management as one of its two strands. The timing coincided with long leave and I was fortunate to be funded by an Independent Schools Association of South Africa (ISASA) Overseas Visitorship which enabled me to attend the conference and thereafter visit Australian and New Zealand schools.   In searching out practitioners, I encountered papers by Australians: Ross Todd, Jenny Lewis and Arthur Winzenreid, but little else. Requests on OZTL_Net, subscribed to by most Australian teacher-librarians yielded little.   Email communications with Todd, Lewis, Winzenreid and Linda Langford[1] - confirmed that there were virtually no acknowledged knowledge management practitioners as such in Australian schools, but that these individuals were grappling with the concept. Ultimately it was their willingness to share their expertise that provided initial insight into aspects of knowledge management practice in schools.

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[1] In July 2001 Linda Langford, an Australian Teacher-Librarian gave a keynote address at the Millennium Minds conference in Cape Town. It was an intense discussion with her that started my thinking on the links between knowledge management and information literacy and which conversation I had a number of opportunities to pick up on in Australia. Linda is writing a doctoral thesis on this topic.

Before undertaking the research trip to Australia and New Zealand I was fortunate to have the opportunity to interact with Australians, Lynn Hay[2] and Linda Langford, guest speakers at two national school library and ICT conferences in South Africa and to participate as a workshop presenter in the *New Millennium, New Horizons ISIS[3] Online Conference*. Australia and New Zealand was a logical region to pursue for research because of these considerable contacts and for the fact that significant innovative practices in libraries and ICTs are generated in Australia. I also explored online resources such as Education Network Australia (EdNA).

I travelled to Australia in late September 2001 and attended the ASLA XVII Biennial Conference[4] at Twin Waters Resort, Mudjimba Beach on Queensland's Sunshine Coast. The conference provided a valuable theoretical overview of knowledge management as well as the opportunity to meet and engage with Australian counterparts. Thereafter, I spent a week each in Auckland, Melbourne and Sydney, visiting seventeen schools as well as meeting with individuals in other educational institutions. The odyssey provided a fascinating insight into the structures, relationships and systems within Australian schools. It was mostly fellow teacher-librarians that provided me with this insight. I decided to focus on teacher-librarians as they generally have day-to-day interactions with colleagues in most departments and are largely responsible for information resources, services and skills.

Purpose of the research

What did I have in mind when I set out? Essentially it was a quest for meaning in the term 'knowledge management' as it related to schools. My aim was to understand how knowledge management contributes to learning and what its practice and potential were in Australian and New Zealand schools.

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[2] Lynn Hay is a lecturer in Teacher-Librarianship at the School of Information Studies, Charles Sturt University.
[3] ISIS: *Information Services in Schools*
[4] The title of the conference was *Forging Future Directions* and its two main strands were *Knowledge Management* and *Information Literacy.*

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My objectives were firstly to gain insight from the teacher-librarian's[5] perspective into knowledge-sharing practices in schools in those two countries. Secondly, I wanted to explore how teacher-librarians worked together with ICT specialists and with teachers themselves to support teachers' needs. Although teacher-librarians work mostly in isolated one-person departments, they are co-operative by nature and rely on networking with each other. I wanted to understand how this was exploited in Australia and New Zealand at national or state level and also within school systems or by commercial enterprises. Thirdly, I wanted to explore the role of the teacher-librarian and how in-house, state or national ICT networks and services supported Australian teachers as well as teacher-librarians as learners. Finally, I wanted to establish what a 'knowledge-enabled' school might look like, i.e. a school that practiced knowledge management.

To achieve the aim answers to the following questions would be required:

- How do Australian and New Zealand teachers share their knowledge in pursuit of learning?
- How do ICTs enable knowledge management?
- What are the implications of knowledge management for teacher-librarians?
- What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

Research Methodology

Initial information was gleaned from the ASLA XVII conference. In ensuing school visits I used an interviewer-administered questionnaire to obtain basic factual information and conducted semi-structured interviews recorded as sound only on a video camera. These interviews were transcribed on a daily basis and

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[5] *Teacher-librarian* is the preferred term for a school librarian with teaching responsibilities in Australia, whilst a *librarian* is generally one limited to administrative and/or technical responsibilities. In this study, the term *teacher-librarian* is used generally to include any person with pedagogic and information/knowledge responsibilities in schools. In New Zealand schools, *librarian* is the preferred term for teacher-librarian. The preferred terms are used to indicate the professional individuals encountered in the different countries during the fieldwork.

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analysed for trends on my return to South Africa. In 2002, a summary report was issued to ISASA as a requirement of the visitorship and a paper presented to the ISASA Librarians conference in Grahamstown. This study explores the transcripts further in order to provide a more detailed analysis of the practices observed, to draw conclusions and make recommendations. Implications for South African schools are included.

Delimitations

This study is limited to a personal exploration of the schools visited and as such does not claim definitiveness other than personal understanding and observation. It was not intended specifically to inform the participant schools.

Overview of chapters

- *Chapter One* provides the introduction, rationale, background, purpose, research questions and limitations of the study.
- *Chapter Two* provides an overview of the literature from which the conceptual framework for the study and the research questions are derived.
- *Chapter Three* describes the research methodology for the study.
- *Chapter Four* discusses the findings of the study.
- *Chapter Five* summarises the findings and analyses them in terms of the literature reviewed in Chapter 2. It provides conclusions and recommendations drawn from the research and includes a reflection on the study.

Chapter 2

Literature Review

Introduction

The lack of direct access to academic libraries at the time frustrated preliminary reading for the research trip to Australia. However, some articles were gleaned from the Internet; some from contacts established through the OZTL_Net listserv and the ISIS Online Conference and others from school library and education journals available at large in the teacher-librarian community. Keywords and key phrases used in searches were *'knowledge management'* + *schools*, *'knowledge management'* + *Australia* and *'knowledge management'* + *'New Zealand'*. The use of *'education'* as a term in combination with *'knowledge management'* generated mostly articles to do with tertiary education. Further literature was located by following citations.

A more recent search using similar key terminology yielded significantly more literature, largely produced in 2001 or later and emanating from a wide variety of countries. The beta version of *Google Scholar* that operates as a citation index proved useful in this later search. Cited works traceable either to open source web postings or to journal services such as *Blackwell's Synergy* and *Taylor and Francis* were, in turn, available online through the University of Pretoria Academic Information Service. This study therefore relies on both a pre-reading of literature and an ex post facto review.

Subject area	No. of titles
Computing & Information systems	26
Information Science, Information Management & Librarianship	18
Management	13
Artificial Intelligence	10
Engineering	8
Medicine	4

Table 1: Subject range of journals including articles on knowledge management

(Wilson, 2002 p.8)

Wilson (2002, p.8) analysed the occurrence of knowledge management articles in journals pertaining to various sectors as illustrated in Table 1. Significantly, he found no articles pertaining to the Education sector.

The following table indicates the geographic location and sector of those writing about knowledge management in schools:

Authors	Geographic location	Date	Sector
Bundy	Australia	2001	Tertiary: University Librarian
Combes	Australia	2001	Secondary: Website Co-ordinator
Cram & Sayers	Australia	2001	Secondary: Teacher librarians in state education library service
Dellit & Hazell	Australia	2001	SOCCI on-line content developers
Ellyard	Australia	2001	Futurist
Hanson	Australia	2000	Tertiary: School of Information Studies
Hay	Australia	2001	Tertiary: School of Information Studies
Hay & Eustace	Australia	2000	Tertiary: School of Information Studies
Lewis (ACEL)	Australia	2003	Primary school principal. The article is written in her capacity as head of the Australian Council for Educational Leadership (ACEL)
Winzenreid	Australia	2001	Secondary: Information Services
McGregor	Australia/ USA	2003	Tertiary: School of Library & Information Studies
Todd	Australia/USA	2000/ 2001	Tertiary: School of Information Studies
Paavola, Lipponen & Hakkarainen	Finland	2001	Tertiary: Psychology
Peters	Scotland & New Zealand	2001	Tertiary: Education
Naeve	Sweden	2001	Tertiary: KM Research Group in Center for User-Orientated IT Design
Schneider, Paraskevi & Frété	Switzerland/ Europe	2002	Tertiary
Williams	UK	2003	Consultant in e-learning
Carroll, Rosson, Dunlap & Isenhour	USA	2003	Tertiary; Center for Human-Computer Interaction and Dept. of Computer Science
Leonard	USA	1999	Tertiary: School of Engineering
Carroll, Choo, Dunlap, Isenhour, Kerr, McLean & Rosson	USA & UK	2001	Tertiary: Center for Human-Computer Interaction; School of Information Studies; College of Education; Xerox Research Centre

Table 2: Geographic location and sectors of KM authors

Table 2 reveals a varied spread of interest in the concept of knowledge management in schools not only from a geographic perspective, but also in

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the range of faculties represented which include education, information science, psychology, computer science and engineering. The predominance of Australian information scientists reflects the area of interest of this study, but it is significant that their papers are largely academic. Very few are generated either by grass-roots practitioners or describe school *systems* that have a knowledge management focus. The potential of knowledge management as a concept spanning many disciplines is recognised, but apart from pilot projects, there appears to be, as yet, little evidence of its practice other than in the Australian schools traced to Combes, Lewis and Winzenreid as listed above.

This chapter will discuss the concepts associated with knowledge management referred to in the literature and relate them to schools. Figure 1 demonstrates these concepts graphically.
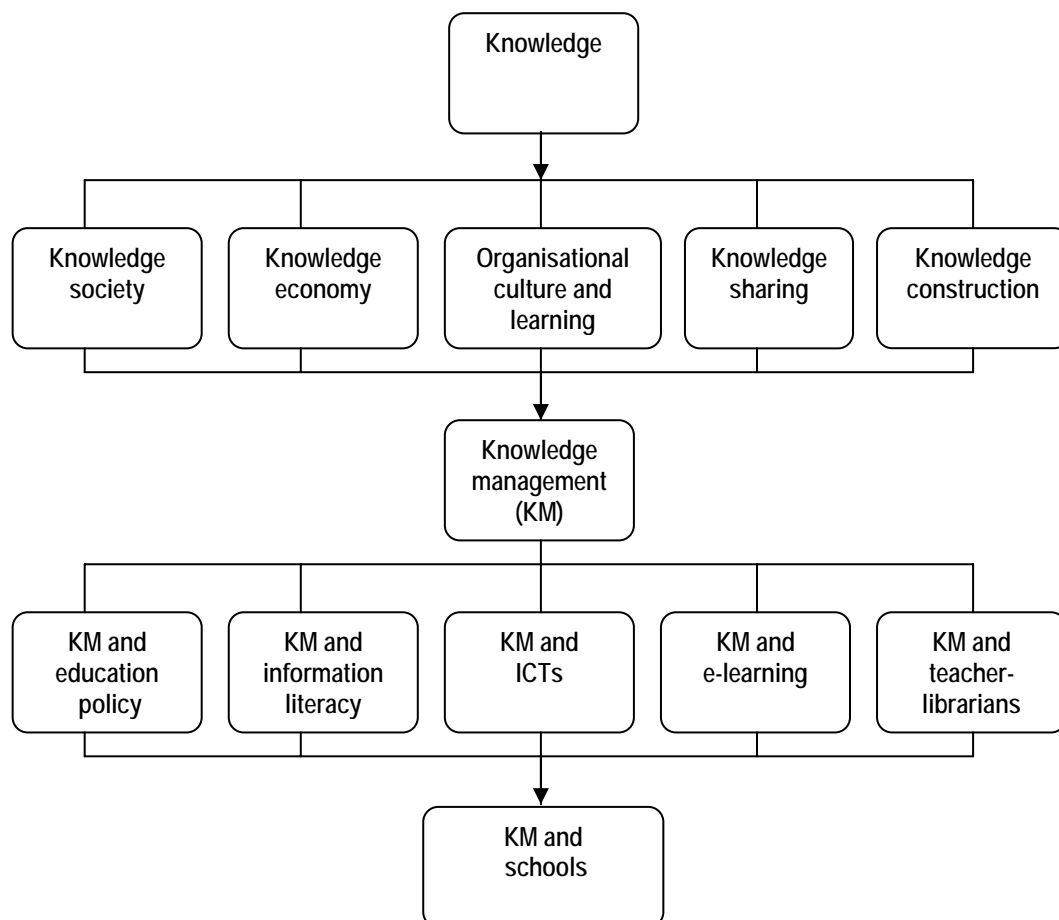
Figure 1: Diagram of knowledge concepts

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This review takes each of these concepts in turn and identifies issues for knowledge management in schools that emerge from the concepts and the concept relations.

Knowledge

Knowledge is the outcome of people working together (Cram & Sayers, 2001 p.3). Three kinds of knowledge converge to create new knowledge: tacit[1], explicit[2] and cultural. New knowledge results in innovations or capabilities that provide the potential for action.   Potential action transforms into commitment to act through decision making in the face of risk and uncertainty, i.e. creating knowledge is a capacity building process (Carroll et al, 2001 p.9).

Todd describes knowledge as *"human knowing in all its forms … competencies, experiences, expertises, skills, talents, wisdom, thoughts, ideas, intuitions, commitments, innovations, practices and imaginations … the stuff of the human mind. Knowledge resides in the user and not in the collection."* He contrasts knowledge and information which he describes as the "*formally published representations of people's knowing, in some form … in a school environment this might mean the various documents, programs, procedures, manuals, teaching materials and the like created as part of our work*" (Todd, 2001 p.5).

Williams (2003, p.46) describes the paradoxical nature of knowledge as *both a thing and a flow*. Snowden (2003 in Williams, 2003 p.46) and Stacey (2001 in Williams 2003:46) suggest that "*knowledge can only be volunteered"* and that "*we only know what we know when we want to know it".* Knowledge, according to Williams, belongs to a particular relationship and context specific to time, place, sequence and timing and cannot therefore be categorised or packaged as a commodity. Knowledge is strategic, whereas information is procedural. Bhatt (2001, p.69) contends that this relationship between data,

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[1] implied or understood without being put into words (Oxford Study Dictionary)
[2] stated in exact terms (op cit)

information and knowledge is recursive and depends on the extent to which it is organised.

Knowledge is not a solid object but a dynamic process. It is a perspective shared by a community and that allows for effective action.   A learning organisation evolves through stages of being data rich, information enabled and knowledge creating to knowledge driven through managing this dynamic knowledge. ICTs enable the process by providing tools that allow information access and retrieval, communication, collaboration, creativity and innovation (Hanson, 2000 p.19).

Knowledge should be distinguished from information and data. Data are facts or assumed facts. Information reflects experience (told, heard or discovered[3]) or interaction with data. Data capture is a mechanical process; recording information or the experience of information is a cognitive process. It is the collaborative structuring of human resources that is required to capture knowledge or shared experience.

The primary issue is for schools to understand the nature of knowledge in the context of a knowledge era and its implications for them.

Knowledge society and knowledge economy

'Knowledge society' is a term coined by Stehr (1994) and derives from the writings of Bell (1973), Drucker (1969) and Lane (1966). In the knowledge society, knowledge displaces labour and property as economic capital (Peters, 2001 p.5).   Dellit and Hazell (2001, p.11) describe a knowledge society as one that is not only premised on knowledge but which trades in knowledge and continuously generates and creates knowledge to push the edges of experience and challenge limits – mostly through the application of ICTs.

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[3] *Oxford Study Dictionary*

The knowledge economy is *"the economics of abundance, the annihilation of distance, the de-territorialisation of the state, the importance of local knowledge and investment in human capital"* (Peters, 2001 p.3). Peters' concern is that organisations such as the OECD[4], the World Bank and the IMF[5] prescribe education policy premised on the knowledge economy.

The terms 'knowledge society' and 'knowledge economy' therefore relate to the current era in which knowledge is the key commodity. The issue for schools is how they address the demands of a knowledge society in their own operations and practices and the knowledge skills they develop in their students.

Organisational culture and organisational learning

Ellyard (2001, p.35-42) describes different types of learning:

Life-long learning (LLL)	*is learning that is enjoyable and motivated by curiosity rather than the desire to do well in exams*
Learner driven learning	*describes the desire and capacity to nurture life-long learning*
Just-in-time learning	*occurs when motivation and need is high*
Customised learning	*is individualised learning or affirmative action for right-brained thinking*
Transformative learning	*assesses the transformation that has taken place through the learning i.e. how much a person has been changed by it*
Collaborative learning	*is part of an interdependent culture of collaborative learning networks, collective thinking groups that accept that no one person can know everything*
Contextual learning	*such as learning about vegetarianism in an abattoir*
Learning to learn	*is about learning to think*
Learning for the jobs of the future	*multi-skilled, flexible, empowered by the learning organisation*

Table 3: Different types of learning (Ellyard, 2001 p.35-42)

All these types of learning apply in the 21st Century school. Information transfer is no longer teacher-dependent. Learning is the process that transforms data and information into knowledge and experience transforms

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[4] OECD: Organisation for European Co-operation and Development
[5] IMF: International Monetary Fund

knowledge into wisdom. Learning is the catalyst. The teacher facilitates the student to achieve this transformation. These types of learning no longer characterise only traditional learning institutions, but organisations that learn collectively in striving for innovation.

The concept of organisational learning is closely associated with knowledge management. According to Aiken and Britton (1997 in ACEL 2003, p.19) a learning organisation is:

> *an organisation which actively incorporates the experience and knowledge of its members and partners through the development of practices, policies, procedures and systems in ways which continuously improve its ability to set and achieve goals, satisfy stakeholders, develop its practice, value and develop its people and achieve its mission with its constituency.*

Carroll et al (2001, p.5-6) argue that organisations need to foster an organisational culture that "*values knowledge, values sharing knowledge and values innovation and risk-taking in the development of knowledge*". Such a workplace culture is termed a community of practice (Lave & Wenger 1991; Wenger, 1998). Sustainable knowledge management depends on peer-driven innovations in workplace culture (Carroll et al, 2001 p.11; ACEL, 2003). Leadership is important in a knowledge-sharing community. The school leader needs to decide what connections to build, the kind of knowledge shared by the community, who constitutes the community and how closely integrated sharing knowledge is with people's everyday work. Understanding these factors will help identify what kind of learning organisation to develop. Key principles underlying learning organisations must include participation, empowerment, a willingness to embrace change and an acknowledgement of learning experiences (McDermott, 1999 in ACEL, 2003:3).

Leonard (1999 p.15) describes organisational learning as reaching a point of metacognition in which educators are more conscious of how they transfer and share knowledge and how effectively they are using technology to do so.

He further argues (1999 p.16) for the "*death of the academic department"*. In high-tech knowledge industries organisational structures are flat, but department-based hierarchies are still extant in education. It is essential for students to share resources in cross-functional teams on interdisciplinary projects.

Twomey (2001, p.2) describes how the Dimensions of Learning provides a *"framework to place all the good things that you know"*. The framework identifies five interrelated types of thinking, or dimensions involved in the learning process and which are essential to successful learning. The value lies in the framework's ability to organise the vast amount of information related to human learning. These dimensions are attitudes and perceptions; acquiring and integrating knowledge; extending and refining knowledge; using knowledge meaningfully and habits of mind or thinking creatively, critically and metacognitively.   Twomey argues that assignments should therefore be structured around using knowledge meaningfully, not reproducing knowledge.

> *The most effective learners have developed powerful habits of mind that enable them to think critically, think creatively and regulate their behaviour. Developing the skills for lifelong learning is about developing productive habits of mind*. (Twomey, 2001 p.10).

The *Dimensions of Learning* offer potential as a resource for instructional strategies, to plan staff development, as a structure for planning curriculum and assessment or for systemic reform. As such, according to Twomey (2001 p.12), they support organisational learning and knowledge construction.

The issue for schools is how they affect radical change in their culture that is traditionally the antithesis of knowledge sharing and organisational learning.

Knowledge sharing

Knowledge sharing is variously described as the social process of construction (Vygotsky, 1978), as enculturation (Brown, Collins & Duguid,

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1989), as enculturation guided participation (Rogoff, 1990) and as legitimate peripheral participation (Lave & Wenger 1991). In earlier societies, each age group had a specific role in handing down knowledge. Paavola, Lipponen and Hakkarainen (2001 p.2) point out two reasons why modern societies do not have such clear-cut boundaries. Firstly, everyone has to function as a newcomer that needs to surpass earlier achievements and secondly, new generations develop competencies that are difficult for older generations to attain.

A knowledge-sharing culture is one in which *"knowledge, in all its diversity and representations, is willingly made available and effectively utilized for the realization of the mission and goals of the school"* (Todd, 2000 p.40). Key dimensions for building a knowledge-sharing culture are identified by Todd (2000, p.42) based on those of Davenport and Prusak (1998). These dimensions are:

- a knowledge orientated culture
- a link to industry value
- senior management support
- process orientation
- clarity of vision and language
- non-trivial motivational aids
- some level of knowledge structure
- technical and organisational infrastructure
- multiple channels for knowledge transfer

Davenport (1998 in Cram & Sayers, 2001 p.4-10) identifies three characteristics of knowledge sharing practices:

- sharing and using knowledge are often unnatural acts
- knowledge access is only the beginning
- effective management of knowledge requires hybrid solutions of people and technology

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In the *"knowledge creating school",* heads and teachers need to become creators of professional knowledge by articulating their experiences as sharable knowledge within and between schools (Hargreaves, 1999 in Paavola et al, 2001 p.7). Teachers need to have this experience to model it for their students. To be fully effective all teachers in a community must participate.

The ACEL (2003 p.6-7) describes the process for sharing knowledge as a series of steps: gathering internal experience, developing an organisational memory, applying the learning by exemplifying, encouraging, integrating and rewarding it, integrating the learning into strategy and policy and finally, providing mechanisms for drawing conclusions. According to the ACEL, it is this last characteristic that differentiates organisational learning from information exchange. Drawing conclusions converts information to knowledge and then knowledge to usable wisdom. This step involves building and evolving a framework for people to think about knowledge and innovation, identifying and evolving architecture to support tangible innovation and knowledge management initiatives and identifying tangible initiatives based on an understanding of the organisation's knowledge assets.

Schools have temporal, spatial and social barriers to overcome in the sharing and dissemination of organisational knowledge (Cram & Sayers, 2001 p.6). Leonard (1999 p.12) takes this argument further, stating that the imperative for change is that the work environment will demand networking and collaboration skills, including skills in using computer-based collaborative tools. Knowledge sharing networks incorporate aspects of the virtual learning environment.

Teachers create material resources, classroom activities, pedagogical techniques and practical insight into learning, development and human relations. These are all knowledge assets that are potentially sharable and reusable (Carroll et al, 2001 p.9). Traditionally, teachers collaborate very little, manage their own resources and exercise great discretion in their classroom

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practices.   Systemic educational reform has increased the uniformity of learning objectives and learning theory expects collaboration.   Knowledge management answers the dichotomy of these perspectives (Carroll, Rosson, Dunlap & Isenhour, 2003 p.1).

As part of the reform measures teachers need to understand, be encouraged and assume greater accountability.   Policy determines and defines what information to collect and share, by whom and for what purpose.   Issues of trust, privacy, and protection need clarification.   Sustainable knowledge management depends on peer-driven innovations in workplace culture. Innovations in knowledge-sharing practices and teacher professional development become part of the social experience of working together (Carroll et al, 2003 p.10-11).   Knowledge sharing therefore involves peer critiquing, mentor collaboration and delegated decision making.

Carroll et al (2001, p.12) suggest an emphasis on local/regional content to develop local communities of practice and resources.   Teachers should be encouraged to appreciate the importance of their own contributions and publish reflections, annotate, share and discuss their activities.   They identify three levels of knowledge sharing: tangible resources, activity or lesson plans and prototypes in use and barriers such as time, awareness and scheduling difficulties.   Carroll et al, (2001 p.5-8) describe the *Participatory Design Process* that leverages everyday notions of time, place, social relations and usage.   Their approach focuses on tools and techniques for knowledge management that support identifying and acting on opportunities for collaboration, dialogues for articulating and discussing goals and frameworks for representing and sharing knowledge that leverage the common ground of everyday experience.   However, their initiative is still in an early phase of development.   Their *place* approach maps to multiple views and the *time* approach is likely to be represented by a timeline.   However, Carroll et al are looking at only one aspect of knowledge management: teacher professional knowledge sharing.

Carroll et al (2001 p.4) argue that business approaches are desirable in a school situation because knowledge management can facilitate many initiatives aimed at school reform. Long term, participatory design is a key strategy for achieving educational reforms through knowledge sharing. Carroll et al (2003 p.5-8) describe a participatory design process that addresses the concerns and practices of its users. The participatory design process is an informal one in that it leverages everyday notions of time, place, social relations and usage. Their approach involves a commitment to long-term participatory design of teacher professional development and the assimilation of knowledge management tools and resources into an existing community infrastructure.

The issue for schools is how teachers overcome the social barriers in the sharing of classroom resources and professional knowledge both within and beyond their own schools.

Knowledge construction, creation or building

The traditional workplace was designed for productive action and the industrial age school followed suit. In the traditional school, students are evaluated on their individual outputs rather than their outcomes. Outputs are the products; outcomes are "*the benefits for participants during and after the programme activities*" (McGregor, 2003 p.7). Knowledge results from people working together. Traditional transfer methodologies cultivate knowledge only accidentally in contrast to deliberate knowledge creation that characterises inquiry-based learning or question-based learning (Naeve, 2001 p.2; McGregor, 2003 p.8; Combes, 2001 p.1).

Knowledge creation is identified by Paavola et al (2001 p.1) as a metaphor for learning - as the innovative processes of inquiry where something new is created and original knowledge is enriched. They use Sfard's (1998) metaphors for learning as acquisition (traditional view) and learning as participation (social constructivist view). Knowledge creation is a process of *doing* rather than a process of *having* (Paavola et al, 2001 p.2). To *do*

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knowledge therefore requires a social infrastructure and social practices. Paavola et al argue that computer supported collaborative learning (CSCL) can provide the tools, but that the tools alone are insufficient. The social infrastructure needs to be in place as well. They describe how CSCL is based on the idea that computer applications can scaffold and implement advanced socio-cognitive processes for knowledge sharing and knowledge building, but question whether there is understanding of these processes that are supposed to be implemented (2001 p.1).

Paavola et al (2001 p.3-4) explore three models of innovative knowledge communities, those of Nonaka and Takeuchi (1995), Engeström (1999) and Bereiter (2001). They describe dynamics of Nonaka and Takeuchi's model come from the interaction between tacit and explicit knowledge in a knowledge creation spiral that starts with socialisation. Engeström extends Nonaka and Takeuchi's model to the expansive model by recognising the controversies and conflicts in knowledge creation. Engeström's expansive model serves as an ideal or heuristic for knowledge creation and consists of seven stages: questioning, analysing, modelling, examining the new model through experimentation, implementing the new model, reflecting on and evaluating the process and consolidating the new practice. Bereiter concurs with the traditional view that knowledge occurs in the individuals head, but argues that it is not only in the head that knowledge occurs. Conceptual artefacts also characterise the knowledge society. For Bereiter, knowledge creation or knowledge building refers to collective work for the advancement and elaboration of conceptual artefacts such as theories, ideas and models or cultural knowledge. Bereiter draws a distinction between learning (a mental state) and the knowledge objects created through shared knowledge building. Learning is not the primary goal of an innovative expert community or business. He argues that the goal is to solve problems, originate new thoughts and advance communal knowledge. Rather than just learning, knowledge building is a collaborative achievement where people develop, create, understand and criticise various conceptual artefacts. Bereiter's model therefore emphasises a conscious effort to advance knowledge and a

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commitment to go beyond existing knowledge.   This business prerogative should also apply to schools (Paavola et al, 2001 p.4).

They continue by outlining the need for schools to have their students involved in dynamic scientific inquiry and describe their observations of teachers in what they term *"a change laboratory"*.   They describe a Finnish school example of *Citizen Memory* in which primary school students created a database of local knowledge by interviewing the elderly in their community about their experiences i.e. they constructed a continuously growing body of local knowledge (Paavola et al, 2001, p.7).   This activity took students beyond mere learning into knowledge creation.   Paavola et al videotaped classroom lessons and interviewed teachers, students and parents, thereby helping teachers to reflect on their current practice, determine the basic tensions and contradictions and identify a collective proximal zone.   This is an example of what Todd also refers to as knowledge construction (2001 p.10).

Carroll et al (2001 p.24-25) describe *TeacherBridge*, a pilot study that follows a similar method of knowledge creation.   Teachers collaboratively constructed a repository of local knowledge to manage and disseminate local knowledge and develop a learning rich community.   *TeacherBridge* has a simple interface that looks like a website but the user can manipulate each piece of content. The goal of the project was to give teachers tools that allow them to create interactive classroom activities.

However, knowledge building, creation or construction as a classroom activity does not alone constitute knowledge management.   Paavola et al (2001 p.7) argue that "*it has become evident that to succeed one needs to better understand how school communities function and find innovative ways of transforming whole educational communities"*.   Although knowledge construction, creation and building are a part of knowledge management, the issue is therefore what else knowledge management consists of within a school environment.

Knowledge management

Knowledge management is a capability rather than information management or organisational *know-how* (Cram & Sayers, 2001 p.10). Peters describes knowledge management as the transfer of knowledge within and between institutions (2001:3). As a theoretical discourse, knowledge management has emerged as part of the knowledge economy and knowledge society. However, Wilson (2002 p.16) contests the concept of knowledge management describing it as a construct of management consultants. He analyses the volume of knowledge management literature that peaks in 2001 and levels off considerably in 2002. Wilson contends that knowledge management is nothing more than information management and that academic scholarship needs to distinguish between *knowledge* and *information*.

Knowledge management is neither information management nor the management of internal and external publications. It is also not a discussion forum. Rather, it integrates shared communication with shared practices (Carroll et al, 2001 p.4). Knowledge management links four critical constructs: knowledge acquisition, information distribution, information interpretation and organisational memory (Cram & Sayers, 2001 p.4). The ACEL (2003:5) states that to manage knowledge means:

- *knowing what (identification of issues)*
- *knowing how (solutions and applications)*
- *knowing who (building social capital)*
- *knowing when (just in time strategies)*
- *knowing where (building social networks) and*
- *knowing why (deep understanding)*

According to Carroll et al, (2001 p.6-8) knowledge management involves new roles and responsibilities, organisational policies and management and a new workplace culture achieved by implementing strategies such as communities of practice, knowledge repositories, expertise directories, peer assistance and best practice replication. The major impediments to knowledge management

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are recognising the need, hoarding knowledge that blocks sharing and the barriers between functional units (Carroll et al, 2001 p.8). Other obstacles are lack of trust, different frames of reference, lack of time and opportunity, rewards going to knowledge owners, lack of capacity in recipients to absorb new knowledge, the *not-invented here* syndrome and intolerance for mistakes Davenport and Prusak (1998).

"Schools manage and develop society's knowledge through teaching and learning, but … do not always manage their own knowledge effectively" (Carroll et al, 2001 p.3). In business, knowledge management refers to organisational policies, practices and tools that increase individual understanding as well as organisational learning (Carroll et al 2001:5). They argue that business approaches are desirable in a school situation, because knowledge management facilitates many initiatives aimed at school reform. For knowledge management to be effective:

> *… an organisation's knowledge assets should be managed as a continuing process of clarifying goals in the context of uncertainty, negotiating commitment, encouraging mutual learning and continual skill development, maintaining trust among stakeholders within the organisation and beyond it (including societal norms and public opinion) and creating rationale.* (Carroll et al, 2001 p.6).

It is therefore clear that knowledge management is a new concept for schools, one that challenges their traditionally hierarchical structures and the isolation of the individual teacher in the classroom. To address these challenges is to address fundamental reforms to school cultures, structures, practices and curricula.

Knowledge management and education policy

In critiquing the assumptions inherent in the use of knowledge terminology in education Peters (2001 p.14) draws on the work of Coffield (1999), Rifkin (1998), Gorz (1999) and Chisholm (1993).

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Coffield (1999 in Peters, 2001 p.14) undertook landmark research on the concept of the knowledge society and provided important evidence on higher, vocational and workplace education and the transition between education and work. He identified *"breaking the consensus"* of policy agreement on human capital theory and notions of *lifelong learning* and *learning society*. Coffield describes learning society as a *"soft concept"* and found that it had plural meanings referring to a range of ten different concepts varying from skills growth to a reformed education system. Rifkin (1998 in Peters, 2001 p.15-16) argues that empirical data in the USA indicate *"the end of work"* as an industrial age paradigm, the end of work under industrial capitalism. Rifkin describes the shift from industrial capitalism to information and knowledge capitalism in which an elite technical labour force will find jobs. In the light of this, the purpose of civil society and national education systems need rethinking.   *Work* must lose its centrality in the minds, thoughts and imagination of everyone. Work as described by Gorz (1999 p.1) should be seen not as something we *have* but something that we *do*, as a means to self-realisation. Chisholm (1999 p.3) argues that ICTs offer access to different worlds that cannot be controlled, but do not offer the acquisition of the ethical and critical faculties needed for personal orientation and balance in negotiation of those worlds. ICTs therefore offer the tools of empowerment but are susceptible to recreating and reinforcing social polarisation. Peters further criticises the use of futurology and scenario building to inform policy, describing them as "*populist millennium products*". He contests the resulting use of the concepts of knowledge and learning on this basis arguing against the predominantly economic definition of knowledge that serves to inform education policy without thought of other approaches (2001 p.15).

The semantics of knowledge policy is a broad educational issue that should be addressed at regional or state level.

Knowledge management and information literacy

It is common knowledge that the industrial age production paradigm gave way to the information age paradigm. However, the sheer volume of information

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generated has resulted in the quick succession of a knowledge age. The Internet and global connectivity provide easy access to boundless amounts information. Williams (2003 p.45) describes the problem of information overload in terms of "*digital mountains*" or *"landfill sites but not much digital intelligence".* The Internet is "*[a] fundamental contributor to the ever-growing information-glut that requires the ability to discriminate between fact and fiction, waste and value, that all too few possess"* (Oseas, 2000 p.3). It is this imperative to work smarter, coupled with the need for collaboration that characterises the knowledge society. To work smarter requires information literacy. Information skills are the skills required for a person to be information literate. Nishimuro (1999 p.1) demonstrates information literacy in Figure 2.

What is Information Literacy?

Traditional Literacy
- Read
- Write
- Calculate

Computer Literacy
- PC Operation
- Email
- Word processor
- Spread sheet
- Presentation tool
- Groupware
- Database access

Information Literacy

* Computer Literacy
+ Information finding
+ Information understanding
+ Information value/creation
+ Collaboration with others through communication

* = Ability to solve problems, take advantage of information technology and networks

Figure 2: Information literacy (Nishimuro, 1999 p.1)

Nishimuro's interpretation of information literacy is broad, incorporating the process skills of computer literacy as well as the cognitive skills of working with information.

Hargreaves (2000 in Peters, 2001 p.2) expands on Nishimuro's interpretation. He argues that information literacy (including information technology skills) has focused on the development of literacy, while schools are under pressure to generate new forms of knowledge.   He maintains that generating new knowledge requires the following:

- metacognitive abilities
- integration of formal and informal learning, declarative knowledge (knowing that) and procedural knowledge (knowing how)
- ability to access, select and evaluate knowledge
- develop and apply multiple intelligences
- work and learn effectively in teams
- create, transpose and transfer knowledge
- cope with ambiguous situations, unpredictable problems and unforeseeable circumstances
- ability to redesign oneself for multiple careers

The first four of these abilities relate to information literacy and cognition, but the others that Hargreaves highlights shift the challenge of literacy to a different level.

The four levels of content of a discipline are: factual, conceptual, procedural and metacognitive knowledge. They range from the concrete to the abstract and are related to Blooms' taxonomy (McGregor, 2003, p.5). The greater the abstraction the higher-order the cognitive/thinking process is rated. Typically, librarians provide information or facts for resource-based learning. They also provide conceptual knowledge – classification and categories, principles and generalisations, knowledge of theories, models and structures and some procedural knowledge as in "how to", scientific method, research process, information literacy skills etc. McGregor (2003 p.5) challenges librarians to provide also for the metacognitive level i.e. strategic knowledge, knowledge about cognitive tasks, and self-knowledge to make students more aware of their thinking.   This kind of awareness makes it possible for students to manage their own knowledge: strategies for thinking about ideas, ability to

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assimilate those ideas, ability to use these ideas to solve problems i.e. incorporate the ideas into their mental models in a conscious way. Students need skills and tools to turn these into strategies.

Bundy (2003 p.3) is critical of school governance and systems that have provided ICT infrastructure without a corresponding focus on information literacy. He argues that knowledge management cannot be sustained without information literacy or the capacity to recognise the need for information and then synthesise, evaluate and apply it. He concludes that the role of the teacher-librarian in knowledge management is therefore critical.

It is necessary to distinguish between information management and knowledge management, at the same time recognising the need for information literacy as a critical skill or set of skills. It is a logical extension of the role of the teacher-librarian in information literacy to advocate the higher-order or metacognitive level of thinking associated with knowledge creation or knowledge literacy.

Knowledge management and ICTs

ICTs are critical to knowledge management in that they function less to support content delivery and more to support student problem solving and open-ended tasks (Schneider, Synteta & Frété, 2002 p.2; Hanson, 2000 p.19-22). Networked ICTs enable information access and retrieval, communication, collaboration, creativity and innovation. They provide management information through daily notices and a calendar, domain knowledge such as units of work and legacy data such as student reporting and finance records. The critical component is the scope for knowledge creation through connection and interaction. Without this component, there is a concentration on explicit knowledge with no recognition of the level and quality of interaction. Thus, connectivity through ICTs is the difference between a traditional and a knowledge-enabled community. Intranets provide freedom of access, ease of information flow and ease of distribution (Hanson, 2000 p.19-22).

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Leonard (1999 p.11) argues that integrating technology into the curriculum does not mean *'technologizing'* the current curriculum. Similarly, Williams (2003 p.45) points out that the issue with ICTs is no longer technical or technological but the need to focus on how we want to use them sensibly and why. He identifies two significant trends. Firstly, the focus is on the result of distributed learning, not the mechanism. Secondly, in the *'new commons'* of the information society, there is no single point of control. Both proprietary and public learning resources are now widely distributed.

Combes (2001 p.4) describes *Sevenoaks*, a school in Perth.   The infrastructure is designed to facilitate and support an outcomes-focused, flexible learning environment that allows for the integration of ICTs across learning area programmes and encourages the development of online curriculum as a method of programme delivery. The school uses a single portal website and *WebCT* interface to provide students with open access to the Internet and remote access to the school via a Virtual Private Network (VPN). All teachers have a wireless laptop enabling students to access them directly for individual support. Students work freely within an extended day from 08h00 to 17h00. The school has tried out an administration system that includes electronic attendance records and online restricted-access comments by other teachers about students. It has a range of industry partners who are actively involved in courses and supply equipment and technical expertise.

Cram and Sayers (2001 p.7-11) describe a knowledge management tool from a service perspective. *Education Queensland*, through its *Professional Exchange* provides a complete desktop reference service designed to meet the professional development needs of educators, administrators and policymakers. An *Executive Information Service* (EIS) forms part of the *Professional Exchange*. The EIS was established as a selected dissemination of information (SDI) service to identify and sift raw data and information and convert it to a form that could be scanned, comprehended and applied quickly.

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They describe it (2001, p.9) as "*a hybrid of the intellectual input of experienced librarians and push-email technology".* The EIS links to various education news and reports, issues and trends in education, issues and trends in management, IT information management and knowledge management as well as notification of new titles. However, what Cram and Sayers describe here in terms of knowledge management is actually an information management service in that it does not capture the interactions of the users with the information in creating new knowledge.

Winzenreid (2001 p.1) describes how Intranets have offered, since 1996, huge benefits in communication, knowledge management and the learning process.   Intranets that include student management systems, flexible education processes and distance education possibilities increase their usefulness dramatically. Ferndale pioneered integrated Intranet use for K-12[6] in Australia, creating a new kind of learning environment that incorporates open reporting to parents linked to courses, assessment and expectations. It is a transparent education experience shared by students, teachers and parents as partners in learning. Developments were driven by the Library, greatly enhancing the image of the library in the school community.   The objectives of *Information [Ferndale]* are to:

- create a system that effectively managed learning
- create a system that allowed and encouraged multiple pathways
- build on a known and common platform (PC/Windows)
- provide a secure network
- build in flexibility to allow for the unknown
- extend the classroom into the unknown
- allow remote access of the system from anywhere
- provide a transparent educational community

These objectives are achieved by involving all stakeholders in the process. Information on courses and assessments is made available only to parents of

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[6] K-12: Common term, used in the USA and elsewhere to refer to schooling from Kindergarten to Grade 12.

enrolled students, not to the world at large. This information is linked to reporting of assessments. Parents are able to link back from the report to how the assessment was determined and how it relates to the course and its objectives, outcomes etc. Staff can also be contacted directly at this point. Students have the same access to their reports, to the course and to expectations. A webcam enables parents to view classes in action. Student behaviour had improved with the notion that parents might be watching.

Winzenreid describes (2001 p.6) how the VPN allows freedom of communication. Ferndale uses an outside provider routed through *Citris* software. Remote access is in line with the schools non-laptop policy. The decision on compulsory membership of the online community was controversial at first, but resolved through parent forums.   However, compatibility of Macs and low-tech home computers are problematic.

According to Winzenreid, the Ferndale Intranet/Internet development is complex.   It includes a comprehensive online student management and learning system that provides resources, business forms and all communications to parents, between staff and between students in various sections. Different profiles are designed for different types of users e.g. parents can see their children's reports and each child can see their own, but not that of a sibling. Each course is individualised to a particular teacher and consists of coursework, requirements, assignments and a schedule. Reports can be hyperlinked to student web pages or class webs as well as photo galleries and activity reports.   Attendance records will be included in the future. Links and whiteboard notes allow students who are absent to catch up on work at home. Communication is via email or discussion groups that focus on a particular grouping at any particular time. Advantages of the system (Winzenreid 2001 p.8-9) are that students are used as a web resource for supervision, organisation and writing and editing which in turn draws in parental involvement. The library staff also have many opportunities to work collaboratively with students on web developments.   The presence of a webcam has led to improved teaching practices.

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Groupware (Hay & Eustace 200 p. 28-30) technology including applications for capturing, cataloguing and storing, transforming, disseminating and securing information supports knowledge management. Groupware:

- support the efforts of teams or paradigms requiring people to work together
- can maximise human interaction while minimising technology interference
- require a good understanding of group dynamics for effective implementation

People fit this scenario through socialisation, alliance building and workgroup formation (Hay 2001 p.4). Hay and Eustace (2000 p.28-23) also recommends that to implement knowledge management successfully using groupware it is essential to:

- get management involved
- plan for corporate change
- start with a pilot project
- use a group that is supportive of ICTs and innovation
- start with a project that is visible, productive and has a learning impact
- pick groupware that is based on a specific problem that needs to be solved
- make use of internal expertise rather than vendors
- learn as you go, being prepared for resistance but making it fun
- only automate the processes which can achieve productivity or learning gains
- lead with a team.

Dellit and Hazell (2001 p.11-12) describe the Schools Online Curriculum Content Initiative (SOCCI) which:

- provides purpose-built learning objects to assist a wide range of teachers to develop concepts and skills across the mainstream curriculum

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- provides an easier way for teachers to freely create individualised learning sequences for their students

- enables schools to develop repositories of units, courses, and very specific locally tailored services

- provides teachers with quick and intuitive access to resources without them having to master the underpinning tools

- because it is built on hard intellectual work by learning, systems and classification specialists but does not require this work of its users

- combines the work of learning, systems and classification specialists as well as content producers into an integrated sophisticated cache of knowledge products that is distributed, scalable and capable of manipulation and flexible use in many places

- at a school level provides an incentive for and framework in which teacher-librarians can work with teachers to create resource repositories, units of work and programmes designed for quite specific purposes

However, Dellit and Hazell, like Cram and Sayers (2001, p.7) are describing an information management system or service rather than a knowledge management system because it does not appear to involve its community of users in creating new knowledge that becomes part of the system, i.e. it is not cyclical.

Leonard (1999 p.12) highlights the imperative for change that characterises the networked and collaborative work environment. The work environment becomes a virtual learning environment that demands networking and collaboration skills that students need to develop through using computer-based collaborative tools. Leonard argues (1999 p.13) that the transformation and expansion of education in technical communication equates to knowledge management. He identifies (2002 p.14-16) three key areas that demonstrate this:

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- business transformation: spearheading enterprise learning, innovation and the application of breakthrough digital technologies to create new products and services

- organisational learning: reaching a point of metacognition or a more conscious transferral and sharing of knowledge together with the effective use of technology for this purpose and

- web knowledge transfer enablement: global dissemination of knowledge that is indexed and catalogued.

Leonard questions (1999 p.18) whether:

- content is orientated toward knowledge management and electronic communication or toward rhetoric and the writing of linear, paper-based information

- the faculty have extensive industry experience

- the curriculum and courses have been upgraded to reflect the emphasis on electronic communication methods and technologies and the use of the Web as a communication and instructional medium

- students collaborate with each other electronically via the web using chat rooms and email

- instructors are using active learning strategies for facilitating knowledge management and transfer or traditional paradigms

- student activities and deliverables are team-based with electronic peer review, revision and posting via the web

The descriptions of the use of ICTs in knowledge management are highly varied. However, there is agreement that knowledge management requires both a social as well as a technical infrastructure. The issue for schools is therefore to develop both of these in parallel.

Knowledge management and e-learning

This section reviews the use of ICTs as distributed or e-learning in the context of knowledge management. Bell (2001 p.2) outlines the difference between a

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portal and a web-page. A portal is a gateway that interfaces the user and the information, whilst a web-page is aimed at the public at large. "*Portal pages know who they are talking to. They are tailored to a specific range of users. Web pages do not discriminate between one type of user and the next.*" An e-learning portal system such as *Masterfile "captures and shares school knowledge assets"* (Bell, 2001 p.7). Bell (2001 p.4) defines e-learning as:

> *… a set of practices and technologies that empower students in a school to readily access teacher-prepared electronic learning resources that help and guide their learning experiences. e-Learning is a set of practices and technologies that empower teachers in a school to collectively create a repository of managed and shared electronic teaching resources that help them deliver guided teaching experiences."*

However, Bell's definition refers to in-house e-learning and not virtual environments. He also refers to learning resources and not the products of the learning process.   Bell further argues that IT staff and technology should be removed from the centre of e-learning (2001 p.13).

Different authors including Carroll et al (2001), Naeve (2001), Schneider et al (2002) and Williams (2003) describe variations in e-learning delivery systems within the ambit of knowledge management.

Carroll, Choo et al (2001 p.12) describe how *TeacherBridge* community networking provides a communications infrastructure involving video conferencing, chat, email and a shared notebook tool. They found, in their pilot project, that teachers became far more successful when they worked together as a coherent subgroup. The emphasis is on the development of local and regional content and a local community of practice. *TeacherBridge* provides tools for authoring and accessing completed or in-progress student work and tools for extracting templates so that teachers can extract, critique, scaffold and adapt new materials (Carroll, 2001 p.15). It also provides tools for publishing of project materials, searching and awareness mechanisms to

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allow teachers to connect with each other, communication tools to discuss possible collaborations and provide means for adapting and integrating materials It provides tools to publish to the Internet as well as consume information from it. Tools to publish reflections and annotate, share, and discuss activities enable evaluation. *TeacherBridge* therefore requires both a social and technical infrastructure. Collaborative tools have to be engaging and accessible. They include synchronous and asynchronous mailing lists, an online system for capturing and sharing knowledge, rich interactive tools such as desktop publishing, web-design packages, domain-specific tools and HTML. The system enables users to locate expertise and facilitate face-to-face interaction i.e. there is a shift from interaction of people with data to interaction of people with people (Carroll, 2001 p.20-23). .

The *Knowledge Manifold* (Naeve, 2001 p.8) contains tools for constructing knowledge patches to support conceptual browsing and knowledge patch construction and editing. The characteristics of the *Knowledge Manifold* are described in terms of a garden metaphor (Naeve, 2001 p.2-3). Both teachers and students are able to construct their own knowledge patches and tailor their own learning modules by combining resources. As part of the system they can also choose their own learning strategies and learning action plans with the guidance of a tutor or mentor from which they follow their own path through the material at their own pace and document the path in a personal portfolio. Each learning experiences is therefore unique. For support, a student is guided to a live discussion service or expert knowledge source situated in any part of the world and that comes from any educational level. Naeve admits that adapting the *Knowledge Manifold* architecture as a default mode requires changes in the surrounding society.

Naeve (2001 p.2) argues that most nations acknowledge fundamental problems with school systems and in particular the lack of motivation and performance at high school level. Traditional schools rely on the knowledge push factor with the teacher as the knowledge conduit. Naeve's student-centric *Knowledge Manifold* provides an open architecture and seven different

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roles based on an interest-orientated knowledge-pull pattern designed to support inquiry-based and customisable forms of networked learning. Naeve (2001 p.10) advocates inquiry or question based learning arguing that project or problem-based learning is usually designed by the teacher and is therefore de-motivating for students.   In question-based learning, students *own* the questions. The *Knowledge Manifold* answers in part McGregor's concern to raise the bar in metacognitive abilities.

Naeve (2001 p.9) argues that there are three important reasons why such a system should include students as knowledge sources:

- When students engage in the explanation process, they realise that they may not understand so well.

- At the point of understanding, there is a sense of excitement and achievement that enables very effective communication of that new knowledge.

- Interacting with a student on the same level bypasses the threat of asking a stupid question. However, it is important for students to know whom they are talking to; therefore, certification of knowledge sources is essential.

Naeve describes (2001 p.10) the various knowledge roles that support the manifold such as the cartographer, composer and coach. He argues that all these roles should be available to both teachers and students.   However, Naeve does not address the reality of the traditional classroom and changes required to accommodate the manifold, nor does he deal with day-to-day issues of connectivity or access.

Snowden (2002 in Williams 2003 p.46) argues that to manage knowledge *"we need to focus more on context and narrative than on content"*.   Similarly, Schneider et al (2002 p.1) criticise e-learning that focuses on content delivery as opposed to supporting students to solve more complex and open-ended tasks. They suggest that e-learning systems and *Learning Management Systems* (LMS) are behaviourist and do not support 'rich socio-constructivist

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scenarios' as they are all based on the accumulation, organisation and delivery of content. Schneider et al (2002 p.5-6) argue for the effectiveness of socio-constructivist pedagogies and identify a lack of supporting tools for this purpose.

In their exploratory research, Schneider et al (2001 p.6-7) deployed a *Community, Content and Collaboration Management System* (C3MS) with selected projects, teachers and students. C3MSs are inspired by weblogs (blogs), simple content management systems and popular groupware applications. A C3MS is a form of web portal containing a variety of useful information and communication resources (including objects and services) into a single 'one-stop' web site. The C3MS system consists of scenarios classified as gathering and distribution of information, creation of collaborative documents and discussion and commentaries around productions tagged for online interaction. A C3MS system includes inter alia web pages, forums, email and ftp. A C3MS *'brick'* is a component that does a particular task and that a teacher can use in combination with other bricks. C3MSs can be adapted for specific communities and tailored to individual needs. Schneider et al surveyed educational use of such portals and came up with very few hits, although they found that awareness was growing amongst software developers, teachers and researchers. They feel that teachers will use them if the technology is simple and effective and under their control. They identified problems in deploying portals within school structures such as the difficult negotiations required, the issues of pedagogical practice and change, the lack of provision for integration and the management of content, activities and people over time. Schneider et al (2002 p.8) describe the SEED project as an example of a C3MS. The SEED project aims to "*[seed] cultural change in the school system through generation of communities engaged in integrated education and technology innovations".* They argue that there is an important need to support less complex technology for community building and that technology should focus on orchestration and not content delivery. They argue for the C3MS in that it "*maintains the Internet spirit in education which is threatened by formal platforms sold to education nowadays*".

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Williams (2003 p.45) addresses key design issues in e-learning and its integration with knowledge management. His underlying premise is that the purpose of e-learning is useful knowledge and that the design of e-learning should therefore be integrated with the design of related knowledge management.   He recognises that distributed or e-learning has made a difference to peoples lives and is based largely on digital ICTs.   However, Williams points out that e-learning, like its technological predecessors, is now in a consolidation phase. It is crucial to realise that the key issues are not technical or technological but need to focus on *how* we want to use it sensibly and *why*.

Williams (2003 p.46) identifies specific trends in e-learning. Firstly, the focus is on the result of distributed learning, not its mechanism. It is available to all inclusive of age, distance or nationality. Secondly, there is no single point of control: learning resources - both proprietary and public - are widely distributed and becoming increasingly so with the new commons of the knowledge society.

Like Naeve and Schneider, Williams (2003 p.47) is also critical of e-learning's focus on content or abstract procedural information that he describes as 'e-photocopying'. He argues that it may be more efficient, but questions whether it is more effective. For e-learning, the focus must be, not on abstracted procedural information, but on relating it to various contexts in which it is generated, learnt, used and in which they can apply it.

> *Linking, analyzing and synthesizing at a conceptual level helps to facilitate learning and to capture and manage the knowledge that results from learning. Relationships require interaction, including both intellectual and personal relationships.   And strategy requires a synthesis of information about procedures and context, and the experience and knowledge against which to measure and evaluate them. (Williams, 2003 p.47).*

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Williams (2003, p.47) argues for a system interface through which teachers and students can explore, elaborate, rearrange and restructure, link and question the relations between concepts and contexts with a high degree of detail. If the aim of learning is useful knowledge, then students and teachers need to be able to manage their own knowledge as they learn. They must be able to capture and manipulate the links that constitute learning on an appropriate graphics package. Second, they need to be able to capture the knowledge and access it efficiently for use i.e. captured knowledge should reflect the decision-making process that someone using it should follow.

In their study of a Middle Eastern school, Williams and Carmichael (in Williams, 2003 p.48) found that:

- consistent institutional backing is critical to success
- open source software can provide flexibility to combine language, scripts, learning objects and lesson plans effectively and affordably
- most of the "learning objects" can be shared in the public domain
- most of the lesson plans and courses can be kept in the private domain where necessary
- increased flexibility can be achieved with XML tags

Williams and Paavola et al describe different paradoxes that arise. Williams (2003 p.48) highlights the paradox of distributed learning in which people are expected to share learning resources within a competitive and commercialised market in which their jobs and livelihoods are neither protected nor guaranteed. Paavola et al (2001 p.8) recommend that the 'learning paradox' – or how something conceptually more complex is created out of existing knowledge – needs further analysis.

The issue for schools is how they address inquiry-based learning and what changes they make to accommodate new ways of learning. The focus should not be on content, but on knowledge as the product of the learning process, i.e. *how* we want to use ICTs sensibly and *why*.

Knowledge management and the teacher-librarian

The traditional role of the teacher-librarian was to provide access to resources (ASLA, 2001 p.40), variously described as collectors, conservators and custodians of the documentary record of civilisation (Bundy, 2001c p.3) or hoarding bowerbirds (Cornock & Jones, 2002 p.1). These labels describe the *librarian* aspects of the role. New roles identified in the literature are as '*filters and not funnels'* of information (Leppard, 2003 p.5), dispensers (McLoughlin, 2002 p.33) providing systems for effective information use in and beyond the school (ASLA, 2000 p.34). They facilitate inquiry for understanding (Leppard, 2003 p.3) and thinking process, problem-solving and critical reading skills (Carr, 1990). As providers of information resources, teacher-librarians need to form part of a collaborative team to develop the potential for integrating ICTs in the learning process (ASLA, 2000 p.21). They plan and co-teach collaboratively (Loertscher, 1988) and communicate with parents (Shaw, 2003 p.6). Teacher-librarians need excellent IT skills (Cornock & Jones, 2002 p.3) whilst recognising that information literacy and not information technology is the critical issue (Bundy, 2003 p.3; Cornock & Jones, 2002 p.3). *"We must re-image ourselves as proactive, knowledgeable leaders who are the educational interfaces between ICT and learning"* (Langford, 2001 p.1).

They are involved in curriculum design as well as curriculum resourcing (Leppard, 2003 p.6). Teacher-librarians help prepare students for information literacy (Harvey, 2001 p.2): the competencies of collecting, analysing and organising information (Mayer, 1996 p.3) thereby developing students into critical consumers of information (Nimon, 2003 p.1) and independent, courageous explorers (McLoughlin, 2002 p.33). Teacher-librarians uphold values, advocating and enabling the free flow of information and ideas through co-operation and sharing and a commitment to social inclusion (Bundy, 2001b p.9). Teacher-librarians thus perform a hybrid role as educators, managers and service providers (Mallan, Lunden & Elliot Burns, 2001 p.30; Harvey, 2001 p.2) handling multimedia and telecommunications, information literacy and inquiry, learner needs analysis, collaboration and curriculum interaction (Tilley & Callison, 2001). The teacher-librarian networks professionally and

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internally as a service-orientated, engaged leader and motivator (Cornock & Jones, 2002 p.5), an empowering collaborator (Sit, 2003 p.2), partner in organisational learning (Okiy, 2004 p.5) and knowledge navigator (Bonanno, 2002 p.8).   The teacher-librarian provides an atmosphere conducive to learning and understanding (Okiy, 2004 p.5) and ensures dynamic and constructive interactions (Sit, 2003 p.11) for the accommodation of curriculum change. The profession, not the place, defines the service. *"The value that teacher-librarians have is the opportunity to contribute skills and knowledge to key elements of a school's transformation plans"* (Leppard, 2003 p.3).

It could be argued that learning and understanding are the prerogatives of the teacher rather than of the teacher-librarian. However, the label of teacher-librarian is a clear indication of the intention of the role. A teacher-librarian has a unique view of a school, functioning at grassroots level, interacting with learning areas, individual teachers, classes and individual students. This may be termed the *hamster's* view. At the same time, the teacher-librarian has a *helicopter* view (Garratt, 2001 p.20): an objective overview of the learning processes in the school. It is bifocal vision: the ability to see on two planes at once. Simply put, the teacher-librarian sees the big picture from a unique perspective.   The teacher-librarian's role is also a non-threatening one. History and Geography teachers may be threatened by each other's presence in the Human and Social Sciences learning area. In contrast, the teacher-librarian has no territory to defend (Reynolds, 2002 p. 9). Todd suggests that the difference between teacher-librarians and teachers is that the teacher-librarian's agenda is open ended learning, whilst the teacher's is the limit of the assignment, syllabus, subject or exam (Todd, 2000[7]). The teacher's place is in the classroom. A knowledge manager's role is a co-ordinating one working with the different dynamics between teachers, curriculum, students and management within the school as well as networking beyond it. The teacher-librarian's classic role of being proactive in terms of information needs is critical in times of change. It is here that the teacher-librarian's bifocal view

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[7] Todd gave this response in answer to a question following his presentation.

has value and moves the profession from one of information provision to a leadership role.   It is the combination of understanding user needs, understanding the educational environment, understanding the need and purpose for change and proficiency with both creating and using the tools of change that give the teacher-librarian's role strategic value in the knowledge environment.

Knowledge management is, according to Todd (2000 p.40) a significant concept for schools as engaged, interactive, networked learning communities. Todd challenges teacher-librarians to take on the role of knowledge-managers, rather than being just information managers, despite resistance from teachers who do not want to share their knowledge and expertise. Todd advocates imagination, engagement, alignment as requirements to overcome the barriers to teachers sharing knowledge.   Similarly, Cram and Sayers (2001 p.3) argue that it is essential for librarians to understand knowledge management and participate in it; otherwise, they remain just information managers.   Effective knowledge management requires interaction with the community of practice within which the Library is embedded.

Combes (2001 p.4) describes how the shift to inquiry-based outcomes affects the role of the teacher-librarian. She describes the *Sevenoaks* experience that has an infrastructure designed to facilitate and support an outcomes-focused, flexible learning environment that allows for the integration of ICTs across learning area programmes and encourages the development of online curriculum as a method of programme delivery.

The primary objective of the knowledge initiative is not to change the culture of the school or create a knowledge sharing culture, no matter how problematic the culture is perceived to be; nor is it the teacher-librarian's problem to change the culture of the school. Instead, the teacher-librarian's change role "*is to create a knowledge-information infrastructure that changes student outcomes … the construction of understanding and the construction of*

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meaning" (Todd, 2001 p.18).   Todd believes that if the construction of understanding and meaning is what learning is all about then a constructivist learning philosophy and practice centring on knowledge construction and knowledge use must define the role and practice of the school library. Todd argues that an appropriately defined vision for knowledge management, centred on constructivist learning, successfully implemented, may well change the culture of the school (Todd, 2001 p.18).

There is consensus amongst the ASLA XVII Conference presenters (Bell, Cram & Sayers, and Langford & Wall) that it is the teacher-librarian's role to facilitate knowledge management in the school. They point out that the teacher-librarian can provide the innovation and co-ordinate the structures to support knowledge management. An email on the *Infolink*[8] electronic mailing list expressed the view that teacher-librarians should *"get back to basics and forget about technology"*.   Teacher-librarians are not technologists.   The teacher-librarian role has focused on reading for pleasure and information as well as information literacy. Teacher-librarians are traditionally information managers. Their role should not be replaced but rather displaced with a broader, more holistic co-ordinating role relevant to the knowledge age. Getting back to basics is getting back to the learning and how it can best be supported. Learning is the bottom line.

Todd refers to his earlier research conducted together with Southon on teacher-librarians' views of knowledge management (Todd, 2001 p.8). For some it was a "*must do"* because it was new. Others dismissed knowledge management, as they were *"too busy doing information management"*. For others it was information management in a new guise or *"a way of shoring up some kind of professional ego: the search for status, recognition, acceptance and value"*. Todd advocates a focus on what we want our organisations to be rather than what we want to do:

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[8] *Infolink* serves the South African teacher-librarian community through *Schoolnet SA*.

> *[This] is future and goals directed, and constructed on people centred characteristics of working together with a common set of beliefs and values to achieve these goals … [T}he fundamental motive for knowledge management has to be contributing to the development of the smart school, one where knowledge construction and knowledge use are not simply espoused in mission statements and policies, but are the essence of learning and the day-by-day practices in school.* (Todd, 2001 p. 8).

Teacher-librarians have moved from resource managers to information literacy, but the outcome is no longer the information literate student or school (Todd, 2001 p.14). Todd suggests instead that the next wave is that of knowledge management and knowledge management is part of learning. The teacher-librarian's focus becomes one of integrating information, people and the knowledge process into dynamic, constructivist learning environments (2001 p.14).

> *"Your change role is to create a knowledge-information infrastructure that changes students' outcomes … the construction of understanding and the construction of meaning"* (Todd, 2001 p.18).

The issue for schools is twofold. Firstly, teacher-librarians must themselves accept the challenge of knowledge management and secondly schools need to recognise the potential contribution that a teacher-librarian can make to knowledge management. However, it is recognised that the multiple roles played by teacher-librarians may well fall within the ambit of knowledge management.

Knowledge management and schools

What differentiates schools from other organisations is the imperative that schools must succeed at knowledge management because they are society's future and that schools have fewer resources with which to accomplish it (Carroll et al, 2001 p. 4). Carroll et al (2003 p.9) argue that knowledge

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management in schools is challenging because the existing culture of a school, although not unique to schools, is highly individual.

Seven focal areas for research and development in teacher knowledge management have been identified by Carroll et al, (2001 p.33). These are:

- Characterise existing practices
- Knowledge capture
- Retrievability
- Make sense of information
- Rediscovering information
- Support knowledge management through time
- Evaluation of knowledge management tools and procedures

Their approach therefore focuses on tools and techniques for knowledge management that "*support identifying and acting on opportunities for collaboration, dialogues for articulating and discussing goals and frameworks for representing and sharing knowledge that leverage the common ground of everyday experience*". (2001 p.33).

Hargreaves (1999 in Carroll et al, 2001 p.10) suggests that school reform should be seen as systemic innovation in knowledge management. Instead of reform as a top down process, teachers need to understand, be encouraged and assume greater accountability. In reform as knowledge management schools need to define carefully what information is collected and shared, by whom and for what purpose. According to Lewis (1999), a knowledge-enabled environment or balanced knowledge ecology manifests a *know-how* that identifies issues and creates solutions through its internal and external social networks resulting in a deeper understanding.

The ACEL (2003 Appendix 1) describes the example of Western School in which systemic reforms were implemented using a grass roots approach to knowledge sharing. The ultimate result was an administrative system, *Schoolmate,* which recorded student achievements against expected outcomes as well as in terms of their individual records. *Schoolmate* evolved

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into a decision-making tool that added value for its analytical features. The system was subsequently marketed across Australia and implemented in a number of states.

According to Dellit and Hazell (2001:11) the implications for education of the knowledge society are:

- using and experimenting with technology applications
- creating familiarity with technology
- developing attitudes to innovation, risk and knowledge creation
- applying technology to pushing the boundaries of how we learn, how we can accelerate and deepen learning
- analysing the knowledge needed to create human and social capital and ensuring our society can generate such knowledge
- managing our knowledge to maximise learning efficiency

Sustainable knowledge management in schools depends on peer-driven innovations in workplace culture (Carroll, et al 2001 p.11). Innovations in knowledge-sharing practices and teacher professional development become part of the social experience of working together. The ACEL (2003 p.4) argues for the centrality of learning and innovation, suggesting that most schools tend to be very action-orientated. As such, learning and innovation tend not to be rewarded either overtly or implicitly. Rather, they are things that individuals are expected to do in their own time or at quiet periods when the '*legitimate'* work permits. However, today's schools must continuously adapt, develop and innovate. Schools will be better able to innovate through networking together in clusters to develop new products, processes and services. The ACEL sees knowledge management as the key to innovation, sustainability and growth.   The council argues that many schools are beginning to consider the possibilities of knowledge management but have yet to construct a knowledge-enabled environment (ACEL 2003:4).

Todd (2001 p.6) describes knowledge management in schools as:

> *the synergy of organisation and personal practices … the integration of the information knowledge system and management of the*

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organisation for the effective use of that information and knowledge.
Knowledge management facilitates knowledge construction and makes
useful all the information and knowledge that a school possesses.

For Todd, a knowledge-sharing culture is one in which all forms of knowledge support the mission and vision of the school (2000 p.40). Knowledge management provides an opportunity for all school stakeholders to participate in a shared learning process that contributes to a dynamic learning and information environment. Within this environment, curriculum development and the innovative use of technology will help meet learning needs (Todd, 2001 p.2).

The issue for schools, therefore, is firstly to understand the nature of knowledge and knowledge management and then to incorporate it into The systemic reform as they address the demands of the knowledge society and economy. This requires a fundamental change in school culture that needs to develop through a knowledge sharing process rather than being top down. The role of ICTs and the teacher-librarian are central.

Conclusion

Knowledge management in schools is subject to a wide variety of interpretations. There is no consensus or clear definition on what it actually is. Some, such as Carroll et al apply it to the sharing of peer-to-peer knowledge amongst teachers either within schools or between schools. Others such as Paavola et al apply it to collaborative knowledge creation amongst students. Information scientists such as Hay and Eustace see it in terms of groupware, while Cram and Sayers interpret it as an information-providing service and McGregor as facilitating higher-order thinking. Yet others such as Bell, Carroll, Choo et al, Naeve and Schneider align knowledge management with e-learning. In fact, knowledge management could incorporate all of these aspects.

The issues that emanate from the different interpretations of knowledge management and the sub-concepts of which it is comprised lead to a number a questions. There appears to be no documentation within the literature of how Australian and New Zealand teachers share their professional knowledge.   Secondly, the implications of knowledge management for teacher-librarians are not clear. Thirdly, the role of ICTs in enabling teacher-librarians as knowledge leaders is not specified. Finally, if all the different interpretations or aspects of knowledge management are considered, it needs to be established which of them are important to a knowledge-enabled school and what relevance this might have for schools in South Africa.

This study therefore attempts to answer these questions:

- How do Australian and New Zealand teachers share their knowledge in pursuit of learning?

- How do ICTs enable knowledge management?

- What are the implications of knowledge management for teacher-librarians?

- What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

The following chapter describes the findings of the research in which the above questions were explored through visits to schools and conversations with individuals in Australia and New Zealand.

Chapter 3
Research Design and Methodology

Introduction

This chapter describes the design of the study and how the fieldwork was conducted.

This research is a phenomenological case study and is both qualitative and naturalistic. As such, it describes a small sample group of schools and interprets the data provided by the individuals interviewed during the fieldwork. The inquiry is influenced by my personal paradigm as a teacher-librarian. The premise is that with a school's prime function being the acquisition and transfer of knowledge i.e. learning and understanding, then there has to be a role for knowledge management in a school. The research is qualitative in that the method produced thick, descriptive evidence from most of the participant schools which is subject to interpretation in the discussion of the findings. It is a naturalistic study in that the fieldwork was conducted in the natural settings of the participant schools during regular schooldays. The fieldwork was observer-based and conducted within the ambit of teacher-librarianship in Australia and New Zealand.

Knowledge management, particularly as applied to schools, is not described clearly in the literature. Theoretical definitions of knowledge management in the corporate sector abound. The study therefore aims to establish clarity on what constitutes knowledge management in the school environment. The key concepts considered are defined in Chapter 2 and illustrated in Figure 1. As a new field, knowledge management is also not established to any great extent. However, it relies on human knowledge sharing structures and knowledge sharing tools. These two aspects are therefore explored in terms of their existing practice and potential capacity for knowledge management.

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Sampling design and methods

Initial aspects of knowledge management in Australian schools were gleaned from papers presented at the ASLA XVII conference together with interactions with fellow participants.   Papers on knowledge management were largely theoretical in that few were presented by teacher-librarians practising in schools. The rest were presented by academics or state administrators. Visits to schools were set up partly through email contacts originating in the OZTL_Net electronic mailing list as well as through recommendations made whilst in Australia and New Zealand. The itinerary was subject to the vagaries of school term times, flight schedules and budgetary restraints. The choice of schools within each city was influenced largely by the contacts I had made and also partly by the availability of public transport. In the end I was able to visit all the intended schools as well as a few unscheduled and locally recommended schools in the proximity.

The types of schools visited ranged across a wide spectrum: from independent, church-affiliated and state; high, intermediate and primary; urban and suburban; girls', boys' and co-educational schools and from polarised socio-economic sectors. The profile of each school is mapped in Table 4 (page 51).

Data collection methods and fieldwork practice

Once contact had been made with a school, the purpose of the visit and itinerary were confirmed. All schools willingly granted considerable time to my visit, usually between two and three hours, while one school charged a fee for a tour and discussion. I met primarily with the teacher-librarian/s in all schools except two. At one of these I met with the IT teacher and at the other I met mostly with the principal, as well as the teacher-librarian. In one school I met with both the IT Director and the Librarian.

For ethical reasons the names of schools visited have been replaced with fictitious names. Any resemblance to existing school names is accidental and unintentional. Whilst two schools visited were already documented in the literature, for consistency their names were also changed.

	Independent	Government	Boys	Girls	Co-ed	Senior	Intermediate	Primary	Student population	Staff complement	Teacher-librarians/librarian	ICT staff	Library Assistants
Caversham College	x		x			x	x		-	128	3	3	
Cornfield	x				x	x	x	x	1800	200	7	7	4
Ellwell	x			x		x	x		1560	150	4	9	1
Fellside	x		x			x	x		950	106	4		2
Ferndale	x				x	x	x	x	900	-	4	-	1
Havilland HS		x	x			x	x		1350	142	4	-	2
Herschelle College	x			x		x	x		900	-	2	-	2
Melville College	x			x		x	x		2200	700	15	-	2
Northview	x		x			x	x		1600	130	1	7	1
Nottingham	x		x			x	x		1800	274	3	-	2
Smithfield	x			x		x	x		1360	-	3	6	1.5
Southern		x			x			x	465	-	1	0	0
St Teresa's	x				x			x	400	-	1	-	1
Tonbridge	x		x			x	x		1400	-	3	-	2
Wellesley		x			x		x		690	-	3	1	2
Western		x			x			x	780	50	1		1

Table 4: Schools visited: type, populations & staffing

All visits took place during October 2001. Using an interviewer-administered questionnaire, I established basic facts about the school relating to size, staffing and facilities and then conducted a semi-structured interview. With the permission of the host schools, I used a video camera for two purposes: the first

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was to capture a brief visual record of the settings and the second was to capture the interviews themselves, for which only the sound was used. In interactions that sometimes lasted a number of hours, this allowed me to concentrate on the interaction itself rather than recording copious notes. Each interaction with the teacher-librarian/s (as well as the occasional IT teacher and one school principal) followed a similar pattern.

Using the video camera as a recording device proved relatively reliable, despite my inexperience with the medium. Sometimes the verbatim record was curtailed by either battery or tape run-outs and I had to rely on note taking. One school requested that I sign a declaration regarding the use of video footage, although the intention was not to produce a video from footage obtained, but merely to have a visual illustration of a school if required e.g. for a *PowerPoint* presentation.

Issues of measurement

The instruments used for this study and the questions that each was able to provide answers for are tabulated in the following matrix:

	Instrument 1	Instrument 2	Instrument 3	Instrument 4
	Analysis of conference papers	Questionnaire (IAQ)	Semi-structured interviews	Informal & other discussions
Question 1	x		x	
Question 2	x		x	
Question 3		x		
Question 4	x		x	x

- **Question 1:** How do Australian and New Zealand teachers share their knowledge in pursuit of learning?
- **Question 2:** How do ICTs enable knowledge management?
- **Question 3:** What are the implications of knowledge management for teacher-librarians?
- **Question 4:** What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

Table 5: Matrix of instruments and research questions

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A list of the ASLA XVII Conference papers on Knowledge Management is included in the List of References appended to this study. These papers were not analysed in the findings for their different interpretations of knowledge management as these are discussed in the previous chapter, but for the viewpoint or perspective from which they approach knowledge management. The interviewer-administered questionnaire (IAQ) is appended (see Appendix E). Questions posed in the semi-structured interview are included as Appendix F. The questions were derived from my understanding of the literature at the time, including the ASLA XVII conference papers. Informal discussions were held over weekends, the proverbial cup-of-coffee or journeys.

Data capturing and editing

In the evening each interaction was reviewed and the audio tracks of the videoed interviews, together with any notes, were transcribed verbatim as text documents onto a laptop. Although intensive and demanding, this method provided a wealth of information which, besides detailed factual and process descriptions, included nuances that proved valuable in understanding emotional and attitudinal issues behind knowledge sharing, collaboration and school cultures. Inevitably, as the visits progressed, the interviews changed slightly, not only in response to different school characteristics, but also as experience dictated what could be omitted and what else needed to be asked. Lastly, I interviewed the Project Officer of the AIS (NSW)[1] who provided insight at a state level on knowledge sharing practices.

On my return to South Africa, I transcribed the balance of the interviews and descriptive text was lightly edited for grammatical accuracy and to eliminate repetition, while opinion and comment remained verbatim. Accidental omissions in basic data were acquired from the school's website, marketing and other publications that were provided or by email.

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[1] AIS(NSW) – Association of Independent Schools of New South Wales

Data analysis

To begin with, basic facts, if not provided separately, were extracted into the IAQs. Printed transcripts were annotated by hand and data was compared and extracted around the following broad themes which emerged from preliminary reading of the literature, the conference papers and the school visits:

- collaboration and sharing knowledge
- the implications of knowledge management for teacher-librarians
- ICTs as enablers of the knowledge ecology
- the changing culture of the school

As the analysis progressed, trends emerged from which I was able to generalise and identify patterns of collaboration and knowledge sharing that indicated, if not knowledge management per se, that a knowledge culture was emerging in a number of schools. In other schools, details of both the sharing and the use of ICTs for the purpose were described in detail. The use of ICTs for the various aspects of knowledge management identified was combined into a *Knowledge Management Toolbox* (Appendix D). To illustrate certain findings, quotations from the interviewees were extracted from the transcripts. The findings were then analysed in terms of the literature and conclusions drawn.

Delimitations

This study does not purport to be a comprehensive study of knowledge management practices in schools in Australia and New Zealand. Rather, it is a personal exploration of the schools that I was able to identify and reach given the limitations of time, distance and budget. Further, the study does not claim any degree of definitiveness, other than what I am able to provide through personal understanding and interpretation. It was not intended to inform either the individual teacher-librarians or the schools that I visited. However, given the topic of knowledge sharing, in producing this study I trust that the knowledge

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gained from the experience, once shared, may be of some value to individuals and schools in Australia, New Zealand and South Africa as well.

Summary

This chapter has described the design of the study and how the fieldwork was conducted. It has detailed the process of the research including the instruments, data analysis and limitations.

Chapter 4 will present and discuss the findings of the study.

Chapter 4

Findings

Introduction

This chapter reports and discusses the findings of the research undertaken in schools in Australia and New Zealand and draws interpretations. Summary profiles of each school are included in Chapter 3, Table 4.

The research focused on the contribution of knowledge management to learning and was an exploration of its practice and potential in Australian and New Zealand schools. The research questions addressed during the school visits were:

1. How do Australian and New Zealand teachers share their knowledge in pursuit of learning?
2. How do ICTs enable knowledge management?
3. What are the implications of knowledge management for teacher-librarians?
4. What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

Analysis of ASLA XVII Conference papers

The ASLA XVII conference provided an introduction to the concept of knowledge management as it was perceived in the Australian teacher-librarian fraternity. At the time I committed myself to the research and the journey, the conference programme was not available and I was therefore unable to determine the focus of the papers beforehand. Table 6 provides an overview of the conference presenters and the aspect of knowledge management on which they focused.

Only two of the listed presenters were practicing teacher-librarians in schools. The others included vendors, state librarians and academics. I realised at the time that there would be few examples of schools consciously practicing

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knowledge management. Consequently, what I would need to look for were indicators of knowledge sharing or collaborative practices and how ICTs were used to support these.

Authors	Sector	Aspect of KM
Brooks	Tertiary	Culture trek: to boldly go where no library has gone before
Bundy	Tertiary: University Librarian	
Combes	Sevenoaks Secondary school: Website Co-ordinator	The role of the Teacher-librarian in setting up a system to manage documentation, support materials and online curriculum
Cram & Sayers	State education service: Access Ed Queensland	Virtual information services
Colin Bell	Vendor of *Masterfile* etc: *Concorde Australia*	e-learning
Dellit & Hazell	Le@rning Federation: developers of SOCCI	SOCCI online curriculum content in a managed information environment
Dillon	Tertiary: School of Information Studies	OZTL_NET mailing list for information professionals in Australian schools
Ellyard	Futurist	The teacher-librarian as a pro-active knowledge leader
Hay	Tertiary: School of Information Studies	Using groupware for knowledge management in schools
Kallenberger	Manager, Education & Training, State Library NSW	Working together to face the future
McDonald	State education service: Access Ed Queensland	Virtual schools and virtual resources
Winzenreid	[Ferndale] College K-12 school: Information Services	VPN and Intranet for sharing curricular and management information with students, teachers and parents
Todd	Tertiary: School of Information Studies	KM as knowledge construction in the classroom; the smart school of the future

Table 6: Aspects of Knowledge management at the ASLA XVII Conference

The dearth of evidence of knowledge management in schools was supported by Todd and Southon's contention that many teacher-librarians were dismissive of knowledge management as they were either too busy doing information management to find time for knowledge management or they saw it sceptically as a way of shoring up professional ego (Todd, 2001 p.8).

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1. How do Australian and New Zealand teachers share their knowledge in pursuit of learning?

Lacking a defined approach to knowledge management in schools, interviews with teacher-librarians focused on how knowledge was shared.   Discussions elicited details of formal or informal structures through which knowledge sharing was achieved.

In Sydney I had the opportunity to meet with Estelle Lewis[1] who is currently running projects as part of the *Quality Teacher Program* (QTP) funded by the Australian Commonwealth Government.   Lewis defined effective professional development as *collaborative project-based work including support*.   One of her initiatives was *Project Based Learning in IPT and SDD* that provided support for the new outcomes-based HSC syllabus that was examined in Year 12 for the first time in December 2000.   The initial component of the project was the development of an online support website that allowed teachers to identify appropriate professional development opportunities and to share their teaching resources and ideas.   A second component was designed to result in workshops that would focus on project-based learning.   Lewis quoted a comment from a teacher on the project: *"We made such assumptions about what the students could do. In the classroom we are so isolated. We've now resolved to visit each other's classrooms, to learn from each other."*

This teacher's comment epitomised the isolation that teachers feel. It is often the case that they are not aware of the benefits of collaboration and knowledge sharing until they are given the opportunity to experience it.   Teacher-librarians on the other hand, although isolated from each other in many schools, rely on their relationships and the sharing of expertise with teachers to be able to carry out their profession effectively.

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[1] Estelle Lewis is a Teacher-librarian by profession.   As Project Officer for the AIS (NSW) she runs professional development courses and projects including those on information skills, assessment and other subjects and areas needing research.

What emerged from the discussions held with teacher-librarians were firstly, structural patterns or the more formal side of school organisation which gave people in different departments, access to each other. These formal structures could be loosely categorised into one of three types: the integration of ICTs into the curriculum, curriculum development structures or professional development in information literacy. Some were committees that met regularly, others were looser. These structural patterns are detailed in Appendix B.

The second characteristic that emerged from the discussions was the different approaches used by different types of schools. Generally, in boys' independent schools there was much more resistance to knowledge sharing than in girls' schools, co-educational schools or junior schools. In these boys' schools, some teacher-librarians remained optimistic and pro-active in trying to advance the sharing agenda, in others there was a feeling of helplessness and isolation.

The Teacher-librarian at Caversham College, a boys' independent school, highlighted some of the problems, yet was still optimistic about what could be achieved:

> *Some teachers are far more advanced than others. There's no policy here, they just hope. That's why my mission in this place is to keep everybody going. Most of the staff are here six days a week and they work till six at night and they have families so they just don't have time. Also the staff is aging somewhat and are becoming reluctant. So they don't want to get out of their comfort zone and change teaching methods that they've been happy with for years. If we could get over the hump they would release time by having things online.*

> *Doing resource-based learning? It varies. There's no philosophy there. Chalk and talk: yes, still very much so. It varies. There are some traditional people, some very resource based. Years 11 and 12, with their*

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emphasis on exams, means that many teachers are using traditional methods of teaching and means of providing resources. That's the battle: to get away from the traditional methods.

Nobody knows what who does unless you are closely associated with that person. That knowledge is totally non-accessible. But, I made the suggestion of starting up with a staff one [Intranet] because also a lot of retired staff will come back and do exactly the same thing. There's a big fear of privacy though: why do you want my details? The idea got knocked on the head. In terms of retaining the knowledge (data – information – knowledge) we're still resorting to analogue forms of print and, to some extent, maybe audio tape.

I want to be able to present the material for all that's going on within the school together with the support for it with one access, hence this [Intranet]. I've just written bits and pieces.

Barriers to sharing identified in this transcript were time, the age factor, a lack of overall philosophy, traditional methods with exam emphasis, teacher's accessibility to each other, suspicion of online methods and reliance on analogue print. The example also demonstrated the co-ordinating role that teacher-librarians play through their wider view of curriculum implementation across all levels and all subject departments.

At a similar institution, Nottingham College, a middle school was being phased in and the Teacher-librarian acknowledged that there was more cross-over between teachers and key learning areas (KLAs) at that level, although *"conservatives don't like the middle school philosophy".* In contrast, Years 10-12 were still very text-book based. The Teacher-librarian described the frustrations linked to tradition. This school was one of a select group that were all more than 100

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years old. *"Teachers are conservative. It's the way of the people, not the school … they don't jump at change".* The Teacher-librarian was frustrated by the lack of co-operative planning with teachers and described what little there was as *"patching up".* In his opinion *"teachers' information literacy skills are only average: they are aware, but don't practice them".* He described finding resources for units of work, preparing task sheets, and adding web sites to the VPN *"when you know about it"* i.e. without a culture of collaboration and sharing, supporting the curriculum became ad hoc*.* Whilst the Teacher-librarian was represented on the IT Committee, there was no direct representation in the Heads of Departments Committee (HODs). *"Someone else has responsibility for the Library, Careers, and Special education - all the odd departments - but that person is not involved in any of them".* This was to be changed as the school was advertising for an HOD Information Technology and an HOD Support Services. Decision making was not collaborative as is evidenced in the comment: *"The IT teacher made the decision to go VPN – internet would have been better, it depends on the server".*

Statutory curriculum change was therefore an important factor impacting both the way teachers worked and the way they worked together. Unlike, the first school described above, the Teacher-librarian was not positive and appeared to feel that his role was sidelined.

In New Zealand, a similar culture prevailed at Northview College. The Librarian was aware of collaboration in curriculum and IT but felt herself isolated from the process, particularly regarding information skills which would clearly have benefited from collaboration with the Librarian:

> *Information literacy is not as integrated as it could be. It's often taught more within its own different department rather than having a policy that's taught within the whole school. I don't think that each department is itself effectively teaching information literacy. There's no overall school policy*

that I'm aware of. ... Often different departments will send out different research skills sheets so we don't actually handle it quite as well as we could. … Sometimes students are not following instructions that have been given or haven't spent enough time in the classroom brainstorming, mind-mapping etc. They often haven't clearly defined what it is that they want to research and also [its] partly still the newness of the Internet – they go straight to the Internet with tunnel vision, not giving enough thought into researching specifically. They waste a lot of time and become quite frustrated: there's no thought-through strategy. When the research area is limited its much better than when they're told they can research anything: 'We're going to have speeches now so you can give a speech on anything'.

This Librarian was clearly aware of what she could contribute, but seemed powerless to make an appropriate contribution to the learning process. The Librarian's feelings were summed up in the comment:

At times I find that I'm slightly isolated in terms of being aware of what's happening and where the Library actually fits in. … Decisions are being made about the Library and I don't fully understand what is happening but also I have to live with the frustration of not being able to give the kind of service that I would like to give. Part of it is, I guess, that I have not found it terribly easy as a person to be able to take on the whole computer thing – the jargon, lingo and what have you. Courses have for instance been held straight after school and having the Library open I can't get to them and those that I've been to aren't always relevant if I'm not using the programme myself.

She acknowledged however that a *"tremendous amount of training is done in IT and in supporting staff [in its use]".* Five teachers had the role of personal IT trainers or '*PITbulls'.* Each trainer was allocated a certain number of hours for

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this duty. They worked in a system of teams that depended on the ability level of the individual rather than a department structure. Each individual teacher was assigned a trainer who they could approach for assistance. The HOD (IT) concurred that there was no close collaboration between his department and the Library, attributing it to an historic default. He acknowledged that a problem was created when a *guru* deserts, i.e. experienced teachers left and took their know-how with them. A balance of skills and responsibilities was needed to address this.

A new appointment was about to be made that would oversee curriculum development and integration. This would contrast with the existing hierarchical structure which fed down from a senior management team, through the HODs to faculty meetings, excluding the Librarian. General staff meetings were held at a time when the Library was open and in need of staffing, which also excluded the Librarian.

The problems that existed in this school clearly stemmed from the hierarchical school structure and although systems were in place for developing teachers' IT skills, the lack of other channels or opportunities for collaboration was clearly evident. Despite this, the Librarian acknowledged that *"we're just here to do our level best and to give the boys the skills. It's a lovely school to work in"*. The hierarchical structures therefore do not impact on relationships which would indicate that the potential is there for collaboration and knowledge sharing to be encouraged.

Amongst independent boys' schools, a multi-campus school from Year K-12, Fellside College, exhibited a good example of knowledge sharing. Teachers booked both the Library and the services of the Teacher-librarian and planned co-operatively for the integration of information skills. A simple online template was used to help set up units. The demand for this service was greater than

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what the Teacher-librarian with information literacy responsibility could cope with. As more teachers made use of the service, others become aware of it. This exponential growth was a result of knowledge sharing which, in turn, was facilitated in part by the simple, but effective strategy of providing all teachers with lunch enabling them to network.

At Tonbridge College, a boys' independent school, the Teacher-librarian described how curriculum development took place only within each department as there was no curriculum committee. The Library offered a wide variety of services and at the time a booking was made by the teacher, help was offered, but not always accepted. Teachers were struggling with the challenges of the new curriculum and developing new ideas. Too many handouts were being given to students, especially in Years 11 and 12. Students wanted information found for them. However, in Years 7 and 8, four teachers per form from English, Maths, Social Science and Languages were teaching across these subject areas and *"some pretty interesting work"* was being produced. Secondly, a pilot information literacy initiative using outside academic consultants (Henri and Eyre) was targeting teachers at the beginning of the process. Six teachers had volunteered to take part. Teachers involved in the project would *"need to have good teaching skills".* They each had to contribute an assignment and discuss with the group the information literacy skills involved. Teachers were then to teach in teams, including a Teacher-librarian after which the process and content would be evaluated at student, teacher and teacher-librarian level to establish if student outcomes had improved. The initial response from both teachers and students was positive. One participating teacher was to speak to others later in the term with the hope that it would have a cascading effect.

Whilst similar problems such as the traditional culture, challenges of the new curriculum and students demand for handouts were present in this school, knowledge-sharing practices were being implemented both through the Library

and generally within the school.   These were clearly aligned to curricular changes. Curriculum change is therefore an important factor in bringing teachers together to share in the process of developing new materials and methodologies, i.e. in developing new knowledge.

Havilland High School is a large state school for boys. One Teacher-librarian is the Curriculum Resources Co-ordinator and leads curriculum and technology initiatives. This is critical to the school's approach. Together with the Enrichment Technology Assistant they run courses for teachers after school.

> *We have this thing called 'Choose your own adventure' where we have about 16 different projected teaching ideas and they choose which one they want to do. They come and do it in the Library for a couple of hours. We spend the time focusing on a particular programme or piece of software or the idea of electronic information sources so that it would give them something to take away to build into their knowledge and understanding of how they might have used it in the curriculum. … The teacher does the thinking; we help them work the programme. We've built up a good relationship with teachers in this way. … The Assistant has 6 periods per fortnight in which to work with teachers on any technology aspects. At the moment we are running an Internet course as part of the PD [professional development] that we do after school. I am working on a web quest with the history faculty on the topic of Australia in WWII. We're gradually getting there; it's new for them. What has really sold it to them is that they will be the first ones in the school to do it. We had a curriculum day last term and we talked to them about it. [We are] working on the history web page and on the web quest. As a staff of four Teacher-librarians we did a web quest about web quests as our own PD and we will probably go and do that with the History department which could be quite interesting. We try to be pro-active. We try to suggest different learning experiences and activities. Best practice is our aim.*

In this instance, the Library is the centre of technology developments; professional development stems from the library and is based on the need for teachers to develop new ideas for implementing new curricula.   It is both knowledge creation and knowledge sharing in action. "*Having this opportunity to work with teachers on curriculum related technology issues is seen as critical.*"

In contrast to some of the boys' schools, knowledge sharing appeared to be a more natural process in girls' independent schools, especially in New Zealand. The Librarian at Smithfield Collegiate described her school in this way:

> *We have a curriculum team that anyone can join if they're interested. It began last year … for developing ideas. It's not just HODs. We have a regular senior staff meeting and anything to do with curriculum is discussed there.   The Librarian attends.   It's a combined effort really: there's no one person with overall responsibility. One of the strengths of the school is the sense of people working together. When people need a hierarchy its there, but the fact of the matter is that we have many teachers who are middle-aged although we do have some younger staff and people just get on – it's a very friendly place, a commonality of being, a sharing place. It's a strength. Staff is expected to take responsibility for things like the Intranet for instance. Rather than have someone do it for you there is a lot of professional development here … you are encouraged to learn new things for yourself, such as using the digital camera. Rather than getting someone to take your photos, you are encouraged to get the camera and do it yourself.   Staff is being encouraged to do this all the time. There's a lot of resource sharing and co-operation.*

The *'commonality of being'* appears to be the key to knowledge sharing in this school. It is part of the school culture. Interestingly, the Librarian described a similar atmosphere amongst the girls:

Girls that come in here pick up the spirit of the place and they seem to ride the wave. They come out at the end with all of their wonderful attitudes, most of them regardless of whether they naturally have them at the beginning … its something about the way this school operates and the expectation that each girl does their best. It's just a given and it's true. It's the same as the expectation for the staff … very impressive quality of the teaching staff. The classes are not streamed. A lot of independent schools stream them - the boys' schools in particular - but they don't here.

Sharing in this school was intrinsic. The question then arises: what leads to such an atmosphere? It may be ascribed partly to a feminine environment which is generally speaking less competitive, and also to the inclusive practice. The quality of the leadership, the non-hierarchical structure and the encouragement given to teachers to try things out were identified as other contributing factors. Trust was implicit in the way the teachers worked together.

At Ellwell College, another girls' independent school, the Librarian, although an HOD, was not involved directly in curriculum development. Curriculum issues were discussed at general curriculum meetings. The school had an overall policy on research-based learning with planned components in all grades. Also, each department had to write its own policy on the integration of research-based learning which was required to indicate a) the use of IT and b) how information would be extracted. In this way there was ownership of it by teachers and departments and an imperative for them to work together with the Librarians. The new curriculum (NZCE) that placed more emphasis on student assignments in the senior years was about to be introduced and was expected to impact on the library.

The Librarian described the atmosphere in terms of teachers *"bound by a strong school work ethic".* There was much *"horizontal teamwork"* and many meetings

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although staff also had extra-curricular obligations. The *"basis of the teamwork is an open information policy in the school: there are no hidden agendas. … There's no them-and-us feeling."* She identified a strong sense of teamwork between the members of the library staff and between the library staff and the teachers. Professional development information was provided for teachers on an ad hoc basis either by email, internal mail or *"corridor communication"*. Periodicals were also circulated.

At Melville College, a girls' independent school with extensive facilities and high staffing levels, the Teacher-librarians were frustrated by factors that inhibited knowledge sharing. *"What we do is not always understood. We are undervalued as information professionals"*. Curriculum integration was not a formalised process and they were *"not very happy with the input level"*. There was no information literacy policy, but a professional development course had been run with the English Department, although *"there were some issues"*. Teachers were able to book the help of a Teacher-librarian at the same time as they booked the library, but this did not always appear to happen. There was however, a rapport with teachers in certain departments where team-teaching and planning of assignments right through to the assessment stage was happening. In the classrooms, teachers used a full range of teaching strategies from chalk and talk through to constructivist, but in the opinion of the Teacher-librarian *"it could be better"*. The school structure was hierarchical: as *Director of Library Services*, the Teacher-librarian reported to the Deputy, with no direct access to the Principal.

Despite the apparent lack of a knowledge sharing culture amongst the staff, this particular school had an extensive Intranet (described later in this chapter) and a system of *Information Networkers* developed for the Year 7 and 8 students. This voluntary programme ran twice per year on a rotating basis. Girls were trained in information literacy, network environment issues, hardware and software issues, the care of laptops, scanners, hubs, printers etc and webpage development i.e.

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the information literacy skills and the ICT skills were not seen as separate. Once trained, members of the *Networkers* became peer specialists and teacher's assistants within the class. As part of the course the Year 7s constructed a web page of resources for use in assignments which was published to the Library home page. The Year 8s were remodelling the information network pages to develop a resource on information networking. At student level, this school was certainly manifesting signs of knowledge creation and sharing.

At Southern Primary, the Librarian/ICT Teacher planned together with the teachers at two year levels each term. To integrate information literacy each classroom had a chart of the skills to be integrated each term. They looked at the units and made decisions about what the children needed and what would fit into the units for the term. *"I work closely with the teachers – there's a lot of co-operation."*

Wellesley Intermediate was a large school in which 690 students were divided into 22 classes over Years 7 and 8. To manage such large numbers of similarly aged students the school was organised into syndicates of 3-4 classes. Classes within syndicates were located together. Teachers worked and planned together within syndicates. One teacher was allocated responsibility for each learning area for budget purposes which included budgeting for Library resources.

At Delville High School, prior communication had indicated that the visit may well be worthwhile, but it was in fact disappointing. I met with the IT teacher who also taught Maths. I discovered that the Year 9 theory and practice of IT appeared to be little more than the study of application packages. Year 11-12 students are offered an optional Information Processing and Technology course which follows the NSW syllabus. This syllabus includes a Bibliography component but there is no liaison between IT and the Librarian on this section. There was no indication of co-operative planning with or between any other teachers. The IT department

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has responsibility for the training of teachers. There is no information literacy policy, no curriculum committee and no Intranet although the school does have a web site. This school clearly relied on a traditional model of curriculum and structure. Although it was a government school, it did not manifest any of the innovations evident in schools such as Western Primary, Southern Primary, Wellesley Intermediate or Havilland High School. Despite the dearth of innovation, the IT teacher appeared to be quite happy with the status quo. It was not possible to meet with the Teacher-Librarian as the Library was in use as an exam venue with the Teacher-Librarian invigilating.

The two schools in which knowledge sharing was overtly part of the culture to the extent that the schools claimed a knowledge management philosophy were Ferndale College and Western Primary. The only similarity between these schools was that they were co-educational. Ferndale served a high socio-economic community in the northern suburbs whilst Western served a socio-economically impoverished suburban community. Western embarked on a knowledge sharing process in order to capture and capitalise on their know-how. Ferndale developed an Intranet/VPN in order to distribute curricular knowledge between stakeholders in the community.

The technical aspects of Ferndale College are described later in this chapter. In a lengthy discussion with Dr Arthur Winzenreid[2], he revealed the challenges to knowledge-sharing encountered in the process of establishing *Information [Ferndale]*.

> *Each learning area in the Curriculum Skills Framework (CSF) has a learning area leader. Within that, for example, the Maths teachers will meet with the Learning Area Leader and discuss converting the CSF into the different grades. Then the teachers for Maths in each Year will look at the outcomes and evaluate which of the CSF measurements they wish to*

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[2] Dr Winzenreid is a teacher-librarian and holds the position of *Director of Information Services* at Ferndale.

use or what they wish to add. In Year 6 there are two teachers who collaborate intensively, so what is done in one class is almost exactly the same as is done in the other class. In the Year 4's there are two teachers teaching one large class so it's always the same. Each of the Prep teachers is doing different types of things depending on the group they teach. In Year 9 amongst the Geography teachers there are differences. There is one "rabid environmentalist" and another with a very different focus. And so the concentration is totally different.

Dr Winzenreid also described the way that *Information [Ferndale]* started.

When I first moved into the school we had two machines wired together. That was four years ago. I decided early on that I wanted to get something fairly consistent going and that I wanted the Library to lead. So what we did right at the very start was to set up that [Intranet] page with the timeline and the newsletter. I also included sports results and a few other things. This was the original "Information [Ferndale]". I developed a resource based Intranet. This is what a lot of these off the shelf products are. They are only resources bases. We tried to get as many resources as we could. I started a policy whereby if someone let me know a topic, within 24 hours I'd have a web page up. I did this to try and make them aware of it and to try and get them to use it, to get them going. I followed a format that shows what is on the computers, what is in the books in the Library and so on. At the top there was usually a bit of information. I involved the students. Wherever possible I would use students to actually do the pages. That is why you get bubbles and moving images and things like that. In many cases they did both the searching and putting the links in. Often they'll know what to write and how to write it, but they'll also know where there are some decent links. They probably find better links than we do and can assess the level at a glance. Sometimes I would have to do things like add in book titles. The students chose many of these.

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Once we got going, teachers began to say how about this one or this one. So that's where it all began and it began as a growth out of the Library. Gradually I extended it as much as I could until the new boss came in and he said hey, this is fantastic. Let's develop it right across the school. He added the management requirement onto that too. It grew from that … which to my thinking is the way to do it because you're putting education first and not the technology first. The technology is being made to work for education. At [another school] not far from us, there are two technology leaders who say you may have this computer here and you may not have it anywhere else and it will do this. It is just thwarting the teachers. They ask how come we can't do this.

In analysing how *Information [Ferndale]* started, a number of important factors are evident. Firstly, the initiative was based on the curriculum, not the technology. Secondly, the students were involved, contributing their knowledge and skills. Thirdly, the initiative grew out of the Library because it had an overview of the whole school – all departments and all grade levels. Although it started as information management, involving student contributions broadened the concept. Parents also became involved at an early stage. As the system expanded to a complete online curriculum parents were given access to ongoing reporting which allowed them, at any stage, to monitor their children's progress. Continual assessment is reflected in the integrated system.

There is no limit to the length of the comment … so the English staff love it. You can have any number of these comments. There's the general comment about the student's whole progress in English. That will be updated at any time. The system generates an online record book. It gives you the ability to very quickly go through it and just change the progress markers even if you don't want to make a comment. All of that is linked back to the outcomes and behind that are the resources and your

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> *Library links and all those other things. It's a completely integrated*
> *system. That is something that you cannot do with Blackboard and other*
> *similar programmes. You can link to an item up here and you can*
> *sometimes link backwards to a couple of links but you can't flow it all*
> *through and have your links between progress and samples of work done*
> *etc.*

The system also extended to live monitoring of the classroom, i.e. the classroom became a transparent environment in which parents could share. Dr. Winzenreid described the parents' response:

> *Starting the way we did has generated this entire whole school approach*
> *into parents, which has been a brilliant working move. The parents are*
> *rapt at what is coming up for them in that they'll be able to log in and see*
> *what their kids are doing. 'Big Brother' was quite the rage here recently.*
> *Just at the time this was on, I put a camera on and asked how many would*
> *like it in their classrooms. There are five level areas that will get cameras*
> *in their rooms next week. The parents are thrilled at this new bunch of*
> *toys. Next year we will put them into our Prep area and for certain hours*
> *of the day they'll be turned on. Only they will be able to see it, no one*
> *else. The teachers have asked for a specific time so that they know when*
> *they'll be on air and can be prepared for it. People are positive about it.*
> *Obviously its successful, obviously it's working. Lots of people want to get*
> *involved. The biggest challenge that I face right now is to move the*
> *teachers through a transition from doing their own thing in their own*
> *classrooms to doing it publicly in front of parents and putting it on line.*

The idea of the camera in the classroom provided a different angle on distance learning. Sharing with the parent community eliminated the barrier between home and classroom forms of learning. It could well have a positive effect on parent/teacher communication and would warrant further study.

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Students also publish their own work to the Intranet subjecting it to peer review:

> *In Year 6 practically every kid is online at some time or another. There are 2-3 computers in each room. They'll race up there to do it or bring it from home on a disc. Often they'll work at home and then download it through the direct link. Kids enjoy having their work on the 'net. It motivates them. One of the problems is that the kids are so motivated that they are putting real-time video in and the files are huge! If this is Year 6 what are they going to be like at Year 12? In Year 6 they use sound, animation, thumbnail pic[ture]s, their own webpage. We have consciously not gone the laptop route. The direct link from home enables them to log in and work on their files as long as they are not too big.*

In so doing, students were becoming accustomed at an early stage to knowledge sharing.

Teachers were not required to publish curricular work to the Intranet themselves, but had to provide all the required information. A web-master was dedicated to the publishing task *"because the teachers' main role is teaching"*.

> *It's got to be done timeously and accurately, so having someone dedicated is essential. The areas that are very mechanical must be done right; they need to be done the same. … When you have parents on line and when they are asking for or expecting accuracy, a system like this will reflect that, whereas most of your normal recording systems won't. … Where [teachers have] their own resource web and things like that it doesn't matter if they do their own thing. We want to encourage that.*

The developments with *Information [Ferndale]* were, at the time, still focused largely at the junior and middle levels although the system was designed for Years K-12. The Teacher-librarian revealed that at the senior level some of the

problems evident in other high schools still prevailed at Ferndale too. *"Ultra-formal hierarchical structures"* had changed to a total team structure with no leaders. Therefore, to establish an answer to a curriculum question became difficult as there was no single person to go to. It also made it very difficult to anticipate curriculum needs. She felt also that teachers at Ferndale did not have a tradition of coming to the Library to *"do collaborative planning"*.

> *So I'm finding it a real battle to get them to tell me what they're doing. … I just get them turning up in the Library after they have made a booking. They'll turn up and I'll ask them what they're doing and if they want anything from here. 'No' they say! Half the time they don't know what they're doing, so I just have to stand and watch and help them find the resources. So I'm finding it really difficult to know what to do. I've been attending meetings of various committees just to voice it.*

> *Some classes are brought in here and the teacher is standing here talking to them about what they need to do and what they need to find so maybe they haven't done any background work or any legwork for what they need to find. Maybe they get the background knowledge in class.*

This last comment indicated that the full implications and value of resource-based learning or question-based learning were not fully understood by teachers. Due to the lack of collaborative planning the Teacher-librarian felt that all she could do in such instances was help students find resources. Some teachers were now coming to her and asking for materials to be prepared. These were then made available on the Intranet as resources for web-based learning. She demonstrated her site on Biomes for classes comparing deserts, savannahs and rainforests in Africa and Australia. The resource consisted of a page on each of the biomes, including links to a search engine for articles, to the local library

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(which students used quite a lot) and to EBSCO[3]. The resource page lists all types of materials available in the Ferndale Library. To a certain extent a resource in this format duplicated what was in the library OPAC[4]. The idea behind the resource was that students could access it from home, whereas the Library OPAC was not yet accessible.

The Teacher-librarian felt that on the whole student's information literacy skills, like those of the teachers, were relatively good at Ferndale.

> *I've worked in some schools in the northern suburbs where language is a big problem and their information skills and their research skills are abominable. But here we have fairly affluent families where kids have been at this school or other schools in the area and their skills are reasonable. Middle class, affluent, kids start from a higher level. There are gaps. I try to pick up on them: thinking about keywords, thinking about directions to choose when they've got a topic, the types of resources that are most suitable for that particular topic. Some go straight for the videos because that's their learning style, which is fine if they find the right video but they can sit there forever. Same with the computers: some of them go straight to the computers without even thinking what it is they need to be doing. But their research skills on the Internet are pretty good. Teachers' research skills are also pretty good as well. There are gaps with both students and teachers and I'm just trying to find those gaps. In this school it is very difficult because there's no structure.*

Western Primary School provided a remarkable contrast in its location, the socio-economic problems associated with the community it served and the learning difficulties that resulted from the problems within the community. Concerned colleagues had questioned why I should want to go out to the school - in west

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[3] EBSCO: A service provider for online access to magazines and journals
[4] OPAC: Online Public Access Catalogue or electronic Library catalogue

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Sydney - of all places. I was privileged to spend an entire morning with the school's Principal, Jenny Lewis, who provided extensive documentation as well as deep insight into her school. Western was a disadvantaged school with 465 students of which 40% were non-English speaking and 20% were Aboriginal. 18-25% of the student population left and enrolled each year[5]. In 2001 there was a turnover of 75% of Year 5 students. The entire school population resided in state-subsidized housing. Unemployment and crime were rife and some families had been on the dole for three or four generations. Single families and dysfunctional families were commonplace. The children were locked into the classrooms for their own safety as there might be wandering adults and other troublemakers around. Staff turnover was high. All Western teachers were in their first three years of teaching i.e. their first postings. They left after three years as they could then get promotional posts. *"It's hard to staff a school in this area."*

Faced with the immensity of the challenge Jenny Lewis embarked on a change process that resulted in Western becoming a flagship school in Australia. She described it in this way:

> *Over the last five years the school has gone through significant change processes that have mined information, managed the correct data sources and collegially created knowledge that has significantly changed programs and processes. Decisions to change have been based upon mutual discussion and the application of current learning theory and action research. The significance of the change processes reflects the teacher refocusing and reframing long-held beliefs, the building over time of a shared vision and the move to a collaborative and collegial climate.*[6]

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[5] Factual information was supplemented by a handout from the Principal. Lewis, Jenny (2001) Leading the learning community – a new role for teachers. Handout from the author.
[6] Lewis, Jenny (2001) Leading the learning community – a new role for teachers. Handout from the author.

A review of current practices had been conducted in 1994. Initial observations and analysis of available data indicated that the school was 'at risk' in terms of learning growth and community morale. School staff faced a number of critical incidents each day. These incidents were time consuming as well as emotionally draining and stressful to staff. Overall, the school was running efficiently, but organised around bureaucratic structures that divided members and minimised trust.

On the positive side, some teachers were knowledgeable about Outcomes-Based Education (OBE) that was being introduced at the time. This knowledge needed to be shared to ensure understanding and transformation of existing practices. Also, a strong sense of collegiality was identified as an enabler of the change process. OBE implied recognising the value of each individual student, changing from a remedial model to an inclusive policy and *"changing the learning environment from one of fear and failure to one of trust and success"*.

Teams were formed with the object of developing a *"proactive learning culture that improved student outcomes"*. This required a fundamental rethinking and redesign of the core business of the school. Lewis described the start of the process and how a community of leaders was established:

> *The teams began to reflect on the alignment or lack of alignment of the approaches to learning, management and leadership. … Many traditional practices, structures and mandatory programs were challenged and in some instances removed or significantly modified.*

> *The school principal and executive members of staff provided a team of support (not a hierarchical framework) to staff and community members. This flat line team interchanges leadership depending on the initiative, modelling collaborative relationships and team commitment. The embracing of a 'team' philosophy at [Western] has meant that well*

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informed knowledge-centred decisions about school change have progressed with healthy discussion and a sharing of a variety of understandings and prior learnings and depicts a knowledge ecology in action.

Hard questions about shared leadership, teacher culture, communication channels and participative process needed to be addressed; as did consideration to the ways we grouped children, resourced classrooms and planned strategically in terms of learning and behaviour outcomes. Collaborative process and a respect for continual improvement became key elements as we began to rethink and redesign structures in our organisation. More importantly our [Western] community came to believe that this extensive change process would culminate in dramatic improvement of student and school outcomes."[7]

As a result of implemented changes, each child was on an individual learning programme and learning outcomes had improved dramatically: 37% in Maths, 47% overall for boys and 31% for girls. Teachers also had to consider the outcomes that would assist classroom practice and organisational accountability.

[Western] required an information system that would assist staff and parents to review school data, would enable continuous construction and reconstruction of practices, and the learning and unlearning of organisational assumptions that had become established over time. … Technology was identified as the necessary change agent that would enable reform at student, class and school level and school planning began to move towards establishing a technology-based learning environment. At the beginning of 1995 the school also began to focus on data gathering and analysis as a mechanism for accurate resourcing and

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[7] Lewis, Jenny (2001) Leading the learning community – a new role for teachers. Handout from the author.

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short and long-term planning.   School based research and a field-gathering exercise encouraged a changed mindset to the way lessons were taught in the classroom.[8]

The result of this was that Western developed an application, *Schoolmate,* that "*move[d] the school from a 'community of learners' to a 'critical learning community' by capturing the intellectual knowledge of the organisation".* *Schoolmate* supported the shift to outcomes-based constructivist learning. It also supports the school in "*embracing a learning culture, knowledge management, learning, continuous improvement and learning community".*

Schoolmate was designed for OBE and contained the curriculum by strand, sub-strand and outcome. Teachers could work on outcomes or indicators and were able to see which other teachers had covered a particular outcome. The system also included a *"feature to allow children to tell us how they're doing".* Student records were added to the system by the administrative staff and included comprehensive information on a student's activities, history, absenteeism, medication etc. Continuous assessment was indicated by effort marks and test results cumulated over the years with progress indicated on a points system.

A critical feature of the system was the 'programme builder' which enabled teachers to build an individual learning programme for a student or provide an analysis of a class, a stage or the whole school. The student profile was only available to the class teacher and principal. Owing to privacy issues, no teacher had access to information provided in confidence to counsellors, although it was recorded in the system. In line with the individual programme, children could be linked to multiple classes. When new students arrived, new profiles were created and all outcomes that they had previously achieved were recorded. Programmes

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[8] Lewis, Jenny (2001) Leading the learning community – a new role for teachers. Handout from the author.

of work were sent to parents and suggestions for activities or resources for activities at home could be included.

Student interventions were recorded in the system e.g. if a student had been placed on an anger management course. All evidence was in place if there was any query from the parents, counsellors or the state. All phone calls made were noted. Behaviour data allowed personalised programmes for each student and provided teachers with bully and victim profiles.   Behaviour patterns were extracted from data on place or time of day of critical incidents. In the case of an intervention a letter was sent home to parents for signing and their response was recorded.

The value of *Schoolmate* lay not simply in its ability as a reporting tool, nor in its functioning as an administrative system. Its real value emanated from the way in which it was able to enhance student learning, teacher learning and organisational learning. The feature whereby a student could add their own comments alongside that of their teacher became a starting point for dialogue between teacher and student. The programme builder, rather than the statutory once per term, allowed the revision of a programme every four weeks, which Western found necessary due to its high turnover. From a management point of view the school was able to access and aggregate data that indicated where their areas of risk were, what their needs were and where the fluctuations in student development occurred. It could also provide detailed comparative levels such as literacy against ethnicity or provide broad assessments of whole school improvement. By analysing critical data *Schoolmate* was able to debunk myths such as that of repeat offenders in which, contrary to perceptions at large, it was proved that it was not the Samoans, but the Aboriginals or Anglo-Saxons that were most at risk. By the start of the summer recess information could be rolled over for the following year. Teachers would know exactly who would be in their class and could prepare for the following year. Teachers were also constantly

reminded of the bigger picture as the school development goals for the year featured prominently on the staff room board.

Parent response to the improvements brought about by *Schoolmate* was very positive and led to many becoming involved in voluntary support. Jenny Lewis summed up *Schoolmate*:

> *"We can tell parents what we know and what we don't know. We can show peaks and plateaus and also if a risk develops i.e. it's value added. Because it's in the teachers hands it becomes applied knowledge".*

From mapping each student's profile and development Western was able to manage individuals, classes, stages and the whole school. Through knowledge sharing Western enabled not only the transition to OBE but made a difference to the learning – and the lives - of many of its children. Its use of a limited ICT infrastructure focused entirely on the improvement of student learning. Western demonstrated knowledge management in action more than any other school.

In summary, knowledge sharing practices in the Australian and New Zealand schools visited varied widely. Sharing depended very much on the culture of the school and was influenced also by gender in monastic schools. The extent of the ICT infrastructure did not necessarily correlate with the extent of the knowledge sharing. School structures and the type of leadership were important factors. The personality, attitude and approach of teacher-librarians also appeared to be a factor. The extent of knowledge sharing varied greatly between schools and in its purpose.

2. How do ICTs enable knowledge management?

In exploring how ICTs enabled knowledge management questions were asked from a teacher-librarian's perspective rather than that of technology management. Some aspects of the contribution of ICTs have been included in

the exploration of knowledge sharing above, as the influence of the human and technological aspects cannot always be precisely delineated.

All schools visited had an Intranet of one sort or another and connection to the Internet. Intranets were used in a variety of ways, usually to provide access or links to internal and external information, but in some cases in combination with a Virtual Private Network (VPN) that allowed controlled Intranet access by users from outside.

Programmes used for Intranet access included *My[Intrane]t* (as used at Melville College), Concord Australia*'s* *Masterfile* (as used by Cornfield College), *Classroom Manager* (New Zealand), MUSAC (New Zealand), *Blackboard* (USA) and *IMPACT*. Ferndale uses *IMPACT's* VPN, but not their Intranet. Caversham divided their Intranet into a *Staffnet* and a *Studentnet.*   The Teacher-librarian explained that Intranet resources are provided through the Library using portal technology. *"There is a student view and a staff view. The IT staff upload what has been designed in Front Page. IT staff does what they're given and make sure it fits the model."*

At Northview College, the Intranet served mainly teachers' needs and included links to databases, notices, and email i.e. it was a staff to staff communication tool.   A bulletin board was used for student-teacher and student-student communication. Tasks were placed on the board by teachers for downloading and completed work could be uploaded by students for marking. The system was fast, included a chat facility and was accessible from home via VPN. The website was used as a promotional site for the school. The school was moving to an online report system to accommodate continuous assessment which linked to the New Zealand Qualifications' Authority (NZQA).

At Havilland High School students logged straight into the Intranet page which had an index including e.g. past exam papers and a full range of subject links.

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Some departments had their own websites with course outlines, links and notes on the topic.

The Melville College Intranet is run by the IT department. Each teacher had a personalised profile or *My[Interne]t*. Every profile included links to the staff and student daily bulletins as well as to a weekly staff newsletter which dealt with longer term issues, a newsletter for communication with parents and the Library newsletter. Email was incorporated into the profile and included an online help link to a specific teacher. Teachers could then select other links to complete their profiles according to subject or extra-curricular interests. Although the Intranet provided extensive communication means and links to them, it constituted no more than information distribution. Its contents were apparently not shared interactively in the generation of new knowledge.

Western's *Schoolmate* developed as a system within one school and was eventually marketed nation-wide. It has subsequently been implemented in schools in a number of Australian states and the Northern Territory was negotiating for state-wide implementation. It was built in MS Access and was undergoing adaptation to a browser version. It could accommodate downloads directly from the OASIS administrative system. The state syllabus was included in *Schoolmate*, which also included the English as a second language (ESL) scales. Language outcomes could be ticked off for either English or ESL. The system had a graphic interface and incorporated time-saving features such as the ability to tick off a whole class and then update backwards for individuals. Compulsory indicators which formed the core curriculum could be tagged. Both numerical and text data could be analysed and timelines across years were a further feature. For high schools, the system could be set up for marks if required. Space for children's own comments were included. Anecdotal comments from continuous assessment could be cut-and-pasted and edited for a

final report comment. Western did not make use of VPN access, but *Schoolmate* could be used with VPN access if required.

Whereas Western developed its system from its internal need, Ferndale College purchased proprietary products used in combination to achieve their aim of a strong educational framework.   Their Intranet was in a constant state of development. Anything to go on the Intranet was updated manually, usually the same day. Parents had access as soon as it was published. Right from the start, both the manufacturer and the school realised that if they were to go the online curriculum route they needed a member of staff who did nothing but publish. Part and parcel of the whole development was that they had such a person. All the updating was done offline and sent to the Web Publisher when ready. Dr Winzenreid justified the choice of Intranet package as follows:

> *"What we wanted was something that would flow. So what we've bought is this product that goes through the various steps of what the course is, what is involved, what its intentions are, the coursework itself, the assessment. In summary, this is what the Mums and Dads like – study schedules."*

To ensure consistency teachers used either a blank or dedicated course outline which was completed online and then submitted to the web publisher for Java-coding and publishing. A *Unit Blueprint* is included as Appendix C. The blueprint guided teachers in what needed to be included: outcomes, study schedule, assessment, content, resources and applications. It assisted teachers to develop their planning in the right way. Winzenreid felt that once it had been made public, consistency was essential: it had to appear to be '*together'*.   A teachers' handbook was provided to guide teachers through the reporting process.

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Curriculum information formed one side of the system.   The other was the coursework itself. For this, each teacher was given a subject folder with an index page. They could add to the index page but could not take away from it.

> *They can do anything they like that connects to that index page. That's their kit. So if you're a classroom teacher you can put any assignment sheet or test in there and link it to that page and you will automatically see it on the course page.*

Dr Winzenreid explained that the index page had the links that were needed to connect to the subject information and work schedule. This made it easier for teachers to input coursework materials. This was the area that needed to grow and develop because the aim was to include every piece of work that was handed out to students, everything that they were expected to finish as well as all tests and assessments actually appearing in the coursework section.

Through the VPN parents had access to the subject information and coursework for the grades that their children were in, but not to other grades. With three children, parents could access three different grades. General materials were available in general areas. Access was password controlled and led into a list of the family's children and their subjects. Clicking on e.g. Science led straight into the Science course. Extra-curricular subjects were also listed using different colours but the same process. Email links to enable contact with the teachers were included.

Parents also had direct access to reports. If no assessment had been made the report was empty. Outcomes were included in the reports. For storage reasons and for streamlining only part of the outcome was shown. The intention was that this would link back to the subject page where the detailed outcome could be found, should the parents require it.

In the junior school from Year 3 up, most children are required to produce any work in their web page. There are very few exceptions. That's how the work is set whether it be a Maths test or a picture. The teacher can write a little comment and link it to the work. Parents can go in and see an outcome, they can see a standard progress mark and they can see a comment and possibly link into the work that was done. So if a child has, for example, made a breakthrough in a certain area the teacher can make a comment and the parents can go straight in and see what it is they have achieved.

Apart from the curricular and reporting functions, Ferndale's Intranet provides links to newsletters and other publications; services such as the Library OPAC and Archives access; the Principal's section which included strategic directions, the Council and a communication forum; email, and web support links such as study help and technical presentations.

One fundamental change that occurred with the switch to online reporting was that the Principal relinquished control over the process. He had previously checked and handed back to teachers every single report for correction.

Now this is bypassed. This system 'scared the hell out of him' because he no longer had any control. Two Year 6 teachers could go in and set up their system completely differently and that's the brilliance of it. If the teacher is doing the job that they should then they'll teach the CSF, but one might have a real bent towards environment and another a real bent towards science. It is a very accurate reflection. Other staff have the right to go into your area and have a look at it, but they can't change anything. That's all set up as part of the system.

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The question still remains as to whether Ferndale provided information access, learning management or knowledge management. Although strategic management information was not elicited from the system as was the case at Western, *Information [Ferndale]* did provide detailed documentation of the learning that was happening and made it available to the whole community at various levels of access, i.e. knowledge sharing. This formed a transparent basis of discussion between teachers, between students and teachers and between parents and teachers as well as between parents and students. Examples of curricular units and strategies were shared online but as far as could be established, teachers were still working on their own and overtly following their own agendas within curricular limits. Whilst *Information [Ferndale]* included all the data it did not yet appear to either be drawing on it or have the capability to draw on it for the generation of new knowledge. By including such a component, it would be able to add value or enable organisational knowledge management.

It was not the intention of this study to investigate laptops to any extent, but inevitably, the question of laptops arose, whether the school was a laptop school or not. One of the major questions in Australia and New Zealand was whether the change to laptop technology was justified. Certain schools such as Cornfield College and Ferndale College had made conscious decisions to not go the laptop route with students, but to provide VPN access instead. (Cornfield College provided teachers with laptops which formed part of their classroom PC access.) Cornfield College's decision to not go the laptop route was justified by the fact that *"laptops do not improve the [students] learning and thinking"*. Havilland High School chose not to go the laptop route because laptops were unaffordable and because of the equity issues in providing them only for certain classes. Other schools such as Melville College and Caversham College had introduced laptops to students from Grade 9 onwards, usually in association with wireless technology. After five years on the programme, every Caversham student had a laptop but the issue remained one of curriculum. In the words of their teacher-

librarian: *"There are curriculum issues still surrounding laptops. How do you deliver your curriculum? Until teachers start thinking out of that little box in their heads they won't get to the real issue."*

Northview College identified many drawbacks to students using laptops all the time, for instance, the amount of time it took to set up once they were in the classroom and the fact that students could access the Internet illegally during class. *"Wireless technology may solve network connectivity problems, but power plug problems still plague classrooms"*. According to the IT Director, the laptop programme which had been in place for six years was worthwhile when there was creativity in the classroom. However many teachers simply dumped from the blackboard to the Intranet and he estimated that "*only 20% of staff are innovative and switched on"*.

Laptops did not appear to make any significant difference to either knowledge creation or knowledge management. The main problems of their use related to teachers' professional development and how to encourage a focus on student learning. Without teachers experiencing shared learning opportunities it was difficult for them to model collaborative learning for their students.

In contrast to laptop schools the Havilland High School Library was built in 1993 complete with a network. The Teacher-librarian explained:

> We didn't have enough understanding of the computer needs back then but we did have the opportunity at that time to make sure that the school was networked. The GLC[9] is just over 12 months old. We don't need more computers! The government has decided that each school should have one computer per five students and they want to give us 43 more. We have a Global Technology Plan that means that we change our computers every three years. We don't keep a computer longer than that.

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[9] GLC: Global Learning Centre

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If they give us 43 now we won't be able to replace them after three years so we want to go back to the government and request that number of machines over three years. … We've surveyed our students and 97% of them have Internet access at home and practically 100% have a computer at home. A lot of them actually have better computers, especially in Y9. 70% have Pentium III's or higher and something like 60% have access to cable modems. We don't have stuff here that's comparable. a) They don't respect it and b) they don't learn from it. That's why we've decided to limit the number of computers but make sure that we use them as effectively as we can and make sure that they're used 100% of the time.

This finding directly supported Bundy's (2003:3) criticism that ICT infrastructure was being provided wholesale to schools without a corresponding focus on information literacy. Also, it is evident that the community that this school served was reasonably positioned to extend into distributed learning, given the density of home computers.

ICTs were used extensively in all libraries for Internet access and to run Library OPACs. Australian schools subscribed to SCIS, the online shared cataloguing service, to which new records could be contributed and from which records could be downloaded to their OPAC. All schools visited had an OPAC and in most schools it was available on all terminals through web browsers. OPAC systems varied quite widely and included *ALICE, OASIS, AIMS, Spydex, Catalyst, ELM, Horizon* or *Athenaeum.* Nottingham College had encountered a frustrating conflict between its OPAC and the network structure due to system design problems as a result of which they had not been able to provide an online searching facility for a year.

All schools had web pages, intended mostly as marketing tools rather than to provide online curriculum information. Curricular information sat on the Intranet

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and could be accessed via VPN in schools such as Ferndale, Caversham, Melville College and Nottingham College. *Masterfile* was typically used for curricular information.

A smart card system was in use at Melville College and at Ferndale for access control and also to track students across the campus. It was about to be introduced at Tonbridge College. When students arrived or departed the card was read automatically. Apart from the security benefits, it could also detect unauthorized behaviour such as bunking or illicit smoke breaks. These measures were taken due to the increased liability of schools and the necessity to be ever more careful. If this information was to be captured into a database in a similar way to how Western captured critical incident information, then it could have been used for knowledge management purposes. Recorded evidence may be critical in liability situations.

Further ICT features were specific to individual schools.

At Southern Primary, a government school, students as young as Year 3 were making highly creative use of ICTs with limited facilities. The roles of Librarian and IT teacher were filled by the same person. She bookmarked sites to the Intranet which students could access under strict supervision, without being able to go beyond the designated site itself. Classes saved work to folders that they could access at any time. Every task was integrated and purposeful. Teachers look at the units and decided how they could incorporate IT into them, whether it involved using a digital camera, the Internet, a CD-Rom or whatever. Year 1 children used the digital camera to snap all the teachers and used *KidPix* to publish the annotated pictures to their website as a staff gallery. Through using constructivist techniques the children learned complex technical skills whilst at the same time contributing to the school's knowledge base. Year 4 students used *Hyperstudio* to retell familiar stories and shared their work online. Year 4

had also started to make short video movies such as that of a visit to a plastics factory. Recreating the visit through editing the film with subtitles reinforced their learning. Year 6 students had completed a Biographies unit in which, to avoid plagiarism, they had to write up their research in the first person or as 'faction'. This was followed by an evening in which they dressed up as that person and the others had to guess who they were.

At Fellside College the focus was previously on student's information literacy skills, but had shifted largely to teacher's skills. The Teacher-librarian used a web-quest page for teachers to explore training materials and examples. Internal courses were run on aspects such as plagiarism, whilst the IT department trained teachers on application software. Email was used extensively to distribute professional development material to staff.

Cornfield College had a new four-story Science block which had its own resource room with copy, print and laptop connection facilities. A Science staffroom accommodated 28 staff. Interestingly, individual offices were not encouraged as they were seen as isolators and not conducive to collaboration.

Caversham College had a common server but separate Intranets for its senior and prep schools which were on separate campuses. The College had opted for cost-saving wireless technology. Website resources were catalogued and linked in the OPAC which was available through the VPN.

The Smithfield Collegiate Principal, when appointed, had commissioned a feasibility study to develop a strategic plan for IT. The IT Manager, in consultation with the Board and staff then developed a seven-year strategic plan with laptops, I-books (for juniors) and ultimately a laptop programme throughout

the school. Everything from the satellite dish to the OPAC was part of this co-ordinated IT plan and all purchases were made in accordance with the plan.

Teacher-librarians at Fellside College were assisting teachers to upgrade their assignment sheets to a web quest format and were thus very much involved with teachers implementing IT in the classroom.

In summary, all schools visited used common technologies such as Intranets and email to store and share information within the school, and many were connected by VPNs. Web pages were almost exclusively marketing tools. Those schools that had VPNs were using or considering using them for interactive reporting purposes. Western had developed *Schoolmate* into a marketable product. Laptops were controversial and their portability did not appear to make any specific contribution to knowledge management in the classroom although they did assist teachers. All Libraries were served by online OPACs and most schools subscribed to shared cataloguing services. Knowledge creation within the classroom using ICTs was evident in the early grades in a New Zealand primary school. However, no schools were using their ICTs for knowledge sharing through distributed or e-learning in the same way as *TeacherBridge* or the *Knowledge Manifold*.

3. What are the implications of knowledge management for teacher-librarians?

So far in this chapter, research findings have focused on the human side of knowledge management - knowledge sharing - and the technical side or how ICTs are used to share knowledge. To determine the implications of knowledge management for teacher-librarians specifically it is necessary to look at their involvement in these two aspects together.

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To understand the challenge that educational reforms present to traditional schools it is necessary to understand their traditional structures. Traditional schools – high schools in particular – follow traditional timetable and subject structures and very likely, traditional hierarchies: head and deputies, subject HODs and the rest. The Library is designated as a stand-alone department as is ICT, English, Science, or History. The territory is clear-cut, the responsibilities are delineated and curriculum content is well defined. Each department operates efficiently within its academic confines in pursuit of maximum marks at term-end, year-end or school end. New learning theories - learning styles, multiple intelligences, inclusion and outcome-based learning - have challenged these traditions and the dynamics within which schools operate. ICTs and connectivity have changed the fundamental characteristics of learners and learning has become a non-linear process. The concept of the classroom itself is challenged. All these changes significantly impact teacher-librarians.

As a teacher-librarian himself, Dr Winzenreid described the extended role of the librarian as *"a hybrid combination of print materials manager, information storekeeper, teacher of information access skills, multimedia engineer, online teaching facilitator, network assistant and web author"* (Winzenreid, 2001a p.6). Each of these roles was evident in schools as shown in the findings regarding ICTs and knowledge management above. However, Todd took the argument a step further in stating how the teacher-librarian essentially *"brings together the human side of knowledge and the documentary side of knowledge"* (Todd 2001 p.5). In each of the successful knowledge-sharing or ICT scenario's described above, the head teacher-librarian, whatever the designation of their post, was a key player, if not the key player, except in Western where it was the principal. Not every scenario amounted to knowledge management, but each successful one had elements which contributed to knowledge management. Teacher-librarians' technical literacy was critical to their understanding of the issues that

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ICTs present, although sometimes their desire for this literacy was frustrated by circumstances apparently beyond their control, such as at Northview College.

In New Zealand teacher-librarians indicated that the new assessment system had a strong impact on innovative classroom practices, particularly regarding resource-based learning. Similarly, those in New South Wales described how the Year 12 assessment had changed in 2001 to the outcomes-based HSC in which there was a 50% internal assessment component in each subject. A feature of the HSC was that teachers were required to scaffold all learning. This meant that for every unit taught the teacher had to clearly indicate to the learners and provide the structure for how the learning would happen. Innovation, integration of ICTs and the skills required for resource-based learning therefore placed heavy demands on school libraries and teacher-librarians. However, it also provided opportunities for them to focus on their *teaching* role which was to support the learning process through collaboration with teachers. Their role is highlighted by the Director of Information Services of Cornfield College:

> *The role of the Library is seen as a support function. It's therefore important for the teacher-librarians to be informed about developments and trends in that area. In this way they can be pro-active in assisting the teachers in the way they work with resources.*

To enable teacher-librarians to work with teachers they were represented in at least one team in most schools. The different team combinations found in both Australian and New Zealand schools which included the teacher-librarian in one way or another as a significant player are identified and listed in Appendix B. These bases for collaborative partnerships included curriculum development teams, ICT integration and support teams, technical teams, policy-making teams, professional development support teams or teams focusing on the development of inclusive communities. Collaborative partnerships also extended to student teams. At Cornfield College, each member of the library staff supported a

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different department or group of departments. They were then responsible for collection development, curriculum support and collaborative planning with teachers from that learning area. This was possible with a staff of seven teacher-librarians serving a high school of 1800 students.

The question of pro-activeness has, in general, dogged the teacher-librarian profession. It is largely to do with traditional perceptions of the school library and the fact that information management was in many cases handed wholesale to the technical experts when the Internet arrived. To break the perception mould, strong personalities and forthright advocacy are required. This was generally evident in the schools visited in Australia and New Zealand. The personality of the teacher-librarian appeared to play a significant part in their impact on the school and the amount of influence they were able to exert. Personality also related very strongly to the culture and character of the school. Where the teacher-librarian was succeeding in playing an active role in new developments, it appeared to be matched by stronger personalities, greater risk-taking and amenable environments, either alone or in combination.

Teacher-librarians and teachers in Australia and New Zealand were supported by services and resources such as those provided by *Education Network Australia* (*EdNA Online)*, *Te Puna*, *Education Queensland*, *ASLA*, *School Library Association of Victoria* (*SLAV)* and the *AIS (NSW)*.

EdNA Online was an information service that aimed to promote the benefits of the Internet for learning. It was free and organised around the Australian curriculum as a directory about education and training in Australia and as a database of web-based resources useful for teaching and learning. As a communications service it "*aims to promote collaboration and co-operation throughout Australia and facilitates the growth of networks of common interest and practice*".

Te Puna was a web directory of New Zealand and Pacific Island web sites provided by the National Library of New Zealand. It included a comprehensive education section with links and documents in both English and Maori.

Education Queensland (EQ) provided services to schools in that state. It made available information in a readily accessible form.   It was essentially an information service, *"designed to help the individual teacher-librarian to manage the learning or knowledge processes"* within a school. EQ provided management systems for Libraries, email, internet filtering and intranet management as well as hosting the *"Curriculum exchange"* portal.

Services of the AIS (NSW) were described in a meeting in Sydney with Estelle Lewis[10] who, at the time, was running professional development projects as part of the *Quality Teacher Program* (QTP) funded by the Australian Commonwealth Government.   One of her initiatives involved teacher-librarians of various independent and state schools working collaboratively in the project *Incorporating Information Literacy into the School Curriculum*.   Two of the schools visited, Cornfield College and Herschelle were taking part in this project. The aim of the project was to embed information literacy development within the curriculum of specific subject areas. The objective of the project was to get teachers to work together with teacher-librarians. The project came about due to various factors. The major factor was the impact of the new examination system at Year 11 and 12 levels which stipulated research competencies. Similarly, the impact of the new syllabus at Years 7-10 required information accessing and processing skills that were to be assessed by subject teachers at the end of Year 10. Finally, the teacher-librarians had the expertise that needed to be transferred to the teachers. The challenges of the project were: to provide opportunities for action research; develop and sustain projects within the schools; achieve a ripple effect within

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[10] Estelle Lewis is a Teacher-librarian by profession. As Project Officer for the AIS (NSW) she runs professional development courses and projects including those on information skills, assessment and any other subjects & areas needing research.

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schools and sustain explicit outcomes. In each school, 3-6 people per school needed to commit to the project with either a teacher or teacher-librarian as team leader. The task was to look at aspects of information literacy in the classroom and design, implement and evaluate a programme for the school.

By participating in the project teacher-librarians were taking on leadership roles, action-research roles and modelling knowledge sharing and knowledge creation between teacher-librarians on the project and with teachers at their own school. One project dealt with the mandated use of data loggers required by the new Science syllabus. Another example was the development of a Year 10 History unit at Cornfield College. This project used the *4-Mat* framework of the four learning quadrants (what if? why? how? what?) to design an alternative research task that gave students the opportunity to create a diverse range of products for a variety of audiences about Post War Australia, Anti-Communist Movements and the Vietnam War. Lewis described how the pilot project had a number of benefits for the teachers involved. *"They gained much from the collegiality it engendered. It demonstrated that new approaches could re-energize even the most experienced teachers. As one teacher commented: "The new things are being done by the old dogs around here!"*

A second support example was the research project on information literacy at Tonbridge College referred to earlier in this chapter. This was a collaborative initiative between one of a team of teacher-librarians at Tonbridge and James Henri and Gaynor Eyre. It was funded by a research grant from Charles Sturt University School of Teacher Librarianship.

Concord is an international company providing portal technology to business enterprises as well as educational institutions. *Masterfile* is a software package, a knowledge management tool that offers an e-learning solution. It is not essential to use a proprietary tool for e-learning, but it is a good starting point for

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setting up an effective e-learning portal. A number of schools including Cornfield College and Caversham College used *Masterfile*.

An online service shared widely in Australia and elsewhere was the Schools Catalogue and Information Service (SCIS), which was demonstrated by Tricia Nathan at the conference. Following a discussion with her on SCIS and its potential in South Africa a short experiment was run by email following on the groundwork that a South African teacher-librarian, Pam Nicolaides, had laid during her visit to Australia the previous year. The idea of linking into a schools' cataloguing service was appealing. Concern was with the relevance of an Australian system for the average South African school library. Two South African colleagues were requested to email a list of the last 100 books that they had catalogued. These were then matched against SCIS and averaged a hit rate of 60%. This meant that a subscription to SCIS could reduce a book-cataloguing task by up to 60%. (Nicolaides subsequently subscribed and found that her hit rate was actually higher.) The cost of such a service would be influenced by exchange rates. As the small volume of South African titles did not warrant a South African system, being able to not only draw on, but contribute to a shared system would be mutually beneficial[11]. The service was apparently about to be launched in Canada as well, expanding it to an international service.

The teacher-librarian's role was described in the literature as multi-faceted. This extended role was evident in most schools visited. Educational reforms and resource-based learning in particular had impacted classroom practices and the teacher-librarian's role as both provider of access and curriculum designer. The teacher-librarian was therefore a key player represented in most teams focusing on curriculum development and ICT integration. The role required specialised abilities and personal characteristics. Teacher-librarians and through them teachers, were supported by a range of services at state and national level that

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[11] SCIS is now being used by a number of South African School libraries.

provided resources and professional development opportunities and models particularly in knowledge creation and sharing. The teacher-librarian is therefore a learner as well as a facilitator of organisational learning.

4. What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

In terms of Dellit and Hazell's (2001 p.1) implications for education of the knowledge society, schools visited faired variously in meeting the criteria as shown in Table 7 below. It should be noted that this table reflects only the researcher's subjective interpretation of individual(s) opinion(s) and may not be an accurate reflection of the reality of the school at that time.

	Cornfield	Ellwell	Ferndale	Caversham	Havilland	Melville	Western	Southern	Tonbridge	Wellesley	Smithfield	Nottingham	Northview	Fellside
Using & experimenting with technology applications	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Creating familiarity with technology	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Developing attitudes to innovation, risk & knowledge creation	x		x		x	x	x	x			x			x
Applying technology to pushing the boundaries of how we learn			x				x	x						
Analysing the knowledge needed to create human & social capital & ensuring its creation			x				x		x					
Managing knowledge to maximise learning efficiency							x							

Table 7: Implications for education of the knowledge society using Dellit & Hazell (2001) criteria

However, it is interesting to note that Western Primary school was the only school that matched all criteria in that it was *'managing knowledge to maximise learning efficiency'* specifically with the Programme Builder feature of *Schoolmate*. The two schools which met five criteria were Southern Primary and

Ferndale. Although Ferndale is a K-12 school, its innovations had at the time only been implemented in the junior school. Of these three schools, two were government schools with limited finance and infrastructure. It could therefore be suggested that knowledge management implementation in primary schools is more advanced than in high schools. This would correlate with the introduction of curricular reforms from the earliest grades upwards, although such reforms had already reached Year 12.

The impact of culture on a school was an intriguing question on the antipodean journey. The entrance to Havilland High School was dominated by a large Union Jack draped together with the Australian flag flanking large pictures of Queen Elizabeth II and Prince Philip *("Was it the one in the yellow dress?").* This relic of colonialism had a startling effect, generating reflections on what made Australia different from South Africa despite the two countries having a common colonial history. The difference lay in the fact that South Africa had a 1960, a 1976 and a 1994. No single event has impacted Australia in the same way. Since colonisation it has developed along a single steady continuum, which does have other advantages. South Africans, no matter their political affiliation or cultural group have been and are continuously challenged by change.

Australia was still colonial, effectively monocultural and monolingual, traditional; whereas South Africans grapple with their preferred futures (Ellyard 2001 p.17) as a national pastime. Australia had developed economically because of its strong free-market focus. In the past decade it had recognised its Asian context and nurtured its Asian links and there was open recognition of the need to address the wrongs of the past regarding Aboriginal Australians. But these were relatively remote issues not impacting on daily life. In South Africa, the vibrancy of Africanness and the problems grappled with are "*in your face*" every day. It was therefore easier for an Australian school to remain in a colonial paradigm and still be relevant than it is for a South African school. Consequently, the

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colonial heritage model of the independent boys' schools is still very strong, particularly in some of the "top" schools in Australia that were included in this study.

Interestingly, the colonial heritage model was found to not be as strong in the girls' schools. It is deduced that that may have been because women have been positively affected by gender equity developments[12].

Alan Morley of the Hutchins school in Tasmania reflects on culture in an article in the *School Administrator* encountered in Australia:

> *The ideas of Dr Thomas Arnold of the Rugby School in nineteenth century England, and his model of school culture and institutional practice, continue to have a profound influence upon independent and state-based education within Australia. A huge proportion of schools – single sex and co-educational – still embrace his 'four pillars' [houses, prefects, games, ceremonies and rituals, each directed towards an educational intent that would accept the development of character as the primary function of schooling] as their institutional blueprint. As we now enter the twenty-first century, very few can offer a cogent defence as to why … It remains, however, that merely to practise the model of Dr Arnold – to enact daily its institutions – without recourse to its underpinning educational rationale is to embrace it upon a cultural rather than a curricular level.* (Morley 2001)

The stronger the cultural ethos was, the harder it was for the school to embrace change. The driving force for change was not an inherent questioning of the role of schools in the 21st century, or recognition of learner needs. Rather, change was imposed by the arrival of the new Higher Schools Certificate (HSC) at Year 12.

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[12] In my capacity as a chair of an Employment Equity Forum I also met with a counterpart at Melbourne University and gained valuable insight into some of their equitable employment practices and the approach to gender issues in Australia.

Outside perceptions of a school do not always match reality. One recommended school had a most disappointing structure. In another, internal politics dominated the interview to the extent that I opted to exclude it from the findings. In another case, I was accompanied by my host, a parent and teaching professional who requested to accompany me only to be dismayed by the frustrations expressed by the Teacher-librarian and the reflections on the attitudes to change in the school.

Some schools had chosen to go the laptop route; others had rejected it for moral, technical or logistical reasons.   Some schools had a sophisticated ICT infrastructure, specialist multi-media, extensive technical support, smart-card access, state-of-the-art buildings and a wealth of resources. Others got by on the minimum. (Details of staffing, student numbers and Library and ICT facilities of the schools are included as Appendix A.) However, the question remained: how much of this was essential for the school to be knowledge enabled?

There was no question about the support that ICTs provided for the management of knowledge. Connectivity provided global access to resources, a means of communication and potential for students, teachers-as-learners and organisations to explore, analyse, create and experiment individually or collegially.

However, the difference appeared to lie in the dynamics that existed in the schools. The dynamic was supported by:

- a culture accepting of change and embracing change
- committed and transparent leadership that provided a driving force for change
- a human resource structure that emphasised teams above hierarchy
- a collaborative environment built around innovation, risk taking and sharing

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- acknowledgement, support and use of the generalist, specialist and empathetic skills of the teacher-librarian
- involvement of the full school community, including parents
- a strategic direction facilitating knowledge construction, sharing and analysis
- a strategic plan to enhance learning
- ICTs integrated in support of learning
- integrated systems

A knowledge-enabled school would need to have all these criteria in place.

Schools met some criteria in terms of Dellit and Hazell's implications for education of the knowledge society. Best practice did not emanate from large wealthy independent schools but from three smaller schools, of which two were government primary schools. This bodes well as a model for South African schools. Tradition and culture had a strong influence on the ability of a school to embrace change and adjust to a knowledge-sharing paradigm. ICTs were important to the management of information and the sharing of knowledge, but knowledge management was dependent on a dynamic supported by strong leadership and a strategic direction focused on improving student learning.

Summary

This chapter has shown the variety and extent of knowledge sharing practice and potential in the schools visited in Australia and New Zealand. It has described how most schools had common technologies such as Intranets, VPNs and OPACs and were well-served by state and national services, although none apparently had developed to using distributed knowledge creation tools. The teacher-librarian was a key facilitator of the information/knowledge process and was involved in strategic teams. Schools were assessed against criteria for education in the knowledge society, but it was evident that tradition and culture

had a strong influence on the ability of a school to embrace reforms concomitant with the Knowledge Age.

The following Chapter will summarise the study, draw conclusions from the findings and make recommendations.

Chapter 5

Conclusions, Recommendations and Reflections

Introduction

This study set out to explore the practice and potential of knowledge management and its contribution to learning in Australian and New Zealand schools. The idea for the study originated and the field work was conducted at a time of high interest in knowledge management as a new concept. The premise was that with a school's prime function being the acquisition and transfer of knowledge i.e. learning and understanding, there had to be a role for knowledge management in a school. Definition of knowledge management and delineation of its contextual boundaries were not clear. Despite many references to knowledge management in the corporate sector and some in the tertiary sector, very little appeared to have been written about knowledge management in schools. The journey to explore its practice and potential therefore began with an open-minded approach that gained some focus at the ASLA XVII Conference. This conference featured knowledge management as one of its two main strands. Knowledge management in schools was therefore finally explored in terms of Todd's (2001 p.5) definition of knowledge management as a combination of the *"human … and the documentary faces of information to enable knowledge construction and knowledge use".* The study looked at the practices and structures that were integrated *"to support organisational learning, teachers as learners, student learning, and community learning"* (Todd, 2001 p.5).

The study was undertaken specifically from a teacher-librarian's point of view, not only because this was the profession of the researcher, but because of the understanding that knowledge management would relate closely to information management and to its pro-active provision to users throughout the school, which are fundamental to the teacher-librarian's domain. The purpose of the study was

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to understand how knowledge management contributed to learning and what its potential and practice were in Australian and New Zealand schools.

To achieve the aim answers to the following questions would be required:

1. How do Australian and New Zealand teachers share their knowledge in pursuit of learning?

2. How do ICTs enable knowledge management?

3. What are the implications of knowledge management for teacher-librarians?

4. What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

The Literature Review

The literature reviewed in Chapter 2 was encountered in two distinct phases. The first was a limited survey prior to the fieldwork in Australian and New Zealand schools. A second more in-depth reading was undertaken ex post facto, which ruffled assumptions and challenged notions with which the study had begun. This later reading, which had largely been published after the fieldwork was conducted, provided a much finer and deeper contextual framework for the analytical phase of the study.

Literature on knowledge management emanated from various sectors. With origins distinctly in the realm of business (Sveiby 1990) it had never been fully subsumed into tertiary education and was scarcely borrowed by K-12 education. However, within these sectors, the range of disciplines represented by the authors was also varied. Whilst literature on information management is commonly limited to the librarianship or wider information sciences discipline and that on information literacy is limited to the education sector, literature on knowledge management does not appear to have these confines, crossing between Engineering, Psychology, Computer Science and Education.

The literature review revealed theoretical arguments about the nature of knowledge (Carroll et al, 2001; Williams, 2003; Snowden, 2003 and Stacey, 2001), the knowledge society (Lane 1996, Drucker 1969 and Bell 1973) and the knowledge economy (Peters, 2001). The important issue for schools was to understand the nature of knowledge in the context of a knowledge era and its implications for them as well as to address the demands of a knowledge society in their own operations and practices and in the knowledge skills they develop in their students.

The review touched on the role of organisational culture (Carroll et al, 2001; ACEL, 2003), its impact on organisational learning (Davenport & Prusak, 1999 and Leonard, 1999) and the development of a knowledge culture (McDermott, 1999). The issue for schools was how they effected radical change in their culture that is traditionally the antithesis of knowledge sharing and organisational learning.

The concept of knowledge sharing (Vygotsky, 1978; Brown, Collins & Duguid, 1989; Rogoff, 1990 and Lave & Wenger, 1991) brought the focus closer to schools and learning (Davenport, 1998; Cram & Sayers, 2001; Leonard, 1999; Carroll et al, 2003; Hargreaves, 1999 and ACEL 2003) and the practical examples of the *Participatory Design Process* (Carroll et al, 2001) and CSCL (Paavola et al, 2001). The issue for schools was how teachers overcome the barriers to knowledge sharing at classroom and professional level.

Knowledge construction as a metaphor for learning was touched on in the writing of Paavola et al (2001) and in particular their exploration of three models of innovative knowledge communities (Nonaka & Takeuchi, 1995; Engeström, 1999 and Bereiter 2001) and their description of the *Citizen Memory* project for knowledge creation amongst students. Carroll et al, (2001) described *TeacherBridge* for knowledge sharing amongst teachers. However, although

knowledge construction is part of knowledge management the issue was what else needs to be present to fully constitute knowledge management in a school environment.

Knowledge management was identified as a capability (Cram & Sayers, 2001), as the transfer of knowledge within and between institutions (Peters, 2001) and as the integration of shared communication with shared practices (Carroll et al, 2001). Knowledge management was a new concept for schools that challenged traditionally hierarchical structures and the isolation of the teacher in the classroom. To address these challenges was to address fundamental reforms to school cultures, structures, practices and curricula.

Leonard (1999) and Williams (2003) highlighted the need to focus on ICT integration or the result of their use. Combes (2001), Carroll et al (2001), Naeve (2001), Cram and Sayers (2003), Schneider et al (2001), Winzenreid (2001), Hay (2001) and Dellit and Hazell (2001) provided varied descriptions of how ICTs were used for knowledge sharing. However, the issue for schools was to develop the social infrastructure for knowledge sharing alongside the ICT infrastructure.   The review also considered the e-learning interpretation of knowledge management. Bell (2001) argued for the technologist to be removed from the central role in e-learning, Naeve (2001) advocated enquiry-based learning, Snowden (2003) argued for context over content and Williams (2003) stressed key-design issues in integrating knowledge management with e-learning. Both Williams (2003) and Paavola (2003) highlighted paradoxes in learning. The issue for schools was *how* they wanted to use ICTs and *why*.

The challenge to teacher-librarians to take on the role of knowledge managers rather than just information managers was laid by Todd (2001) and echoed by Cram and Sayers (2001). Combes described how the shift to inquiry-based learning in the knowledge creation context affected the role of the teacher-

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librarian.   Consensus amongst the teacher-librarian fraternity was that knowledge-management in schools should be facilitated by teacher-librarians although earlier research (Todd & Southon 2002) had highlighted some resistance to this idea. The issues were therefore for teacher-librarians to accept the challenge and for schools to recognise the contribution that teacher-librarians could make.

Knowledge management in schools was a challenging concept because schools had fewer resources (Carroll et al, 2001) and because schools' cultures were traditionally highly individual.   Hargreaves (1999) and the ACEL (2003) suggested knowledge sharing as the basis for systemic reforms.   Dellit and Hazell (2001) suggested implications for education of the knowledge society and Carroll et al (2001) and the ACEL (2003) argued that sustainable knowledge management depends on peer driven innovations.   The issue for schools was therefore to understand the nature of knowledge and knowledge management and to incorporate it into systemic reform, recognising the need for a knowledge sharing culture and ICT infrastructure as well as the role that the teacher-librarian could play in facilitating this.

Research design and methodology

As described in Chapter 3, the research was a naturalistic case study of a limited number of schools in Australia and New Zealand, which provided a teacher-librarian's snapshot view of colleagues within the profession. The methodology provided thick, descriptive evidence subject to interpretation in the findings. Field work took place on visits to the selected schools in those countries.   The choice of schools was based on various contacts and recommendations as well as itinerary and cost restrictions. Instruments used were a brief analysis of sectors represented by the conference presenters, a short questionnaire to elicit factual data and semi-structured interviews used in the schools and informal conversation throughout the journey. Interviews were mostly recorded on video

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tape, supplemented by handwritten notes. The recordings were transcribed onto a laptop at the time and analysed and annotated by hand.

The study was a personal exploration not intended as a comprehensive study of knowledge management in schools in those countries. It was not intended to inform the schools but rather to epitomise the sharing within the profession that was itself the subject of the study.

Discussion of the findings and conclusions

The findings presented in Chapter 4 began with a brief analysis of the papers present at the ASLA XVII conference. The analysis gave an indication of the sectors represented by the authors that included mostly academics, state and corporate service providers and few practicing teacher-librarians. The analysis confirmed the pattern found in the ex post facto reading although the sectors were not as wide. It also confirmed the notion that knowledge management was a new idea that would not likely have been encountered as a systemic concept, but rather in isolated pockets of practice or potential in schools.

The findings provided answers to the research questions as follows:

1. How do Australian and New Zealand teachers share their knowledge in pursuit of learning?

The knowledge sharing concept stems from Vygotsky's (1969) theory of the social process of knowledge construction. However, as Paavola (2001) points out, modern societies do not have the clear-cut boundaries of knowledge sharing identified by Vygotsky in traditional cultures. Therefore, lacking a defined approach to knowledge sharing, interviews with teacher-librarians focused on the informal structures through which knowledge-sharing was achieved.

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Teacher-librarians rely on their relationships with teachers to carry out their professional duties effectively (Todd, 2000 p.40). The isolation of some teachers (including teacher-librarians) led to not only the lack of opportunity to share knowledge, but also a lack of awareness of the benefits of sharing knowledge. The study demonstrated the co-ordinating role that teacher-librarians could play with their wider view of curriculum implementation. The findings revealed a variety of team structures that included (or occasionally excluded) the teacher-librarian and that provided potential for knowledge sharing.

Approaches to knowledge sharing varied widely across different types of schools. In boys' independent schools there was much more resistance to knowledge sharing than in girls' schools or junior schools. Barriers to sharing included time, the age factor, gender mindsets, a lack of overall philosophy, traditional teaching methods with emphasis on exams, conservative policies and cultures, teacher's accessibility to each other, lack of co-operative planning opportunities, suspicion of online methods and reliance on analogue print. Where schools lacked an information literacy policy or a formalised policy on curriculum integration of information literacy, knowledge sharing was inhibited. These barriers align with those identified by Cram and Sayers (2001 p.6) and Davenport's (1998) contention that sharing and using knowledge are often unnatural acts. The underlying dynamics that work against knowledge sharing in schools therefore need to be rectified.

Conclusion 1: *The structuring of human resources into teams and the structuring of appropriate decision making processes optimises knowledge sharing in schools.*

Statutory curriculum change has impacted the way teachers work together and the way that students respond. Information skills are recognised generally as core skills for the 21st Century and are embedded in new curricula. In one school

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an information literacy pilot project was initiated to encourage teachers to work co-operatively with teacher-librarians on integrating these skills. In contrast, in another school exponential growth of teacher demand for the integration of these skills through the assistance of the teacher-librarian was greater than what the incumbent could cope with. Sharing resources using Intranets alleviated this problem to a certain extent. A resistance to new methodologies from students was also identified. Students who had not experienced collaborative construction of knowledge demanded handouts rather than acquiring information literacy skills. These skills underlie both knowledge sharing and knowledge creation. Knowledge creation is identified by Paavola et al (2001 p.1) as a metaphor for learning. If information literacy is fundamental to knowledge creation and knowledge creation is learning, then students must become information literate to develop learning as understanding rather than learning as memorisation.

Conclusion 2: *Information literacy skills are fundamental to knowledge creation in the 21st Century school context, and means must be established for students to construct and share knowledge in the process of understanding.*

Socio-economic status was not a factor in the development of a knowledge management philosophy. Ferndale College and Western Primary were examples representing the extremes of Australian society. Their approaches were also dissimilar. Western embarked on a participatory design (Carroll et al, 2003 p.5) knowledge sharing process in order to capture and capitalise on their know-how. Ferndale developed an Intranet/VPN in order to distribute curricular knowledge between stakeholders in the community. The initiator in each case was also different: at Western it was the Principal, at Ferndale, the Director of Information Services. What was common to both schools was that they were leader-driven (McDermott, 1999 in ACEL, 2003 p.3), involved the parent community (Carroll et al, 2001 p.12), involved teachers as creators of professional knowledge (Hargreaves, 1999 in Paavola 2001 p.17), relied heavily on Intranets with VPN

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access and the reforms associated with their versions of knowledge management were systemic (Carroll et al, 2003 p.1).

Conclusion 3: *Collegial exchange of knowledge, active support or involvement of school leadership, built in evaluation, added value from data analysis (particularly to support inclusive policies) and applied knowledge focusing on student learning contribute to a critical learning community which optimises student, teacher and organisational learning.*

2. How do ICTs enable knowledge management?

Within schools, there was a need to focus on information literacy not ICTs (Bundy, 2003 p.3), to extend information literacy to include metacognitive levels (McGregor, 2003 p.5) and to generate new forms of knowledge (Hargreaves, 2000 in Peters, 2001 p.2). However, it was necessary to distinguish between information management and knowledge management and to acknowledge the logical extension of the role of the teacher-librarian in information literacy to advocate the higher-order or metacognitive level of thinking (McGregor 2003:5) associated with knowledge creation and knowledge literacy. Whilst ICTs were not a prerequisite to knowledge sharing, in a 21st Century organisation networked ICTs enabled information access and retrieval, communication, collaboration, creativity and innovation and provided a critical component for knowledge creation (Schneider et al, 2002 p.12; Hanson, 2000 p.19-22).

In the schools visited a variety of different packages were used to provide Intranets for information sharing, provided mostly through the Library for both student and teacher use. Parents and students were able to connect to Intranets via VPNs. Ideally, Intranets were constructed by a person dedicated to that purpose, with curricular input from teachers using templates or outlines. Coursework and resources were added to provide complete online versions of classroom courses. However, as Schneider (2002 p.1) points out, systems that

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rely on the accumulation, organisation and delivery of content by transcribing traditional materials into electronic format do not constitute either e-learning or knowledge management. An Intranet has the potential to be used interactively for the generation of new knowledge, i.e. supporting *'rich socio-constructivist scenarios'* (Schneider, 2002 p.1) such as a *C3MS*. These require significant pedagogical change. The networked environment demands collaborative skills and collaborative tools.   Leonard states that this becomes knowledge management (2002 p.12). At school level collaborative skills are provided to students through information literacy and constructivist methodologies and through collaborative groupware tools such as email, bulletin boards and blogs (Hay, 2001 p.2; Hay & Eustace, 2000 p.28; Hanson, 2000 p.19). It is the communication and interaction aspects that transform these social processes and through which new knowledge is generated. A knowledge management system should therefore provide the tools for this type of interaction both at student and teacher level as well as the opportunities for sharing face to face. These tools can be put together into a *'Knowledge Management Toolbox'* (see Appendix D).

Conclusion 4: *Schools need to develop both social and ICT infrastructures to manage knowledge creation and sharing at student, teacher and organisational levels. These changes presuppose constructivist methodologies, active learning strategies, inquiry-based learning and metacognitive approaches.*

Teachers were supported by various initiatives such as those provided by *SOCCI*, *Education Queensland*, or *EdNA*. These services were described within the ambit of knowledge management but do not constitute knowledge management. However such online services provide much of the professional development information that teachers rely on to implement educational reforms, including knowledge management approaches. Information management for

professional development is therefore an integral part of the wider knowledge management concept.

School libraries are accessed online through OPACs that provide full Boolean searching of their Library holdings including print, multi-media and online resources to support inquiry-based learning. Portals of linked resources support the integrated online curriculum. OPACs and portals are further examples of information management tools that support the wider picture of knowledge management.

Conclusion 5: *Information management tools form part of the larger picture of knowledge management in that they provide access to explicit knowledge which is the raw material of inquiry-based learning and knowledge construction.*

Student administration systems (Winzenreid, 2001 p.1; Lewis, 2001) should include continuous assessment and reporting on outcomes based learning as well as essential data that profile individual students and classes (Lewis, 2001). These systems provide a basis for teachers to plan for accommodating individual needs as well as communicating with parents. Diagnostic reporting features of these systems support decision making at organisational level. In this way, ICTs allow teachers to share knowledge about students, allow the generation of new knowledge in support of the decision-making process, thereby constituting a knowledge management system in the corporate sense.

Conclusion 6: *Student administration systems with diagnostic capabilities are able to support decision-making as well as well as individualised instructional design.*

Knowledge creation using ICTs was not limited to schools with sophisticated infrastructure nor was it dependent on highly developed skills in higher grades.

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An innovative example of knowledge creation was evident in the early primary years of a New Zealand government school with limited resources.

Conclusion 7: *It is not the provision of ICTs but the way in which they are used that is critical.*

3. What are the implications of knowledge management for teacher-librarians?

There was consensus that it is the teacher-librarian's role to facilitate knowledge management in the school (Bell 2001, Cram & Sayers 2001, and Langford & Wall 2001). Todd (2001 p.18) argues that it is not the teacher-librarian's role to change the culture of a school but to '*create a knowledge-information infrastructure that changes student outcomes'.* He argues further that a vision for knowledge management, centred on constructivist learning, successfully implemented, may well change the culture of the school.

Educational reforms impact considerably on the role of teacher-librarians. In Australia and New Zealand new curricula require far more use of resources for inquiry-based learning thus teacher-librarians are involved in collaborative design of new units and scaffolding of the learning process. These developments contrast with the traditional role of the teacher-librarian as simply provider of access to resources as described by Bundy, inter alia, in Chapter 2. However, teacher-librarians welcome the new opportunities to focus on their *teaching* role of supporting the learning process through collaboration with teachers.

The personality of the teacher-librarian appeared to be significant with greater progress made by those who were prepared to innovate and take risks although this was affected by the culture of the school.

Teacher-librarians are offered professional development opportunities such as that run by the AIS (NSW) to keep themselves abreast of new developments. The value of the project was two-fold in that it offered teacher-librarians the opportunity to experience knowledge construction and sharing in an online environment as well as to draw teachers into the process. Participants took on leadership roles and action-research roles. Ellyard (2001 p.7) in his opening keynote to the ASLA XVII Conference challenged teacher-librarians to *lead*, rather than *manage* knowledge. Organisation of knowledge assets in schools requires management as well as leadership. Teacher-librarians are in a position to provide both.

Conclusion 8: *The teacher-librarian's role is multi-faceted. Over and above the traditional role, the teacher-librarian is:*

- *an initiator, manager and leader of information-knowledge structures*
- *a key member or leader of collaborative teams involved with information literacy, inquiry-based learning, curriculum development and ICT integration*
- *an active conduit linking the school with resources, services and opportunities*
- *a learner (including researcher) as well as a facilitator of organisational learning*
- *pro-active, an innovator and a risk taker*

4. What constitutes a knowledge-enabled school and what relevance does this have in South Africa?

Schools have fewer resources with which to succeed at knowledge management (Carroll et al 2001:4) and the existing culture of most schools is highly individual and contrary to knowledge sharing (Carroll et al 2003 p.9). These factors were found to be true in different combinations in certain, but not all, schools. Matched to Dellit and Hazell's (2001 p.11) criteria, only Western Primary, a government

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school with limited resources, met all criteria i.e. it was *'managing knowledge to maximise learning efficiency'.*

School culture, and particularly the traditional, colonial based culture of the boys' independent schools, had a strong impact on knowledge sharing. Girls' schools were not as adversely affected, possibly because of gender equity developments. However, there were differences between girls' schools which may have been the result of competitiveness. Schools with top academic results may be too focused on achievement to become more inclusive and allow more knowledge sharing. The stronger the cultural ethos was, the harder it was for the school to embrace change. The driving force for change was the arrival of the new certification process at Year 12.

Whether the schools had a laptop programme or not, or, whatever the level of sophistication of its ICT infrastructure did not appear to influence a school's capacity for knowledge sharing or knowledge creation. However, networked ICTs provided significant support for the management of information and knowledge at student, teacher and organisational level.

Whatever the culture of the school or its level of infrastructure, the difference appeared to lie in the dynamics that existed in the schools. The dynamic was supported by:

- a culture accepting of change and embracing change
- committed and transparent leadership that provided a driving force for change
- a human resource structure that emphasised teams above hierarchy
- a collaborative environment built around innovation, risk taking and sharing
- acknowledgement, support and use of the generalist, specialist and empathetic skills of the teacher-librarian

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- involvement of the full school community, including parents
- a strategic direction facilitating knowledge construction, sharing and analysis
- a strategic plan to enhance learning
- ICTs integrated in support of learning
- integrated systems

Conclusion 9: *A knowledge-enabled school is a school that understands the nature of knowledge and knowledge management and incorporates the concepts into systemic reforms.*

The knowledge-enabled school has multiple implications for South Africa. Firstly, it needs to be recognised that provision of ICTs, although a catalyst for reform, does not constitute systemic reform. This is an important point in view of the fact that ICTs are now being rolled out to South African schools in certain provinces. Secondly, to gain the full benefit of ICTs classroom pedagogy and the approach to professional development in ICT integration should change or be expanded. For teachers to work together on the development of knowledge creating tasks requires appropriate human structures supported by knowledge sharing tools. Thirdly, teaching to the individual is realised by sharing knowledge that profiles individuals and classes within a diagnostic administrative tool such as *Schoolmate*. Finally, online systems used for professional development can model knowledge sharing if directed at information literate personnel with an holistic overview of the school, its culture and its resources. Western's model of systemic reform provides significant hope for impoverished South African schools. For independent schools at the other end of the South African spectrum, the role of ISASA in facilitating the introduction of knowledge management as a working concept should be reviewed.

Conclusion 10: *It is feasible for South African schools to benefit from the lessons learned from Australian and New Zealand schools, particularly from knowledge sharing in professional development, and systemic reform through extending administration systems to become knowledge management systems.*

Recommendations

As indicated in the rationale, this study was not intended to inform the schools in which the field work was conducted. It is an individual South African's interpretation based on teacher-librarian's views in a limited selection of schools in Australia and New Zealand. However, the study has focused on the broadness of the concept and the contribution of knowledge management to learning. It has revealed many aspects of knowledge management that could be applied to schools in general and to South African schools in particular. The recommendations that follow evolve from the conclusions of this study:

1. The ways in which teachers share knowledge at school, regional and professional association level require greater scrutiny.
2. Developing teacher-librarians to knowledge managers is a complex and protracted process. Research should establish the capacity for knowledge management in schools: the ICT capacity and the human capacity.
3. The Western Primary model of systemic reform should be piloted at similarly challenged schools in South Africa.
4. Networked ICTs in an integrated system form the basis of a *Knowledge Management Toolbox* (Appendix D) that serves student, teacher, organisation and community learning and decision-making needs. The implications of integrating and optimising existing tools need to be established.

On reflection

Would my findings have been different if I had interviewed Principals or ICT managers rather than teacher-librarians? Principals are unlikely to have given

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the time that teacher-librarians gave. ICT managers may have been able to provide some similar information but I question whether their understanding of teachers would have been the same. The ICT manager is concerned with equipping teachers with new skills, but predominantly with ensuring that the ICTs function; the teacher-librarian is concerned with the application of information (including ICT-based information) in the classroom. Teacher-librarians also have a professional knowledge and history that extends much further back than ICTs. Further, although knowledge management is accepted as part of both disciplines of Information Science and Information Technology, Information Science is more closely associated with the human side of it. I therefore believe that meeting with teacher-librarian's was the correct approach.

I embarked on this study fully aware that there were no distinct definitions of the concept of knowledge management in schools. Papers presented at the ASLA conference, although they offered disparate perspectives, confirmed this view. The door was therefore left wide open for me to explore without a predominant theory clouding my mind. However, it also exposed me to the danger of not finding what I was looking for and having to contrive the relationship between knowledge management and schools. The ex post facto reading encountered as part of documenting this experience, confirmed further that there was still no unique definition of knowledge management as it applies to schools. Each person who has written about it has drawn on business perspectives for the theory and interpreted it suitably. This is not a criticism, because their premise has been similar to mine: that with a school's prime function being the acquisition and transfer of knowledge i.e. learning and understanding, then there had to be a role for knowledge management in a school.

The question is, does knowledge management really exist, or is it a new guise for information management. The delineation between data and information is without controversy: data is unequivocal recorded fact or assumed fact. Data

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becomes useful information in the hands and mind of a user. Knowledge adds experience to the equation.

Data + User = Information + Experience = Knowledge

Can knowledge be managed in the same way as information? Knowledge per se exists only in the individual user's mind and cannot be managed. What can be managed are the processes of knowledge creation and knowledge sharing. Wilson is highly critical of knowledge management as a term, and points out that even the so-called father of knowledge management, Sveiby, (Wilson, 2002 p.20) is uncomfortable with the term, although he argues for its retention:

> *I don't believe knowledge can be managed. Knowledge Management is a poor term, but we are stuck with it, I suppose. "Knowledge Focus" or "Knowledge Creation" (Nonaka) are better terms, because they describe a mindset, which sees knowledge as activity not an object. A[ctivity] is a human vision, not a technological one.   (Sveiby in Wilson 2002, p.20).*

Within schools each learner, including teachers as learners, is pre-occupied for the better part of each school day with making sense of information. A learner reaches the point of understanding when transfer occurs and confirms understanding when able to explain it to others (Wiggins & McTighe, 1998 p.38). It is arguing semantics to proselytise on whether at this point the learner is conveying knowledge or information.   Students construct knowledge in constructivist classrooms; teachers construct knowledge as they piece together data on an individual student collected in disparate classrooms and from disparate experiences, encounters or critical incidents. Knowledge management in a school therefore supports knowledge creation by students and teachers through the provision of integrated and balanced ICT and human infrastructures.

This study has described and analysed the practice of knowledge management in schools in Australia and New Zealand. It has provided an overview of the range of interpretations that are given to knowledge management and attempted to add clarity to the definition of what constitutes knowledge management in a school environment.   The study has also described the contribution that knowledge management makes to student, teacher, organisation and community learning in schools and the role that the teacher-librarian plays in facilitating knowledge management practices.

Appendix A

School Profiles

	Independent	Government	Boys	Girls	Co-ed	Senior	Intermediate	Primary	Student population	Staff complement	Teacher-librarians/librarian	ICT staff	Library Assistants
Caversham College	x		x			x	x		-	128	3	3	
Cornfield	x				x	x	x	x	1800	200	7	7	4
Delville HS		x			x	x	x		450	-	1	1	-
Ellwell	x			x		x	x		1560	150	2	9	4
Fellside	x		x			x	x		950	106	4		2
Ferndale	x				x	x	x	x	900	-	4	-	1
Havilland HS		x	x			x	x		1350	142	4	-	2
Herschelle	x			x		x	x		900	-	2	-	2
Melville	x			x		x	x		2200	700	15	-	2
Northview	x		x			x	x		1600	130	1	7	1
Nottingham College	x		x			x	x		1800	274	3	-	2
Smithfield	x			x		x	x		1360	-	3	6	1.5
Southern		x			x			x	780	50	1		1
St Teresa's	x				x			x	400	-	1	-	1
Tonbridge	x		x			x	x		1400	-	3	-	2
Wellesley		x			x		x		690	-	3	1	2
Western		x			x			x	465	-	1	0	0

Table 4: Schools visited: type, populations and staffing

Appendix B

Collaborative structures in Australian Schools

The models of collaborative structures are grouped according to their purpose.

1) Integration of IT into the curriculum:

  a) Model 1 (Ellwell College)

     i) An **ICT Steering Committee** including the principal, the academic deputy, the ICT manager (technical), the teacher librarian, the ICT co-ordinator (curriculum) and the Business Manager. Their brief is 'big decisions', strategic planning and implementation review and policy statements.

     ii) An **Academic Technical Committee** consisting of one member from every subject department (not necessarily the HOD, preferably the most information literate person). Their brief is to discuss and negotiate budget needs. Each department presents its requests and then the committee ranks priorities. This committee divides the cake. Some members serve on both committees including the teacher librarian and the ICT co-ordinator (curriculum).

  b) Model 2 (Ferndale)

     i) A teacher-librarian, as **Head of Library and Information Systems,** is responsible for **co-ordination** of the integrated online-curriculum and its resources. This team also includes **students** with the right skills and specific subject interests.

     ii) There is a **Web Publishing Team** with at least one member totally dedicated to making sure that the **Intranet** works and that the required content is there. One person does all the data crunching that goes behind the system and also supervises the Intranet.

     iii) There are also **support staff** such as the **ICT teachers** that help with professional development.

c) **Model 3 (Northview)**

   i) Five teachers have the role of **Personal IT Trainers** ("Pitbulls"). They each have a certain number of hours allocated to this duty. There is a system of teams, depending on the ability level of the individual rather than a department structure. Each individual teacher is assigned a trainer who they can approach for assistance.

2) **Curriculum development structures**

   a) **Model 1 (Ferndale College)**

   In this particular model the school has no formal hierarchy. E-Learning is delivered via a VPN. The Head of Library and Information Systems described the model as follows:

   > *"Each learning area in the CSF (Curriculum Studies Framework) has a **Learning Area Leader**. Within that, for example, the Maths teachers will meet with the Learning Area Leader and discuss converting the CSF into the different grades. Then the teachers for Maths in each grade will look at the outcomes and evaluate which of the CSF measurements they wish to use or what they wish to add."*

   b) **Model 2 (Caversham College)**

   In this model the librarian's frustrations were evident. I have included it as there is recognition by the teacher-librarian of the way to go, but no breakthrough.

   i) "*There is no planned knowledge management or structure to encourage collaborative practices. An individual may be aware of what another is doing if he is closely associated with that person. The knowledge and expertise of that individual is therefore totally inaccessible*".

   ii) The school structure includes a **Committee of Heads of Faculties**, of which the teacher-librarian is a member. The teacher-librarian also

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attends all major faculty meetings. Faculties meet every third or fourth week at lunchtime. A Faculty covers a Learning Area e.g. Sciences, Languages.

iii) The teacher-librarian has broached the idea of a knowledge management structure but there are a number of fears that would have to be addressed e.g. privacy issues. What knowledge is accessible is in printed format.

c) Model 3 (Havilland High School)

i) The Librarian is the **Curriculum Resources Co-ordinator**, chairing the **Curriculum Resources Development Committee**.   This committee includes the **School Principal** and the **Technology Co-ordinator**.   All development related to ICT has been through this committee, which has a very strong curriculum focus.   It is characterised by good teamwork and a very supportive principal.

ii) Part of the job is to look at curriculum and technology and together with the teacher-librarian in the role of **Enrichment Technology Assistant** run courses for teachers after school. "*Having this opportunity to work with teachers on curriculum related technology issues is seen as critical.*"

d) **Model 4 (Smithfield Collegiate)**

The strength of this particular model is clear from the following: "Over the past 3-4 years there has been a concerted effort to ensure that teachers know what is going on. "One of the strengths of the school is the sense of people working together. When a hierarchy is needed, it's there. The fact of the matter is that we have many teachers who are middle-aged although we do have some younger staff and people just get on. It's a very friendly place, a commonality of being, a sharing place. It's a strength."

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i) The **Curriculum Team** includes the **Library HOD**.   The team was started last year. Anyone interested can join the team, not just HODs. Their aim is developing ideas. No one person has overall responsibility for curriculum development.

ii) There is also a regular **senior staff meeting** at which curriculum issues are raised. The Librarian also attends this meeting.

iii) **Co-operative planning**: The teacher approaches the librarian with responsibility for that subject to sort out what information is available. The Librarian is not involved in developing the assignment. However, in NZ, teachers' information literacy levels are high.

e) Model 5 (Cornfield College)

i) Committee for Teaching and Learning headed by the **Director for Teaching and Learning** and including the **Director of Information Services** (Teacher-Librarian).   The responsibilities of this committee are curriculum planning and development and monitoring and developing approaches to teaching and learning.

f) Model 6 (Fellside College)

i) The **Curriculum Committee** is chaired by the **Director of Studies** and includes the **Director of Library Services** and **representatives from each campus** (not department). This committee looks at the overall programme without vested interest i.e. it functions at policy level.

ii) **Faculty Heads Committee** is chaired by the Director of Studies and looks at curriculum at implementation level.

iii) Each **faculty** has a meeting including all the teachers in the subjects. One **teacher-librarian** is assigned to each faculty meeting to keep in touch with needs. Some areas e.g. Humanities are too large and therefore unwieldy.   Subject HODs rather than faculty heads were easier to deal with.

iv) The teacher-librarian felt that she should be represented on both the policy and the implementation levels of curriculum discussions.

g) Model 7 (Tonbridge College)

A sense of despondency came through from this model but as the school is now involved in a support project, possibilities have been ignited.

i)   There is no curriculum committee. Development takes place within each department only.

ii) Although the Library offers many services, teachers often only seek help at the stage of booking the Library as a venue.

iii) It is only on the project that teachers have been targeted at the beginning of an assignment.

h) Model 8 (Nottingham College)

I have included this model to show that even where developments are taking place, if they are designed on old hierarchies, the same problems may persist.

i)   The Teacher-Librarian has no direct representation on the HODs forum.   Previously, the Library was represented, but not now. Someone else has responsibility for the library, careers department and special education ("all the odd departments") but that person is not involved in any of them.

ii) The school is now changing this. They are now advertising for an HOD Information Technology and an HOD Support Services. However the emphasis in this position appears to be on the Technology.

i) Model 9 (Northview College)

Similarly**,** this librarian felt herself to be very much on the periphery, with even the new appointment offering little hope. The library was seen as a separate department.

i)   The Librarian is not part of either the Curriculum or the HODs group.

ii) *"There are 6-7 senior staff in the senior management team that meet to deal with a whole lot of issues that are then fed down the track to the HODs."*

iii) There are also faculty groups. The Library is in a group with Graphics, Music, Art, and Computers. The group holds one meeting per month but the Librarian cannot attend very often.

iv) A new **Head of Senior Study** has been appointed. The incumbent will run a new style HOD committee to look at curriculum integration and changes especially in light of the new assessment procedures.

v)   *"There is no close collaboration between the ICT department and the library, more by historical default, than by design."*

vi) There is a weekly general staff meeting. *Again, the Librarian does not always go to them. The meeting is at 08h00, a time when the Library is open and in need of staffing.*

3) Professional Development in Information Literacy for Teachers

This section includes comments on practices in some of the schools. Generally speaking, New Zealand teachers were considered by their librarians to be information literate, but this was apparently not as prevalent in Australia. This could have been due entirely to the selection of schools.

a) *"The new assessment systems have had a strong impact on innovative classroom practices, particularly regarding research skills."*

b) *"The Librarians offer training for departments on new developments. Staff development sessions are held in the library e.g. on electronic resources held by the library, including recommendations from departments, tips on using the Internet, Reuters, Britannica Online, Te Puna etc."*

c) *"The staff is expected to take responsibility for things like the Intranet. Rather than have someone do it for you there is a lot of professional development here. You are encouraged to learn new things for yourself,*

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such as using the digital camera. Rather than getting someone to take your photos, you are encouraged to get the camera and do it yourself. Teachers are being encouraged to do this all the time. There is a lot of resource-sharing and co-operation."

d) *"Teachers appear to be struggling with the new challenges and the new ideas. It is difficult to inculcate an information literacy approach when students are reliant on the many handouts that they are given particularly in Y11 and Y12. Students expect information to be found for them."*

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Appendix C

[Ferndale] College Unit Blueprint

Information **[Ferndale]** **Web Published Unit Blueprint for**	
Junior/Middle/Senior*/College	
	Information here:
Year Level	
Unit Name	
Unit Author	
Other Contributors	
CSF Link	
Introductory statement (Your opening welcome to students, max. 70 words)	
Instructions for students (How to use this material/guide, max. 70 words)	
Intentions	
Objectives:	1.
	2.
	3.
Expected outcomes:	1.
	2.
	3.
Attach a study schedule (week by week plan of intended unit)	
Assessment Instruments	
Assessment A:	
1. Type	
2. Week due: (Check schedule above)	
3. Formative/Summative*	
4. Report format – numeric/alpha/S/N/comment*	
5. Short description:	

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Assessment B:		
	1. Type	
	2. Week due: (Check schedule above)	
	3. Formative/Summative*	
	4. Report format – numeric/alpha/S/N/comment*	
	5. Short description:	
Etc.		
Content		
Set out content if possible divided into sections of about 70 words. Include known links to resources.		
HELP possibilities e.g. "Email your teacher"		
Suggest **Communication** components that could be added e.g. "chat session on topic X, week 3"		
Tools needed by students e.g. MS Word, Visio software etc.		
List words (and their definitions) for a **Glossary** of this Unit.		
Other ideas you wish to try		
Resources to be linked to this Unit (e.g. web pages, existing Intranet pages, books, library catalogue, etc.)		

Information [Ferndale] Unit Blueprint courtesy Dr Arthur Winzenreid

Appendix D
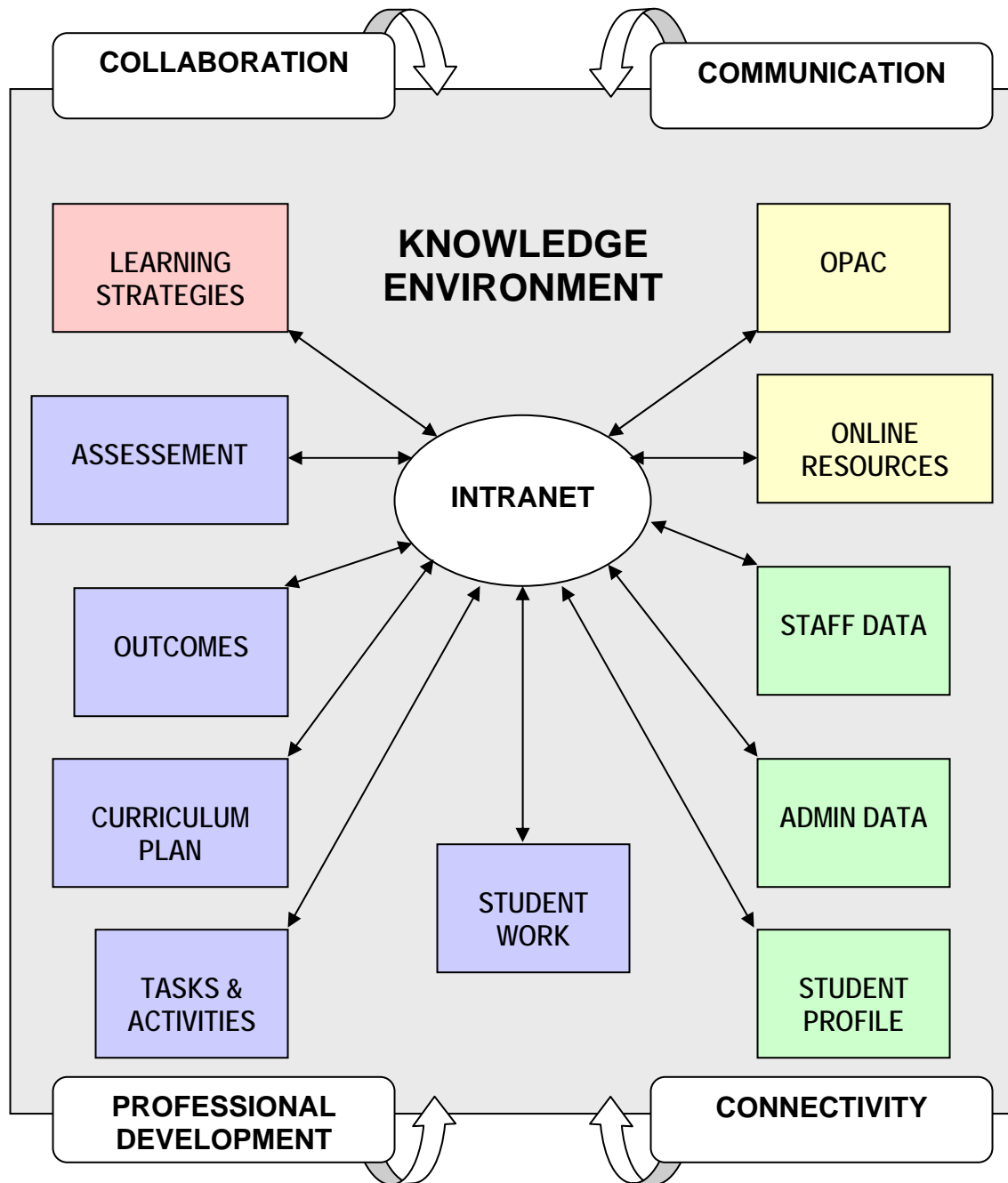
Knowledge Management Toolbox

FIGURE 3: The *Knowledge Management Toolbox*

The *Knowledge Management Toolbox* is synthesised from the various components identified in Australian schools during the field work for this

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research. The *Knowledge Management Toolbox* acts as a backbone to the knowledge environment of the organisation. The *Toolbox* consists of the Intranet that draws in and interfaces disparate information that is contained in various databases together with curriculum information, classroom strategies and samples of student work.   Interaction through connectivity, professional development, communication and collaboration create a dynamic from which new knowledge is created. This in turn becomes part of the knowledge environment.

Appendix E:

Interviewer-administered questionnaire

Summary information	
Name of school:	
Head of Library/Information services:	
Web site:	
Email:	
Type of School:	
Grade levels and numbers:	
Library staff –TLs:	
Library staff – tech:	
Library staff – other:	
OPAC:	
Library PCs:	
Other PCs:	
Intranet responsibility:	
Web site responsibility:	
ICT management:	

Appendix F:

Semi-structured interview questions

What formal structures exist that enable you, as teacher-librarian/librarian to work collaboratively with other teachers?	
What informal structures exist that enable you, as teacher-librarian/librarian to work collaboratively with other teachers?	
Who heads the collaborative group/s that you are part of?	
How do you/does your school integrate information literacy or information skills into the curriculum?	
What ICTs does the Library use to share information e.g. OPAC, Intranet, Internet links?	
Does your school have a knowledge management focus that you are aware of?	
How does it all work for you?	

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References

Aiken, M. & Britton, B. (1997) 'The learning organization and the voluntary sector', in Cook, J., Staniforth, D. and J. Stewart (eds.) The learning organization in the Public Services. Aldershot, UK Gower

ASLA (2001*) Learning for the future: developing information services in schools*, 2nd edition. Australia: Curriculum Corporation.

Australian Council for Education Leaders (ACEL) (2003) *Response to the discussion paper: Young people, schools and innovation: towards an action plan for the school sector.* Submission Number RTTE 212.

Bell, C. (2001) *Challenges of implementing an e-Learning portal*. Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Bell, D. 1973, *The coming of the post-industrial society*. New York: Basic Books.

Bereiter, C. (2001) *Education and mind in the knowledge age*. Hillsdale, NJ: Erlbaum.

Bhatt, G.D. (2001) Knowledge management in organisations: examining the interaction between technologies, techniques and people in *Journal of Knowledge Management* 5(1) 2001, pp. 68-75.

Bonanno, K. (2002) The mind – your greatest, creative asset in *ACCESS* 16(1), pp. 8-12.

Brown, J.S., Collins, A. & P. Duguid (1989) Situated cognition and the culture of learning. *Educational Researcher* 18, pp. 32-42

141

Bundy, A. (2001b) Attitude is everything - towards an information enabled knowledge nation. Paper presented to a meeting of ALIA NT members. Darwin NT, November 2001. Available online:
http://www.library.unisa.edu.au/about/papers/attitude.htm. Accessed 13.03.05

Bundy, A. (2001c) *Enabling the knowledge nation: What Australia needs in the 21st Century.* Address to the 11th National Library Technicians Conference. Available online: http://conferences.alai.org.au/libtec2001/papers/bundy.html Accessed 11.02.2005.

Bundy, A. (2001a) Towards an information enabled knowledge nation. Paper presented at the Victorian Commercial Teachers' Association COMVIEW 2001 Conference, November 2001. Available online:
http://www.library.unisa.edu.au/about/papers/towards.htm Accessed: 13.03.05

Bundy, A. (2003) *Only connect: towards the information enabling of young Australians.* Address to the School Library Association of Victoria (SLAV) Conference, March 2003. Available online:
http://www.library.unisa.edu.au/about/papers/connect1.htm Accessed 13.03.05

Carr, K.S. (1990) How can we teach critical thinking? *ERIC Digest.* Urbana, IL: ERIC Clearinghouse on Elementary and Early Childhood Education. (ED326304)

Carroll, J.M., Choo, C.W., Dunlap, D.R., Isenhour, P.L., Kerr, S.T., McLean, A. & M.B. Rosson (2001) *Knowledge management support for teachers.* Available online: http://java.cs.vt.edu/public/classes/communities/readings/KM4Teachers-ETRD03.pdf Accessed 11.02.05

Carroll, J.M., Rosson, M.B., Dunlap, D.L., & P.L. *Isenhour (2003) Frameworks for sharing knowledge: Towards a professional language for teaching practices* in Proceedings of the 36th Hawaii International Conference on System Sciences, 2003. Available online: http://www.hicss.hawaii.edu/HICSS36/HICSSpapers/DDOML22.pdf. Accessed 07.02.05

Chisholm, L. (1993) *The transition to a knowledge society and its implications for the European social model.* Discussion paper presented at XVII European Symposium on Science and Culture, Bruges.

Coffield, F. (1999) *Breaking the consensus: Lifelong learning as social control.* Inaugural lecture at the University of Newcastle, Newcastle.

Combes, B. (2001) *The Sevenoaks experience: the role of the teacher librarian in setting up a system to manage documentation, support materials and online curriculum.* Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Cornock, L. & R. Jones (2002) The patchwork TL in *Commentary* 16(4) 2002. Available online: http://www.asla.org.au/access/a_commentary_160402.htm. Accessed 13.03.05

Cram, J. & R. Sayers (2001) *Creating and managing context: the use of knowledge management principles to deliver virtual information services to schools.* Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Davenport T.H. and L. Prusak (1998) *Working Knowledge: How Organisations Manage What They Know.* Cambridge: Harvard Business School Press

143

Davenport, T. (1997) *Knowledge management case study: knowledge management at Microsoft.* Austin, TX: University of Texas, McCombs School of Business. Available online: http://www.bus.utexas.edu/kman/microsoft.htm. Accessed: 14.02.05

Dellit, J. & A. Hazell (2001) *The Le@rning Federation: Online curriculum content in a managed information environment.* Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Drucker, P. (1969) *The Age of Discontinuity: Guidelines to our Changing Society*. London: Heinemann

Ellyard, P. (2001) *Planning for thrival in a planetist future: the challenge for knowledge management and for learning*. Keynote address to the ASLA XVII Conference, Mudjimba Beach, Queensalnd, October 2001.

Engeström, Y. (1999) Innovative Learning in Work Teams: Analyzing Cycles of Knowledge Creation in Practice <u>in</u> Engeström, Y., Miettinen, R. and R.L. Punamaki (eds.) *Perspectives on Activity Theory*, pp. 377-404. Cambridge: Cambridge University Press

Garratt, B. (2001) *The learning organization: developing democracy at work*. London: HarperCollinsBusiness

Gorz, A. (1999) *Reclaiming Work: Beyond the Wage-based Society*. Cambridge: Polity.

Hanson, K. (2000) Surfing the subjective memory: Granularity or innovation? <u>in</u> Hay, L., Hanson, K. and J. Henri (eds.) *New millennium, new horizons: Information services in schools*. 2000 Online Conference Proceedings. Wagga Wagga: Charles Sturt University Centre for Studies in Teacher Librarianship.

Hargreaves, D.H. (1999). The knowledge-creating school in *British Journal of Educational Studies* 47(2), 122-144

Harvey, R. (2001) Teacher librarians ... who are you? in *Commentary* 15(4) 2001. Available online: http://www.asla.org.au/access/a_commentary_150401.htm. Accessed 13.03.05

Hay, L. (2001) *Groupware: supporting knowledge management in schools.* Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Hay, L. & K. Eustace (2000) Groupware as a knowledge management tool: Possibilities for schools in Hay, L., Hanson, K. and J. Henri (eds.) *New millennium, new horizons: Information services in schools.* 2000 Online Conference Proceedings. Wagga Wagga: Charles Sturt University: Centre for Studies in Teacher Librarianship.

Lane, R. E. (1966) The decline of politics and ideology in a knowledgeable society in *American Sociological Review*, 31 (5), pp. 649-62.

Langford, L. (2001) "Editorial" in *ACCESS*, 15(1), p 1.

Langford, L. & J. Wall (2001) *Knowledge management: a word to the wise.* Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001

Lave, J. & E. Wenger (1991) *Situated learning: Legitimate peripheral participation.* New York: Cambridge University Press

Leonard, D.C. (1999). The web, the millennium, and the digital evolution of distance education in *Technical Communication Quarterly* 8 (1) pp. 9-20, Winter

145

1999. Available online: http://www.attw.org/TCQarticles/8.1/8-1Leonard.pdf.
Accessed: 07.02.2005

Leppard, L. (2003) The role of the teacher librarian in essential learning in
Commentary 17(3) 2003. Available online:
http://www.asla.org.au/access/a_commentary_170303.htm. Accessed 13.03.05

Lewis, J. (1999) Leading the learning community – a new role for teachers.
Handout from the author, 2001.

Loertscher, D.V. (1988) *Taxonomies of the school library media program*.
Englewood CO: Libraries Unlimited

Mayer, E (1996) Information literacy and the autonomous learner in *Learning for
life: Proceedings of the Second National Information Literacy Conference 30
November-1 December 1995.* Adelaide, University of South Australia

Mallan K., Lundin, R. & Elliot Burns, R. (2001) Exploring the impact of new
technologies on the role of teacher librarians in *ACCESS* 15(1), pp. 29-32.

McDermott, R. (1999) Learning across teams: How to build communities of
practice in team organizations in *KM Review* May/June 1999. Available online:
http://www.kunnskapsnettverk.no/C14/C10/CoP/Document%20Library/Learning
%20Across%20Teams.pdf Accessed 07.02.05

McGregor, J.H. (2003) *Students managing personal knowledge.* SCIS Oration
delivered to the ASLA XVIII Conference, Hobart, Tasmania, October 2003.
Available online: http://athene.riv.csu.edu.au/~jmcgregor/SCIS2003.pdf
Accessed 07.02.05

McLoughlin M. (2002) Profile – Jan Sismey in *ACCESS*, 16(3), pp. 33.

Morley, A. (2001) Character: a decent obsession: revisiting Dr Arnold of Rugby in *The Practising Administrator* 23(4), 2001, pp. 6-8.

Naeve, A. (2001) *The Knowledge Manifold: An educational architecture that supports inquiry-based customizable forms of e-learning.* Report CID -162. Stockholm: Royal Institute of Technology. Available online: http://cid.nada.kth.se/pdf/CID-162.pdf. Accessed: 07.02.05

Naidoo, V. (2002) Intellectual capital: the new wealth for organizations, in *HR Future*, February 2002, pp. 46-48

Nimon, M. (2003) School libraries in Australia in *The Australian Library Journal* 53(1). Available online: http://www/alia.org.au/publishing/alj/53.1/full.text/nimon.html. Accessed online: 13.03.05

Nishimuro, T. (1999) Information literacy: How does it differ from traditional or Computer Literacy? in *TechKnowLogia Frontline.* Available online: http://www.techknowlogia/TKL_active…   Accessed online 05.10.99

Nonaka, I. and H. Takeuchi (1995) *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovation.* Oxford: Oxford University Press.

Okiy, R.B. (2004) The Universal Basic Education (UBE) Programme and the development of school libraries in Nigeria: A catalyst for greater female participation in national development in *Information Development* 20(1) 2004, pp. 43-50.

Oseas, A. (2000) Introduction: An invitation to ask "What if …?" in Gordon, D.T. (ed.) *The Digital Classroom: How technology is changing the way we teach and learn.* Cambridge MA: Harvard Education Letter.

147

Paavola, S., Lipponen, L. and K. Hakkarainen (2001) *Epistemological foundations for CSCL: A comparison of three models of innovative knowledge communities.* Helsinki: University of Helsinki Centre for Research on Networked Learning and Knowledge Building. Available online: http://newmedia.colorado.edu/cscl/228.pdf. Accessed 07.02.05

Peters, M. (2001) National education policy constructions of the 'knowledge economy': Towards a critique in *Journal of Educational Enquiry* 2(1) 2001 pp. 1-22. Available online: http://www.literacy.unisa.edu.au/jee/Papers/JEEVol2No1/paper1.pdf. Accessed: 07.02.05

Reid, Ian C., 2000, *The web, knowledge management and universities.* Available online: http://ausweb.scu.edu.au/aw2k/papers/reid/paper.html. Accessed 02.06.01

Reynolds, M.E. (2002) *Sailing into the wind: the role of the teacher-librarian in the knowledge environment.* Paper presented at the ISASA School Librarians Conference, Grahamstown, April 2002.

Rifkin, J. (1998) A civil education for the twenty-first century: preparing students for a three-sector society. *National Civic Review* 87(2), pp. 177-181.

Rogoff, B. (1990) *Apprenticeship in thinking: Cognitive development in social context.* New York: Oxford University Press.

Schneider, D., Synteta, P. and C. Frété et al (2002) Community, content and collaboration management systems in education: A new chance for socio-constructivist scenarios? in *Proceedings of the 3rd Congress on Information and Communication Technologies in Education*, Rhodes, September 2002. Available

148

online: http://tecfa.unige.ch/proj/seed/catalog/docs/rhodes-paper-tecfa-web.pdf. Accessed 07.02.05

Sfard, A. (1998) On two metaphor's for learning and the dangers of choosing just one. *Educational Researcher 27*, pp. 4-13.

Shaw, J. (2003) Navigating a raging river: A Canadian teacher-librarian's experience implementing information technology. Available online: http://libres.curtin.edu.au/libres13n2/ess&op_shaw.htm Accessed 13.03.05

Sit, A. (2003) *Capitalizing on knowledge: mentorship among teacher-librarians in Hong Kong.* Available online: http://www.ied.edu.hk/fesym/1A03-010%20Full%20paper.pdf Accessed 13.03.05

Stehr, N. (1994) *Knowledge Societies.* London: Sage Publications

Sveiby, K. E. (1990) *Kunskapsledning: 101 råd till ledare i kunskapsintensiva organisationer.* [Knowledge management: 101 tips for leaders in knowledge-intensive organizations.] Stockholm: Affärsvärlden.

Tilley C. & D. Callison (2001) Preparing school library media specialists for the new century. *Journal of Education for Library and Information Science* 42(3): 220-227.

Todd, R. (2000) Building a knowledge-sharing culture in schools: Knowledge management in action in Hay, L., Hanson, K. and J. Henri (eds.) *New millennium, new horizons: Information services in schools.* 2000 Online Conference Proceedings. Wagga Wagga: Charles Sturt University: Centre for Studies in Teacher Librarianship.

Todd, R. (2001) *The Smart School: Knowledge management working for your future*. SCIS Oration delivered to the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Todd, R.J. & G. Southon (2001) Educating for a knowledge management future: Perceptions of library and information professionals in *Australian Library Journal* 50(4).

Twomey, M. (2001) *Dimensions of learning: a learning and teaching framework that focuses on learning and the learning process, planning curriculum, instruction and assessment*. Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Vygotsky, L.S. (1978) *Mind in society: The development of higher educational psychological processes.* Cambridge, MA: Harvard University Press

Wenger, E. (1998) *Communities of practice: Learning, meaning and identity.* New York: Cambridge University Press

Williams, R. (2003) Integrating distributed learning with just-in-context knowledge management in *Electronic Journal of e-Learning* 1(1) 2003, pp. 45-50. Available online: http://www.ejel.org/volume-1-issue-1/issue1-art6-williams.pdf Accessed 07.02.05

Wilson, T.D. (2002) The nonsense of 'knowledge management' in *Information Research*, 8(1), paper no. 144. Available online: http://InformationR.net/ir/8-1/paper144.html Accessed: 16.02.05 [unpaged]

Winzenreid, A. (2000) Information Eltham: A hybrid approach to information provision in Hay, L., Hanson, K. and J. Henri (eds.) *New millennium, new horizons: Information services in schools*. 2000 Online Conference Proceedings.

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Wagga Wagga: Charles Sturt University Centre for Studies in Teacher Librarianship.

Winzenreid, A. (2001) *Intranets that work for you: Key component in broader educational communities of the future.* Paper presented at the ASLA XVII Conference, Mudjimba Beach, Queensland, October 2001.

Winzenreid, A. (2001a) Intranets – key components in broader educational communities. BITE Paper. Handout from the author.

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