Information literacy research: the consolidation of a theme[1]

Sylvia Edwards, Christine Bruce and Lynn McAllister

with contributions from Natalie Cuffe, Hilary Hughes, June Lennie, Mandy Lupton, Camille McMahon, Michael Middleton, Helen Partridge, Christine Tilley, and Stephen Towers

Queensland University of Technology Centre for Information Technology Innovation
Email correspondence: s.edwards@qut.edu.au

Abstract

Information literacy research is reviewed by considering its role in three sectors: higher education, the workplace, and the community. A description is given of how research is being undertaken in these three areas within QUT's Centre for Information Technology Innovation (CITI). For each of the research projects described, an overview is provided of the research method, outcomes and application.

Introduction

For a number of years there has been evidence that a research territory, which may be labelled information literacy is being formed. This idea is based on the premise that information literacy research is constituted by those engaged in the work:

> Information literacy researchers see their research as belonging to the information literacy domain or 'territory', and as they widen the scope of that research they construct the domain (Bruce, 2000).

Bruce (2000) suggests that the territory of information literacy research may be described in term of five dimensions:

1. The sectoral location of the research
2. Ways of seeing information literacy
3. What is being investigated – the research object
4. How the object is being investigated – the research approach
5. Disciplinary influences.

She also suggests likely trajectories for future information literacy research:

- Growth beyond the educational sector
- Attention to a wider variety of cultural settings
- A firmer more consolidated research agenda
- Greater collaboration between researchers
- An agenda driven by funding priorities.

[1] Paper accepted following a double blind refereeing process and subsequent revision.

This paper broadly reviews current directions in information literacy research and focuses attention on a range of development in the QUT Centre for Information Technology Innovation (CITI).

Current information literacy research

The following gives a brief overview of recent information literacy (IL) research in the Asia Pacific region. This overview is broken up into three broad sectors: higher education IL research; workplace IL research; and IL research in the community. Within each broad sector the work can be further divided into sub-topics. The research undertaken by the CITI team is included in a subsequent section: IL research in CITI.

IL research in higher education

Much of the research in IL is concentrated on the higher education sector. It includes work that investigates IL in a specific discipline, or the IL experiences of university students, the development and evaluation of higher education IL programs, IL as a generic skill or graduate attribute, and IL as expressed in information-seeking behaviour.

Specific discipline or as a specific skill of university students
Two studies have considered the IL experiences of university doctoral students (Genoni & Partridge, 2000; MacAuley, 2001). Both studies considered aspects of how doctoral students collect, store, retrieve and manage their research data, and also investigated students' supervisory expectations and experiences. Both made recommendations to improve existing IL programs to meet the specific needs of the research students.

The acquisition of specific IL knowledge and skills by university students has also been the focus of attention. Pavey (2003) has found that while both university academic staff and their students have good levels of communication and IT skills, staff are more confident than the students in this area. This latter finding lends weight to a study which indicates that the level of IT skills in first-year undergraduate students is variable (Lim & Lee, 2000). Lim and Lee argue that IT training for university students is an urgent necessity in order to satisfy employers' graduate skill requirements, and, more importantly, to achieve successful learning outcomes when computer use in tertiary institutions is so widespread. Research by Oliver and Towers (2000) also supports the need for IT training. They found disparity between university and TAFE students' access to ICTs and their level of skills in using them. The finding that most minority groups are to some extent disadvantaged in terms of ICT access and skills is significant in regard to IL program development.

Using a cognitive psychology approach, Macpherson (2004) used concept-based teaching methods to teach undergraduate students information searching processes. This approach produced an improvement in the students' knowledge of the search process and in the ability to locate credible literature. The latter potential problem is given further weight in a suggestion by Stern (2003) that a considerable proportion of students do not consider either the quality or the reliability of Internet resources. Another study (Handzic & Lin, 2003) supports the idea that an extended cognitive style perspective on learning may lead to improvements in idea generation, problem solving, and inquiry approaches. Stern has called for the higher education sector to improve its understanding of how students gather information and then devise curricula to teach students the ways in which information is managed in digital formats.

Development and evaluation of IL programs

A study by Brewer (1999) raises some concerns about the value of IL programs. After implementing a curriculum-integrated IL program for undergraduate students, a follow-up evaluation, using quantitative and qualitative data, showed that participation in the program had little or no long-term impact on students' searching skills. However, other researchers reporting on evaluation of the implementation of IL programs (Douglas & Murdoch, 1999; Hill, 1999; Hiscock & Marriott, 2003; Holden & Cribb, 2004; Yu, 2004), using research methods varying from surveys and student course-evaluation instruments to action research projects, have found clear evidence that while the programs are valuable, improvements to our teaching methods and modes of delivery of these programs are needed (Drew, Abbott & Orr, 2001; Salisbury & Ellis, 2003). In a study at Macquarie University (Talay-Ongan, Edmonds & Gosper, 2001), which gave clear evidence that the integration of IL programs into course assessment and task design led to a more relevant and highly successful learning experience, concern was raised that this integration should not be done 'at the expense of scaffolding necessary for the unit content, learning processes and assignments'.

There have also been reports on studies that have considered the effectiveness of how librarians and academics, or researchers, work together for IL programs (Ivey, 2002; Smith & Martina, 2004; Tucker & Palmer, 2004). It appears that the challenge for the academic community, and the librarians who work with them, is to ensure that the skills taught in IL programs are relevant, regularly repeated, well publicised, have sound instructional design and relevant modes of delivery, and are extended into all areas of the curriculum (Hartmann, 2001; Turnbull, Frost & Foxlee, 2003; Wallace, Shorten & Crookes, 2000). Hartmann, in particular, found that, while students' learning is influenced by their previous experiences, they will engage with IL programs as a 'subject matter only to the extent that they perceive lecturers and tutors require them to'. They also raised serious questions about students' abilities to seek and use information.

Student information-seeking behaviour in context

Various studies are attempting to understand university students' information-seeking behaviour and use. Cunningham, Reeves and Britland (2003) have suggested that the design of music digital libraries could benefit from studying the

music public's information behaviour shown in music stores and public libraries. Klaus (2000) used phenomenography to reveal users' understandings of how the thesaurus is conceived in the process of searching indexing and abstracting services. This study speculates on the importance of including thesauri as pivotal elements in IL programs in higher education.

Another phenomenographic study (Parker, 2001) found that, while student learning and information behaviour is probably closely related, 'their relationship has been framed by a narrow interpretation of 'information' in the higher education literature and considered beyond the scope of Information Science'. Parker researched students completing assessment tasks aiming to understand the complexity of the interaction between learning and information and suggests this is an area needing further research.

The use of phenomenography and critical incident technique, as a means of identifying individual experiences, thought processes and feelings of subjects, acknowledges the holistic nature of the information-related experience. It should, therefore, impact on the nature of IL teaching/training/programs, since it will demand of the T&L design the reflective dimension where students can begin to understand their own thought/feeling processes. If the holistic nature of experiences is made explicit by the research methods used in IL research, then this dimension should necessarily inform subsequent curriculum/program/T&L design.

Generic skill or graduate attribute

Some work has been done on integrating IL as part of the overall curriculum in either the university as a whole, or as an embedded part of a specific course. Abbott and Peach (2000) provide an overview of the work at Griffith University to integrate and further develop IL as a generic attribute in the curriculum. Similar work at Curtin University is documented by Briguglio (2000), while Patrick and Crebert (2004) suggest there is a 'need to consider the role of personality or nature as an influence on the perceptions of importance of further development of generic skills'. They call for the exploration of strategies to raise awareness of the need for lifelong IL skills.

Finally, in considering students' graduate attributes and their ability to transfer these to the workplace, Yashin-Shaw, Buckridge, Buckridge and Ferres (2004) suggest that students may be assisted in acquiring an explicit rather than a tacit understanding of graduate attributes and that this understanding may enable students to better represent themselves when seeking graduate employment and be more proficient at transferring their skills in the workplace. This research really fits in either this sector, IL research in higher education, or in the next one, IL in the workplace.

IL research in the workplace

Providing evidence of IL research growth beyond the educational sector, recent research in IL in the workplace focuses on four areas:

1. The need for IT skills in the workplace
2. The transfer of IL and IT skills from formal education to the workplace
3. The development of effective IL workplace programs
4. Workplace information use and behaviour.

Transfer of skills from formal education to the workplace
As with the last study in the previous sector (Yashin-Shaw et al., 2004), there has been recent research into the transfer of IL skills gained from formal education into practice in the workplace setting. Reid-Searl, Dwyer, Jirojwong and Hinton (2000) studied nursing graduates and, based on their findings, have called for the introduction of IL workshops in clinical areas, with an increased participation of health librarians in professional development sessions. They have also called for the encouragement of undergraduate students to undertake further collaborative research projects in clinical and community settings.

Need for information technology skills
Recent IL research in the workplace also provides suggestions to further improve both IL and IT skills in the curriculum at universities. For example, Lawson and de Martos (2000) examined the experiences of BA graduates to investigate the trends in demand for IT skills in the workplace and used their findings to explore the implications for future BA degrees.

Unlike other studies in this area, Parboosingh (2000) considered the experience of physicians in practice for 10-15 years, who are unlikely to have been exposed to education which developed skills of self-directed learning and IL. However, this study was more in the form of considering the value of a new piece of software aimed at giving physicians better information access and organisation in their daily practice. It seems more of an advertisement than true research into IL in the workplace.

Development of effective IL programs
In a study of journalists working with their librarians in the workplace, Bradley (2003) has suggested that 'there is a lack of research examining the transition from university/formal learning to the workplace'. Bradley proposes that further research is needed into how librarians plan training for journalists, how they can work together to develop training resources, and more work is needed to find out what teaching methods will give the best impact on journalists. Almost in an indictment of IL workplace programs, Bradley suggests that the reasons behind the introduction of IL by librarians need to be further explored to establish the benefits of such programs in different contexts.

Information use and behaviour in workplace context
The relationship between individual and organisational IL has recently been explored. Bruce (1999) suggests that workplace IL experiences are closely related to the usual workplace processes, such as environmental scanning, information management, corporate memory, and research and development. This area has also been closely investigated by Kirk (1999; 2002; 2004), with findings showing that there are five qualitatively different ways of experiencing information use in the workplace: packaging information, enabling flow of information, developing new knowledge and insights, shaping judgements and decisions, and influencing others. Use of information and information behaviours in specific workplace settings have also been investigated; examples are Lloyd's (2004) work with firefighters and a study of university technical support workers (Cunningham, Knowles & Reeves, 2000).

IL research in the community

Further evidence that there is growth beyond the education sector in IL research and an emerging attention to a wider variety of cultural settings is seen in recent research into IL in the community. While there has been little research to date in IL in the community, that which has been done focuses on information access, or on the use of information and communication technologies.

Use of ICTs
Synthesising current statistical reports and other reliable public domain information resources, Funston and Morrison (2000) have provided an overview of the use of the Internet and other ICTs in Australian young people. They suggest that while Australia is still a world leader in Internet and ICT use, the 'digital divide' between information 'haves' and 'have-nots' is still evident, with family status, household income and educational levels being the key determinants.

In a study loosely connected to IL, Hardy (2001) has suggested that a scan of the local authorities' efforts in Victoria, Australia, shows that many of these organisations are engaged in identifying, organising and redistributing information to their constituency. While Hardy found that there was a high demand for basic tool literacy courses, the report findings suggest that a more sustained approach to professional development of key personnel within the organisations could be an efficient way to develop the information capacity of those community organisations. Hardy further suggests this could be an area for library/community partnerships.

Information access for social action
This final sub-topic covered in IL in the community research studies has implications for social justice and action. A study of adolescents' information use as they sought and analysed their knowledge of the drug heroin suggested implications for information practice and instructional design to drive the actions in this social problem area (Todd, 1999). Another study into the service implications for the supply of information to blind and vision-impaired people

showed that resources other than the Internet, such as radio stations, should specifically cater for the blind and vision-impaired (Williamson, Schauder & Bow, 2000). These services are vital to the blind and vision-impaired community and, as such, need to be maintained at their current levels.

Finally, in a government initiative using Women's Advisers from all Australian governments and from the New Zealand Government, a report was commissioned from Urbis Keys Young to undertake research into women's information needs and information-seeking behaviour in relation to government information (Urbis Keys Young, 2002).

Clear evidence has been found of growth in IL research beyond the educational sector. Research into IL in the workplace is growing and there is some evidence that cultural settings and community are now beginning to be considered.

IL research in CITI

CITI is one of two research centres of the Faculty of Information Technology at QUT. For many years those members of the Centre interested in matters associated with information analysis and literacy have been part of a research subgroup called the Information Systems Management Research Group (ISMRG). The group has a number of scholars whose research relates to IL. Christine Bruce completed her doctorate with this research focus (Bruce, 1997) and Sylvia Edwards and Helen Partridge are nearing completion of their doctorates in the area. Gillian Hallam, Neville Meyers and Karen Nelson, though completing doctorates in other areas, have research interests associated with IL, as does Michael Middleton who is pursuing doctoral research in areas of information management influenced by IL. In addition, there are also several research students investigating areas of IL. The research centre is presently working through a restructuring of its research areas around a series of macro themes.

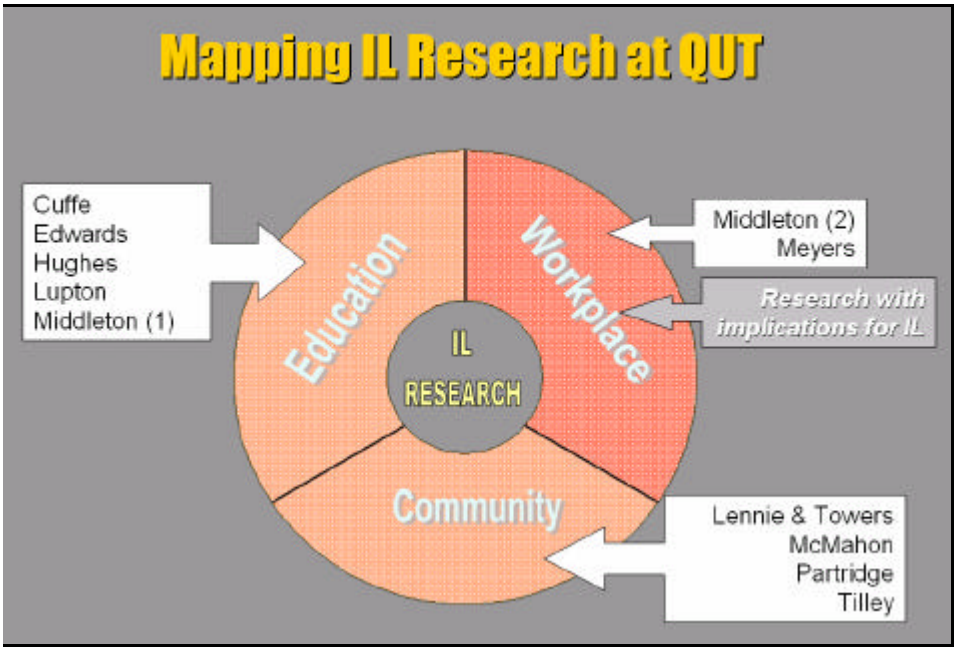

Figure 1: Mapping IL research at QUT's CITI

In the preceding section IL research has been divided into three sectors – IL in the higher education, workplace and community sectors. This is also an accurate description of the work in the CITI group (Figure 1). Using these sector headings, each CITI project is described by presenting the aims and the research method, which includes a brief method explanation. Each project description concludes with identification of likely outcomes.

CITI - IL research projects in higher education

Natalie Cuffe has recently completed research in the area of *Legal Information Literacy – student experiences and the implications for legal education curriculum development* (Cuffe & Bruce, 1999). The project aims to contribute to current understandings of IL in the legal education context – in particular, to examine the extent of law students' use of information and information technology, their success rates with using information and information technology and their views on the place of legal research and IL education.

The research method: A written survey was administered to final-year law students at three Brisbane university law schools. The survey included a research problem that focused on common legal research tasks involving Australian law that was designed to test the students' perceptions of their success rates in a range of information and information technology activities and to provide common information about student legal research ability that could not be provided by individual university assessment results.

Outcomes and application: The primary outcome of this survey is a picture of law students' present experiences with information and information technology, previously unavailable to legal educators. In particular, the results of the survey show that, despite the rich information and information technology environment in which law students undertake their tertiary studies and the high level of skills training, present legal curricula do not seem to have succeeded in the task of educating students in effective information problem solving that is critical in legal practice.

The results of the research reveal a picture of law students' present experiences with information, information technology and legal research of interest to legal educators in reviewing legal curricula to foster IL and lifelong learning. This has prompted the development of a curriculum model that inculcates these educational imperatives and shifts the paradigm from legal research training to legal IL education.

Mandy Lupton is currently undertaking a research project on *Information literacy and learning* (Lupton, 2003; 2004). The project aims to investigate later-year undergraduates' ways of experiencing IL in particular disciplinary contexts, in order to develop a model of the relationship between IL and learning. The research questions are:

- What is the relationship between IL and learning?
- What are the generic and situated aspects of IL?

Research method: Because the investigator is seeking to uncover the variation in students' experiences, phenomenography is used, as it is a suitable research approach and theoretical framework for investigating difference in experience. Phenomenography is an interpretative research approach for 'mapping the qualitatively different ways in which people experience, conceptualise, perceive, and understand various aspects of, and phenomena in, the world around them' (Marton, 1986). Phenomenography has been primarily used as a research approach in education, and more recently in IL (Bruce, 1997; Limberg, 1998; Lupton, 2003; 2004). Phenomenography looks at the relation between the person (subject) and the part of the world in question (object) (Marton, 2000). It describes the variation and meaning behind the way in which people experience a phenomenon. The outcome of a phenomenographic inquiry is the identification of the different ways people experience a phenomenon and the structural relationships between these different ways of experiencing that phenomenon.

Information gathered through semi-structured taped interviews with third- and fourth-year students in two disciplines at Griffith University will form the data source. In line with a phenomenographic approach, a purposive sample will be chosen for maximum variation. The interview questions will illustrate the different aspects of learning and IL to be investigated:

- Learning through doing the assignment (learning about the topic).
- Learning through doing the unit (learning about the discipline/field).

- Learning IL (learning about finding and using information).
- Learning in general.

Outcomes and application: The study is likely to have an impact in four primary areas. Firstly, it will make a substantial contribution to the understanding of the relationship between IL and learning. Through investigating the experiences of later-year students, it will contribute to a more complete mapping of the experience of IL in higher education. Secondly, it will make a methodological advance in terms of empirically investigating relationships between two related phenomena. Thirdly, it will offer strategies for teachers in higher education (academics, librarians and learning skills advisers) regarding curriculum design for IL education. Lastly, it will inform policy makers, administrators, academics, librarians and learning skills advisers about the nature of IL as a generic skill and graduate attribute.

Hilary Hughes's IL research project (Hughes, 2004) concerns the experiences of international students' use of online tools and resources. The aim of this project is to gain a deeper understanding of international students' experience in using online resources and tools. In particular, the research seeks answers to the following questions:

- How do international students use online resources and tools for study?
- Do international students experience difficulties in their use of online resources and tools that are attributable to linguistic or cultural differences?
- What IL strategies are needed to assist international students overcome these difficulties?
- How could online resources and tools be improved to facilitate their use by international students?

Research method: Critical Incident Technique (CIT), a qualitative research method developed in the 1940s by John Flanagan (1954), provides the methodological framework for this project. The main reason for adopting CIT is its ability to focus on individual experience in a real-life context. Its efficacy, validity, and ability to handle large volumes of data have been attested to in hundreds of studies across a variety of disciplines, including information science and education. CIT was originally designed as a behaviourist tool, but, in common with other subsequent researchers, the current researcher has adapted – or rather expanded – some aspects to widen the perspective, from the purely behavioural, to incorporate affective and cognitive facets of participants' experience.

Through purposeful sampling, the researcher has recruited a culturally and linguistically diverse group of international students – a mix of undergraduates and postgraduates in their first year of study at CQU Brisbane International Campus. Data was collected through semi-structured interviews, and observation of a set task that required participants to search the internet, a journal database and the CQU Library's online catalogue. Although the combination of two data collection methods was not a feature of early CIT studies, it is believed triangulation will enhance the value and credibility of the results.

In accordance with CIT, data analysis for this project centres on the identification and categorisation of 'critical incidents' from which a picture of 'critical behaviours' relating to the participants' online use can be drawn. Since the purpose of the research is to foster understanding of the participants' whole experience, the term 'critical incident' has been defined broadly to include participants' thoughts and attitudes, in addition to their actions, associated with online use. As a result, the findings will not be limited to a set of behaviours, the usual outcome of 'traditional' CIT studies. They will, instead, constitute a thematic presentation that interweaves participants' actual online use with their individual and cultural attributes, set in the context of international education. The cross-cultural nature of this project adds complexity to its design and execution, especially with regard to recruitment of participants, data collection and data analysis.

Outcomes and application: It is hoped the research project will lead to a greater understanding of international students' online experience. This greater understanding of their experience and the difficulties encountered may then be applied to a range of areas, including the development of IL curriculum and strategies, improvements in information retrieval software and web usability, and internationalisation of software. Benefits – in terms of enhanced online experience and learning outcomes – may extend beyond international students to the wider student population, which is becoming ever more culturally and linguistically diverse and dependent on ICT for learning.

Sylvia Edwards has recently completed a phenomenographical study of tertiary students' experiences with web-based information searching (Edwards, 2000, 2004, in press; Edwards & Bruce, 2002a, 2002b, 2002c, 2003, 2004). The research project – *Web-based information searching: understanding the experience* – was based on previous research findings and on teaching observations. In broad terms, the project aimed to determine variations in QUT students' web-based information searching experiences. Specific aims of the project were:

- To determine variation in the ways students approach information searching when using the Internet and library databases
- To determine variation in ways of learning to search for information when using the Internet and library databases
- To recommend teaching and learning strategies for curriculum design that is based on managing students' experiences
- To determine if there are levels of sophistication in information searching or other differences in information searching behaviour approaches
- If levels do exist, to identify any triggers to move from one level of searching sophistication to another level.

Research method: As the research aimed to make sense of the students' understanding of the information searching and retrieval concepts and understand their approaches to learning to search, a phenomenographic approach was used

(Bowden & Walsh, 2000). Phenomenography is an interpretive research approach, which looks at the different ways people experience or conceive a range of phenomena (Marton, 1988). In simple terms, it is a way to describe how things appear to people (Marton & Fai, 1999).

Phenomenography aims to uncover the variations in experience and describes these variations as a finite set of categories. These categories reveal the space of the variation, or the various ways of seeing information searching. Having found the variations, we can use them to identify ways to encourage students to discern another aspect of the information searching experience, an aspect they have previously not discerned. We can structure the learning environment to ensure that students experience the variations of the information searching experience. By doing so, we may encourage learning.

Outcomes and application: The structure of awareness of the four categories identified has revealed variation in the experience of information searching. The four categories of experience are:

- Information searching is seen as looking for a needle in a haystack
- Information searching is seen as finding a way through a maze
- Information searching is seen as using tools as a filter
- Information searching is seen as using tools as a filter to limit results to high quality information.

Students, in some experiences, are frozen in their ability to find information as they see through a haystack or a maze when they attempt searching. This lens hampers their ability to use the information environment more effectively. Aspects of the search tool features and the information environment are to some, at best, a hazy image and, at worst, an aspect clearly misunderstood. When teaching information searching skills, then, what could be done? Clearly, we need to encourage students to discern another information searching experience. There are four areas which could be considered here: providing students and other information searchers with opportunities for reflection; improving exercises used to encourage searchers to see the variation; using and exploring online tools to further enhance the learning experience; and, finally, encouraging staff development to enable understanding and application of the findings.

Michael Middleton has begun a project which, although not focused upon IL, does have relevance to, and implications for it. This research – *Library support for online education* – involves investigation of the effective provision of remote online library services in tertiary institutions. There is a research assumption that many library users undertaking courses now make use of digital services, irrespective of whether they are undertaking distance education courses.

A preliminary literature review has identified relevant areas of study, each of which is a factor in effective off-campus education. Four of these – the institutional framework, management of courses, utilisation of delivery media and

teaching and learning effectiveness – are of interest to the study because of the influence they have on the fifth area, which is provision of supporting services.

The research is endeavouring to establish a model for effective delivery of such services. It is, therefore, in the process of identifying elements of services presently being offered by libraries in an online educational framework, and discovering why they have developed in this way.

These supporting services are being examined to identify those elements that are presently being adopted in the Australian academic environment, and so investigating the questions:

- What are the elements of services presently being offered by libraries in an online educational framework, and why have they developed in this way?
- Which of these elements are presently being adopted in the Australian academic environment?
- What do managers who are presently providing these services regard as effective performance indicators?
- How effective do learners who are using the present services consider them to be?
- How would learners like to see libraries support their learning in a digital environment?

Research method: A mixed method approach has been chosen for this research project. The project incorporates a case study and uses a survey to gather data from both service providers and students. A preliminary scoping survey has been conducted through the Council of Australian University Librarians. This will be followed up with a more detailed survey of chosen institutions identified in the initial survey. Students from the case study site will be surveyed.

Outcomes and application: A description of case studies of representative services is likely to expand understandings by providing rich information on the current state of online library service delivery. In addition to providing a situational analysis of library support for remote users, the research is expected to provide a model for effective continuing provision and development of such services.

Publications from the group in the area include:

- Edwards, S. L., & Bruce, C. S. (2004). The assignment that triggered …change: Assessment and the relational learning model for generic capabilities. *Assessment & Evaluation in Higher Education,* 29(2), 141-157.
- Edwards, S. L. (in press). Panning for gold: Understanding students' information searching experiences. In C. Bruce (Ed.), *Transforming IT Education: Promoting a culture of excellence*. Brisbane: Faculty of Information Technology, Queensland University of Technology.
- Edwards, S. L. (2004). Web-based information searching: understanding students' experiences in order to enhance the development of this critical graduate attribute. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International*

Lifelong Learning Conference, 13-16 June 2004 (pp. 106-113). Rockhampton, Q: Central Queensland University Press.

- Edwards, S. L., & Bruce, C. S. (2003, August). *Designing the learning experience to bring about desirable learning outcomes*, Paper presented at the EARLI 10th Biennial Conference: Improving Learning, Fostering the Will to Learn, Padova, Italy.
- Edwards, S. L. (2003). *Using phenomenography to construct the students' experience of learning*. Paper presented at the Australian New Zealand Institute of Information Literacy (ANZIIL) Research practices for librarians symposium, Brisbane.
- Bruce, C. S. (2003). Information literacy. In J. Feather & P. Sturges (Eds.), *International encyclopedia of information and library science* (pp. 261-263). London: Routledge.
- Bruce, C. S., Chesterton, P., & Grimison, C. (2002). Constituting collective consciousness: information literacy in university curriculum. *International Journal of Academic Development*, 7(1), 31-40.
- Bruce, C. S. (2002). *Information literacy as a catalyst for educational change*. Paper presented at the UNESCO Information Literacy Leadership Conference, Prague, April, 2003.
- Bruce, C. S., & Nightingale, P. (2002). *Workshop materials for supervising literature reviews: contribution to fIRST Consortium web site*, from http://www.uts.edu.au/oth/first.
- Edwards, S. L., & Bruce, C. S. (2002). *The assignment that triggered …change: Assessment and the relational learning model for generic capabilities*. Paper presented at the EARLI/Northumbria Assessment Conference Learning communities and assessment cultures: connecting research with practice, 28-30 August 2002, Longhirst Hall, University of Northumbria, Newcastle upon Tyne, UK.
- Edwards, S. L., & Bruce, C. S. (2002, June). Needles, haystacks, filters and me: The IT confidence dilemma. In K. Appleton, C. Macpherson & D. Orr (Eds.), *Refereed papers from the 2nd International Lifelong Learning Conference, Yeppoon, Central Queensland, Australia, 16-19 June 2002* (pp. 165-171). Rockhampton, Q: Central Queensland University Press.
- Edwards, S. L., & Bruce, C. S. (2000). Reflective internet searching: an action research model. In O. Zuber-Skerritt (Ed.), *Action learning, action research and process management: Theory, practice, praxis* (pp. 141-152). Brisbane: Griffith University.
- Bruce, C. S. (2001). Faculty-librarian partnerships in Australian higher education: a critical analysis. *Reference Services Review*, 29(2), 106-115.
- Bruce, C. S. (2001). Interpreting the scope of their literature review. Significant differences in research students' concerns. *New Library World*, 102(1163/64), 158-165.
- Bruce, C. S. (2000). Information literacy programs and research: an international review. *Australian Library Journal*, 49(3), 209-218.
- Bruce, C. S., & Candy, P. (2000). *Information literacy around the world: Advances in programs and research*. Wagga Wagga: Centre for Information Studies, Charles Sturt University.
- Bruce, C. S., & Candy, P. (2000). Information literacy: people, politics and potential. In C. S. Bruce & P. Candy (Eds.), *Information literacy around the world: advances in programs and research* (pp. 1-10). Wagga Wagga: Centre for Information Studies, Charles Sturt University.
- Cuffe, N., & Bruce, C. S. (2000). *Information and information technology use in undergraduate legal education*. Paper presented at the Fourth Australian Information literacy conference, Adelaide.
- Edwards, S. L. (2000). You have provided me with a new set of tools and taught me how to use them: Embedding generic skills within the IT curriculum. In K. Appleton, C. Macpherson & D. Orr (Eds.), *Selected papers from the inaugural International Lifelong Learning Conference, Yeppoon, Queensland, Australia, 17-19 July, 2000* (pp. 95-101). Rockhampton, Q.: Lifelong Learning Conference Committee, Central Queensland University.
- Edwards, S. L., & Bruce, C. S. (2000). Reflective internet searching: an action research model. In O. Zuber-Skerritt (Ed.), *Action learning, action research and process management: Theory, practice, praxis* (pp. 141-152). Brisbane: Griffith University.
- Bruce, C. S., & Brameld, G. H. (1999). Encouraging student-directed research and critical thinking. In Y. Ryan & O. Zuber-Skerritt (Eds.), *Supervising postgraduate students of NESB backgrounds* (pp. 157-166). Open University Press.

- Bruce, C.S. (1998). The phenomenon of Information Literacy. *Higher Education Research and Development,* 17(1), 25-43.
- Bruce, C. S. (1997). The relational approach: a new model for information literacy. *New Review of Information and Library Research,* 3, 1-22.
- Bruce, C. S. (1997). *The seven faces of information literacy.* Adelaide: Auslib Press.
- Bruce, C. S., & Brameld, G. H. (1996). Encouraging the critical use of information and information technology. In O. Zuber- Skerritt & L. Sheveller (Eds.), *Fourth manual for conducting workshops on postgraduate supervision* (pp. 75-106). Lismore: Workplace Research Learning and Development Institute.
- Bruce, C. S. (1996). From neophyte to expert: Counting on reflection to facilitate complex conceptions of the literature review. In O. Zuber-Skerritt (Ed.), *Frameworks for postgraduate supervision and research.* Lismore: Southern Cross University Press.
- Bruce, C. S. (1995). Information literacy: A theoretical framework for higher education. *Australian Library Journal,* 44(3), 158-170.
- Bruce, C. S., Weeks, T., & Crebert, G. (1995). Teaching lecturers: modelling information literacy education. In D. Booker (Ed.), T*he learning link: Information literacy in practice* (pp. 239-244). Adelaide : Auslib Press.
- Bruce, C. S., & Candy, P. (1995). *Developing information literate graduates: prompts for good practice*. Retrieved 16 August 2001, from http://www2.fit.qut.edu.au/InfoSys/bruce/inflit/prompts.html.
- Bruce, C. S. (1995). A reflective approach to reviewing the literature. In O. Zuber-Skerritt & S. Pinchen (Eds.), *Third manual for conducting workshops on postgraduate supervision* (pp. 141-164). Brisbane: Griffith University.
- Bruce, C. S. (1995). Using the library for effective teaching and learning. In G. Crebert (Ed.). In *Introduction to teaching and learning at QUT* (2nd. ed.). Brisbane: Queensland University of Technology.
- Bruce, C. S. (1994). The reflective literature search. In O. Zuber-Skerritt (Ed.), *Second manual for conducting workshops on postgraduate supervision* (pp. 131-152). Brisbane: University of Queensland.
- Bruce, C. S. (1994). Educating end-users of remote online systems. In A. Kent (Ed.), *Encyclopedia of l ibrary and information science* (Vol. 54, pp. 155-182). New York: Dekker.
- Bruce, C. S. (1994). Supervising literature reviews. In O. Zuber-Skerritt & Y. Ryan (Eds.), *Quality in postgraduate education - issues and processes* (pp. 165-178). London: Kogan Page.
- Bruce, C. S. (1994). Research students' early experiences of the dissertation literature review. *Studies in Higher Education,* 19(2), 217-229.
- Gerber, R., Ottosson, T., Boulton-Lewis, G., Bruce, C. S., & Aberg-Bengtsson, L. (1993). *Towards an understanding of how children understand graphic representations of quantitative data*. Paper presented at the EARLI Conference, Aix-en-Provence, France.
- Bruce, C. S. (1992). Teaching end user remote online searching. *Australian Academic and Research Libraries,* 23(1), 11-19.
- Bruce, C. S. (1992). *Developing students' library research skills*. Kensington, NSW: HERDSA.
- Bruce, C. S. (1991). Postgraduate response to an information retrieval credit course. *Australian Academic and Research Libraries,* 22(2), 103-110.
- Bruce, C. S. (1990). Information skills coursework for postgraduate students: investigation and response at the Queensland University of Technology. *Australian Academic and Research Libraries,* 21(4), 224-232.
- Bruce, C. S., & Brameld, G. H. (1990). Improving the quality of fourth year civil engineering research projects through bibliographic instruction. *Research Strategies,* 8(3), 129-136.
- Bruce, C. S., & Brameld, G. H. (1990). Developing research skills for civil engineers: a library contribution. *Higher Education Research and Development,* 9(2), 151-159.

CITI - IL research in the workplace

The second area of research being undertaken by **Michael Middleton,** *Information management: formation of a discipline,* has some connection with IL in the workplace. It involves the study of discipline formation in information management. The research seeks to answer the following questions:

- Can a discipline area for information management be articulated?
- Is it possible to harmonise information management concepts across competing disciplines?
- Has such a discipline been employed in the establishment of computer-based information services?
- Do the areas of agreement among practitioners constitute a discipline formation?

The work includes an exploration of whether information management can be articulated as a discipline involving the application of information science. It currently involves investigating scientific and technical information (STI) service development in Australia, by means of the case study and interview, for its contribution to the development of information management. An aspect of information management is the application of IL in a corporate context. Education for information use is a significant aspect of planning for effective application of information management in business and government.

Research method: A case study approach has been chosen for the project. Multiple case studies involving STI services managed by organisations including CSIRO, National Library of Australia, the Australian Mineral Foundation and Australian Road Research Board are to be undertaken. The interview method is being used to gather information. Semi-structured interviews are to be carried out with managers, retired managers and previous managers who have moved to other roles. This is being complemented by archival research.

Outcomes and application: An initial outcome of this project is the publication of a book that consolidates the aspects of IM – *Information management: A consolidation of operations analysis and strategy* (Middleton, 2002). The research will contribute to current understandings of scientific and technical information service genesis and development in Australia and will provide a task analysis of information management practitioners.

An important factor in preparation for employment is the development, for those who are not information specialists, of programs that incorporate learning about application of information and knowledge systems in the workforce.

Publications from the group in this area include:

- Bruce, C. S. (1999). Experiences of information literacy in the workplace. *International Journal of Information Management,* 19(1), 33-47.

- Bruce, C. S. (1998). *Information literacy in the workplace*. Paper presented at the 3rd Australian Information Literacy Conference, Adelaide.

CITI - IL research in the community

IL research projects are currently being carried out in the community sector by four of our researchers.

Helen Partridge is concerned with *Establishing the human dimension of the digital divide* (Partridge, 2002a, 2002b, 2003, 2004). The aim of this research is to explore the human dimension of digital inequality by examining the psychological factors that contribute to the digital divide. The research is focused by the basic question: are there internal forces causing members of a community to choose not to integrate information and communication technology, such as the Internet, into their lives? The main aim of the research is to explore the notion of the Social Digital Divide proposed by Harper (n.d.) by examining the Internet self-efficacy of Internet users and non-users within the community. This is to be achieved by:

- Measuring the Internet self-efficacy of Internet users and non-users
- Determining if there is a difference in Internet self-efficacy between these groups:
  - Internet non-users users who represent the 'Socio-economic Digital Divide', or, as proposed by Harper (n.d.), the Access Digital Divide
  - Internet non-users who do not represent the 'Socio-economic Digital Divide' but who may represent the Social Digital Divide as proposed by Harper
  - Internet users who are not considered to be part of the digital divide.

Research method: This research will examine the internal or psychological forces that motivate an individual to refrain from integrating technology, such as the Internet, into their lives. To achieve this end, the research is underpinned by the Social Cognitive Theory (SCT) developed by Albert Bandura (1986). Self-efficacy is a major component of the Social Cognitive Theory. Bandura (1986) describes self-efficacy as 'people's judgments of their capabilities to organise and execute courses of action required to attain designated types of performances' (Bandura, 1986).

Self-administered surveys will be used in data gathering. The survey instrument will consist of three sections. The first section seeks information on demographic details such as gender, age, employment status, income level and education level. The second section gathers data on the participants' Internet use. Data gathered includes where they obtain access to the Internet, length of involvement with the Internet, self-perception of Internet skill and frequency of Internet use. The third section will gather data on the participants' level of Internet self-efficacy.

Surveys are one of the most widely-used data gathering techniques. Surveys have been employed in many disciplines including the social sciences, law, business

and library and information studies. Self-administered surveys have the advantage of being cost-effective, being simple to administer and providing data that is easy to collect and analyse. Self-administered surveys are an appropriate choice for the current study because of their general suitability for investigating research questions about self-reported beliefs or behaviours (Neuman, 2001).

Outcomes and application: This research is significant because it develops a new theoretical framework through which to view the division between information 'haves' and information 'have-nots' in society. The research will illustrate that the digital divide involves more than just the availability of resources and funds to access those resources. In addition, this is the first time that Internet self-efficacy has been explored within the context of the wider community. The research will develop an Internet self-efficacy scale that is appropriate for use within the context of the general population.

This research is important because it expands current understanding of a phenomenon that has far reaching social and economic implications. The research will allow a more concise understanding of what is and who represents the digital inequality in society. Developing a clear and comprehensive picture of the forces behind the division in society between 'haves' and 'have-nots' is a vital step in bridging the gap. The research will allow organisations (for example, public libraries) involved in the digital divide solution to develop and tailor services and programs to more accurately and effectively narrow the gap between information rich and information poor. As a consequence, real steps can be made in bridging the gap between the 'haves' and the 'have-nots' in society. It will allow for all members of the community to have an equal chance of establishing and maintaining productive personal and professional lives in the rapidly emerging digital age.

Christine Tilley's research project, *A sense of control: a virtual community for Queenslanders with long-term physical disabilities*, is seeking to develop a theoretical framework for a virtual community for a specific group of people – people with long-term physical disabilities. The research focuses on the central question, How can virtual communities best be facilitated for persons with disabilities? It aims to propose strategies for implementing a virtual community model based on user information needs for Queenslanders with long-term physical or mobility disabilities.

Research method: The research method, grounded theory, used in-depth interviews with persons with paraplegia, quadriplegia or other severe, long-term physical or mobility disabilities, and the health care professionals, service providers, information personnel and policy advisers who were involved in their well-being. Responses enabled the researcher to determine the types of information that persons with long-term physical disabilities would report about their experiences using information and communications technologies (ICT). Essentially only one interview question was used in this determination. Details of the various response categories of these interviews with participants, about their perceptions of community information networks and their impact on the

community members, were analysed as part of the grounded theory constant comparison methodology. Their relationship to the literature was considered. Each interview explored in detail the elements, and any barriers, behind the usage of ICT and/or assistive technology.

Outcomes and application: The study found that technology itself could provide strategies for independence and, thus, facilitate self-empowerment. However, the process that gives a sense of control and is empowering is also capable of disempowering. Empowerment and disempowerment are intersecting processes because of digital divide issues and the fact that virtual reality for people with physical disabilities may be a double-edged sword. Based on the new knowledge and the theory that will be the outcomes of this study, a range of recommendations that have application in the community will be discussed.

Stephen Towers, June Lennie and **Christine Bruce** are proposing to research IL issues in the community context. They are aiming to find *new models and methods for evaluating the social and economic impacts and effectiveness of rural information literacy programs.* The advent of the knowledge society has increased the significance of IL for educators, businesses, governments and information professionals around the world (Oliver & Towers, 2000). IL enables more effective use of technologies such as computers and the Internet, which are argued to have many benefits for sustainable community and economic development (Mansell & Wehn, 1998; Simpson, Wood, Daws & Seinen, 2001). However, there are many challenges and issues in the use of information and communication technology (ICT) by rural communities.

While previous research into IL programs has focused mainly on primary outcomes for individuals, such as increased skills, knowledge and awareness, we argue that a broader context – namely community capacity-building and development – is required for rural IL research. The proposed project will, therefore, develop evaluation methodologies that identify indicators of the primary, secondary and tertiary impacts of IL programs. The subsidiary objectives of this project are:

- To elicit rich descriptions and identify key indicators of the primary, secondary and tertiary impacts of community capacity-building and IL programs; and
- To develop strategies and tools for the inclusion of a broad diversity of community members in IL programs and in the evaluation of these programs.

Research method: The research combines participatory action research (PAR) and phenomenographic methodologies. Such a methodological combination has not yet been applied to IL research. PAR has been successfully used in a wide range of fields including education, health, community development and agricultural extension (McTaggart, 1991; Wadsworth, 1998). This innovative multiple methodological approach will provide a richer and more complete picture of the impacts and effectiveness of IL programs, compared with the use of participatory evaluation methods alone. This approach allows maximum

flexibility and creativity in the research design and implementation. It enables the complexity and richness of evaluation data to be more fully represented and understood from a broad range of perspectives.

This analysis will focus on social and economic impacts on various sub-sections of the selected rural community, such as farming families, indigenous people, town-based small business people, youth, NESB and older retired people. Gender, age, ethnicity and other differences will be taken into account. The methodology will enable both intended and unintended impacts and outcomes to be crit ically evaluated.

Outcomes and application: A significant contribution of the project will be the development of an innovative methodology and tools to identify and evaluate the secondary and tertiary outcomes of community capacity building and IL programs. Outcomes of the project will contribute to building lifelong learning communities and to increasing skills, innovation and community engagement in rural and regional communities, which are key Federal and Queensland government policies. (ARC Linkage Proposal: Funding Partners Mt. Isa TAFE, State Library of Queensland, Dept. of Communities, and Dept. of Employment and Training).

Camille McMahon and **Christine Bruce** have recently conducted research which looked at the *IL needs of local staff in cross-cultural development projects* (McMahon & Bruce, 2002). Investment in information and communication technologies (ICTs) in developing countries is presented in much of the development literature as a major means of achieving development goals, for example, Mansell & Wehn (1998), United Nations Development Program (1998). Stakeholders assert that ICTs can have a levelling effect, giving poor communities access to markets, information and other resources otherwise inaccessible (Goldstein & O'Connor, 2000). Attending to IL needs and facilitating effective information practices would seem to be a critical component of any development strategy which involves the use of ICTs.

The research question adopted for this study may be stated as follows: What significant differences in perceptions of local workers' IL needs exist amongst Western development workers? The interest in variation suggested phenomenography as the most appropriate research approach (Marton, 1986).

Research method: Phenomenography is a research approach that seeks to describe phenomena in the world as others see them, the object of the research being variation in ways of experiencing the phenomenon of interest (Marton & Booth, 1997). A fundamental assumption underlying phenomenographic research is that there is a finite number of qualitatively different understandings of a particular phenomenon. In this research the phenomenon explored was the IL needs of local workers in development projects (as understood by the Western development workers). In order to elicit perceptions of IL needs, semi-structured, in-depth interviews were conducted and transcribed. The focus of the interview

questions was not specifically based on ICTs, but on the experiences of the individuals in their various workplace settings.

Outcomes and application: Five conceptions of IL needs were established:

1. Basic Literacy Skills – At the core of this conception of IL needs is the need for basic literacy skills
2. Understanding Workplace Systems – IL needs in this category are understood to be the need to understand the workplace systems in which the local worker, at any level, is working
3. Communication Skills – At the core of this conception of IL needs, and building on the basic literacy skills and understanding of workplace systems, is the need for the local workers to develop communication skills
4. Accessing Information Sources – The core meaning of IL needs within this conception is for the local workers to be able to access information sources
5. Understanding the Dominant Society – For this conception, IL needs are understood to be directly related to the ability to understand the dominant society.

Formatted: Bullets and Numbering

The research findings suggest several considerations that should inform policy and practice within the context of cross-cultural development projects. Firstly a step-by-step approach to meeting IL needs is appropriate in the cross-cultural context. Second, there is a need for open communication between Western project managers and local workers about broad issues. Third, it is appropriate for local workers to develop an understanding of the broader socio-political context in which they are working. Fourth, information systems should be designed according to the cultural context in which the project is based or, alternatively, could be established around existing local information structures. Fifth, a broad and systematic approach to facilitating the effective use of information and technology should be a critical component of any development strategy that involves the use of ICTs. Finally, government and non-government organizations, including development agencies, can look to this research to develop and implement policy aimed at bridging the digital divide in a manner which maximises opportunities for sustainable project outcomes.

Recent publications from the group in this area include:

- McMahon, C., & Bruce, C. S. (2002). Information literacy needs of local staff in cross-cultural development projects. *Journal of International Development*, 14, 113-127.
- McMahon, C., Bruce, C. S., & Thompson, F. (2002). *Information literacy in cross-cultural projects: implications for policy and practice*. Paper presented at the UNESCO Information Literacy Leadership Conference, Prague.
- Tilley, C., Hills, A., Bruce, C. S., & Meyers, N. (2002). Communication, information and well-being for Australians with physical disabilities. *Disability and Rehabilitation*, 24(9), 503-510.

What appears to be the state of IL research territory?

If we return to the original ideas about the IL research territory that we suggested we would explore – and it is clear that the sectoral locations of the research are widening – IL is being understood more deeply, a broader range of research approaches are being adopted and a wide range of disciplines continues to influence the work. We have some useful examples of investigations conducted in workplace and community settings. Although these remain marginal in number when compared with educationally focussed projects, they are likely to have a powerful impact on our understanding of IL. Interest in different cultural settings is emerging, with investigations being considered across cultures, into cultural influences and within culturally specific frameworks, workplaces, people with disabilities etc. Interestingly, a great deal of contemporary work is employing research approaches that are best described as qualitative, interpretive or even critical in orientation (Figure 2).

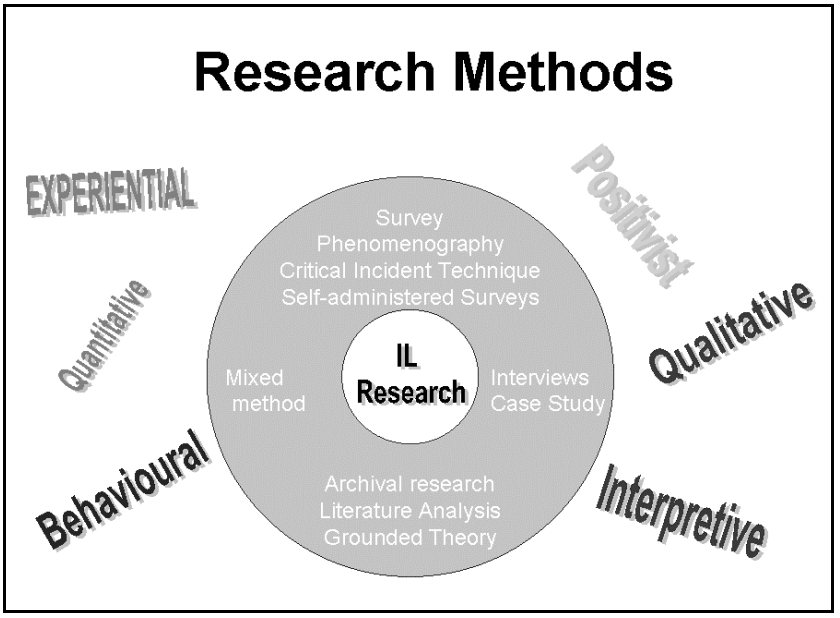

Figure 2: Research methods in IL

In terms of the suggested future trajectories, we appear to still have some way to go before we achieve what may be considered features of a maturing research territory. We have achieved limited growth beyond the educational sector and have begun to see attention to a wider variety of cultural settings. In terms of the other trajectories:

- **A firmer, more consolidated, research agenda** – A number of groups around the world have developed research agendas, most recently the IL

Meeting of Experts. IL researchers need to consider whether this agenda is adopted as a consolidation of previous directions, or whether it becomes yet another of a range of agendas that have been proposed over the years.

- **Greater collaboration between researchers** – There is comparatively little evidence of collaboration across the boundaries of local research groups. More groupings of researchers across institutions, across states, and across national boundaries are required.
- **An agenda driven by funding priorities –** Funding for IL research appears to be an ongoing challenge. The issue is not in itself high on the agendas of funding bodies. Members of the academy seeking research funding are likely to need to align their work to existing priorities, for example e-health or regional communities. The existing agendas appear to be more altruistic than driven by funding priorities. This may be because much research is still being conducted outside the funding framework, largely by research students.

What is the way forward for our research group in CITI?

Here in CITI we know that we need strategic alliances across disciplines and institutions, as well as with industry partners to carry forward the IL agenda. We have an embryonic group that is interested in an embryonic research territory. We will need to explore funding opportunities not only from traditional granting sources but also from our larger interested organisations – the National Library, the State Library, City Councils, TAFE colleges and the like.

Our position is that the IL research agenda should be seen as practical and real – it is about real people doing real things in real-life contexts. That is the strength of our research. Our opportunities are waiting to be created and taken.

To achieve this we must work to bring together a research community that is ready to cross boundaries and forge relationships with other groups. We also need to overcome the primary weakness of our current IL research agenda, which is that it is set by those devoted to IL. Progress will be slow unless we can establish links with the priorities of research funding bodies or we can lobby to influence those priorities.

References

Abbott, W., & Peach, D. (2000). *Building info-skills by degrees: embedding information literacy in university study*. Paper presented at 21st IATUL Conference, Virtual Libraries: Virtual Communities, Brisbane, Queensland. Retrieved 27 May 2004, from http://www.iatul.org/conference/proceedings/vol10/papers/Abbott_full.html.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bowden, J., & Walsh, E. M. (Eds.). (2000). *Phenomenography*. Melbourne: RMIT University Press.

Bradley, F. (2003). *Information literacy and news libraries: The challenge of developing information literacy instruction programs in a special library environment.* (Master of Arts dissertation, Curtin University of Technology, Perth).

Brewer, C. (1999, December). *Integrating information literacy into the health sciences curriculum: longitudinal study of an information literacy program at University of Wollongong.* Paper presented at the 4th National Information Literacy Conference, Adelaide, South Australia.

Briguglio, C. (2000). Generic skills: Evaluating the level of generic skills development in the Curtin undergraduate curriculum. In K. Appleton, C. Macpherson & D. Orr (Eds.), *Selected papers from the inaugural International Lifelong Learning Conference, Yeppoon, Queensland, Australia, 17-19 July, 2000* (pp. 35-40). Rockhampton, Q.: Lifelong Learning Conference Committee, Central Queensland University.

Bruce, C. S. (1997). *The Seven faces of information literacy*. Adelaide: Auslib Press.

Bruce, C. S. (1999). Experiences of information literacy in the workplace. *International Journal of Information Management,* 19(1), 33-47.

Bruce, C. S. (2000). Information literacy research: dimensions of the emerging collective consciousness. *Australian Academic and Research Libraries,* 31(2), 91-109.

Cuffe, N., & Bruce, C. S. (1999, December). *Information and information technology use in undergraduate legal education.* Paper presented at the 4th National Information Literacy Conference, Adelaide, South Australia.

Cunningham, S.J., Reeves, N., & Britland, M. (2003). An ethnographic study of music information seeking: Implications for the design of a music digital library. Paper presented at Joint Conference on Digital Libraries (JCDL'03), Houston, Texas USA.

Cunningham, S.J., Knowles, C., & Reeves, N. (2000). An ethnographic study of technical support workers: why we didn't build a tech support digital library. In *1st ACM/IEEE-CS Joint Conference on Digital Libraries* (pp. 189-198). Roanoke, VA, USA: ACM/IEEE.

Douglas, A., & Murdoch, L. (1999, December). *Putting it online: information research skills for postgraduates.* Paper presented at the 4th National Information Literacy Conference, Adelaide, South Australia.

Drew, H., Abbott, W., & Orr, D. (2001, January). *What a web we weave: Evaluating the flexible Delivery of information literacy education.* Paper presented at the Information Online 2001 Conference, Sydney, New South Wales.

Edwards, S. L. (2000). You have provided me with a new set of tools and taught me how to use them: Embedding generic skills within the IT curriculum. In K. Appleton, C. Macpherson & D. Orr (Eds.), *Selected papers from the inaugural International Lifelong Learning Conference, Yeppoon, Queensland, Australia, 17-19 July, 2000* (pp. 95-101). Rockhampton, Q: Lifelong Learning Conference Committee, Central Queensland University.

Edwards, S. L. (2004). Web-based information searching: understanding students' experiences in order to enhance the development of this critical graduate attribute. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 106-113). Rockhampton, Q: Central Queensland University Press.

Edwards, S. L. (in press). Panning for gold: Understanding students' information searching experiences. In C. Bruce (Ed.), *Transforming IT Education: Promoting a culture of excellence*. Brisbane: Faculty of Information Technology, Queensland University of Technology.

Edwards, S. L., & Bruce, C. S. (2002a). *The assignment that triggered …change: Assessment and the relational learning model for generic capabilities.* Paper presented at the EARLI/Northumbria Assessment Conference Learning communities and assessment cultures: connecting research with practice, 28-30 August 2002, Longhirst Hall, University of Northumbria, Newcastle upon Tyne, UK.

Edwards, S. L., & Bruce, C. S. (2002b, June). Needles, haystacks, filters and me: The IT confidence dilemma. In K. Appleton, C. Macpherson & D. Orr (Eds.), *Refereed papers from the 2nd International Lifelong Learning Conference, Yeppoon, Central Queensland, Australia, 16-19 June 2002* (pp. 165-171). Rockhampton, Q.: Central Queensland University Press.

Edwards, S. L., & Bruce, C. S. (2002c). Reflective internet searching: an action research model. *The Learning Organization,* 9(3/4), 180-188.

Edwards, S. L., & Bruce, C. S. (2003, August). *Designing the learning experience to bring about desirable learning outcomes.* Paper presented at the EARLI 10th Biennial Conference: Improving Learning, Fostering the Will to Learn, Padova, Italy.

Edwards, S. L., & Bruce, C. S. (2004). The assignment that triggered …change: Assessment and the relational learning model for generic capabilities. *Assessment & Evaluation in Higher Education,* 29(2), 141-157.

Flanagan, J. C. (1954). The critical incident technique. *The Psychological Bulletin,* 51(4), 327-358.

Funston, A., & Morrison, M. (2000). *Investigating gaps and opportunities: young peoples' access to IT in Australia*. Retrieved 10 July 2004, from http://www.youngaustralians.org/Resources/BYTE%20Audit%20Report/Overview%20of%20Report.htm.

Genoni, P., & Partridge, J. (2000). Personal research information management: Information literacy and the research student. In C. Bruce & P. Candy (Eds.), *Information literacy around the world: Advances in programs and research.* (pp. 223-235). Wagga Wagga: Centre for Information Studies, Charles Sturt University.

Goldstein, A., & O'Connor, D. (2000). *E-commerce for development: Prospects and policy issues.* Technical Paper, no. 164. Paris: OECD Development Centre.

Handzic, M., & Lin, J. (2003, November). *K-space and learning.* Paper presented at the 14th Australasian Conference on Information Systems, Perth, Western Australia.

Hardy, G. (2001). *Vicnet: Communication rules ok?* Paper presented at the 5th National Information Literacy Conference, University of South Australia.

Harper, V. B. (n.d.). *Digital divide (DD): Redirecting the efforts of the scholarly community.* Retrieved 10 July 2002, from http://cal.csusb.edu/cmcrp/documents/Digital%20Divide%20position%20paper1(hypertext%20version).doc.

Hartmann, E. (2001). Understandings of information literacy: The perceptions of first-year undergraduate students at the University of Ballarat. *Australian Academic and Research Libraries,* 32(2), 110-122.

Hill, C. (1999, December). *Improving information skills programs using action research.* Paper presented at the 4th National Information Literacy Conference, Adelaide, South Australia.

Hiscock, J., & Marriott, P. (2003). A happy partnership: using an information portal to integrate information literacy skills into an undergraduate foundation course. *Australian Academic and Research Libraries,* 34(1), 32-41.

Holden, H., & Cribb, J. (2004). Knowledge without boundaries: A reflection on collaboration. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong*

learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004 (pp. 161-167). Rockhampton, Q.: Central Queensland University Press.

Hughes, H. (2004). Researching the experiences of international students. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 168-174). Rockhampton, Q.: Central Queensland University Press.

Ivey, R. (2002). Information literacy: how do librarians and academics work in partnership to deliver effective learning programs? *Australian Academic and Research Libraries*, 34(2), 100-113.

Kirk, J. (1999). Information in organisations: Directions for information management. *Information Research*, 4(3). Retrieved 2 March 2005, from http://informationr.net/ir/4-3/paper57.html.

Kirk, J. (2002). *Theorising information use: managers and their work.* (Doctoral dissertation, University of Technology, Sydney).

Kirk, J. (2004). Tumble dryers and juggernauts: Information-use processes in organizations. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 192-197). Rockhampton, Q: Central Queensland University Press.

Klaus, H. (2000). Understanding scholarly and professional communication: Thesauri and database searching. In C. Bruce & P. Candy (Eds.), *Information literacy around the world: Advances in programs and research.* (pp. 209-222). Wagga Wagga: Centre for Information Studies, Charles Sturt University.

Lawson, R., & de Martos, C. (2000). Information technology skills in the workplace: Implications for Bachelor of Arts degrees. *Australian Journal of Educational Technology*, 16(2), 87-103.

Lim, K. F., & Lee, J. (2000). IT skills of university undergraduate students enrolled in a first-year unit. *Australian Journal of Educational Technology*, 16(3), 215-238.

Limberg, L. (1998). *Experiencing information seeking and learning: A study of the interaction between two phenomena.* (Doctoral dissertation, Göteborg University, Göteborg).

Lloyd, A. (2004). Working (in) information: conceptualizing information literacy in the workplace. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 218-224). Rockhampton, Q.: Central Queensland University Press.

Lupton, M. (2003). *Researching an essay: Undergraduates' ways of experiencing information literacy.* (Masters thesis, University of Canberra, Canberra, ACT).

Lupton, M. (2004). *The learning connection. Information literacy and the student experience.* Adelaide: AusLib Press.

MacAuley, P. D. (2001). *Doctoral research and scholarly communication: Candidates, supervisors and information literacy.* (Doctoral dissertation, Deakin University, Geelong).

Macpherson, K. (2004). An electronic processing model of undergraduate database information retrieval. *Journal of the American Society for Information Science and Technology*, 55(4), 333-347.

Mansell, R., & Wehn, U. (Eds.). (1998). *Knowledge societies: Information technology for sustainable development*. New York: Oxford University.

Marton, F. (1986). Phenomenography: A research approach to investigating different understandings of reality. *Journal of Thought,* 21, 28-49.

Marton, F. (1988). Phenomenography: exploring different conceptions of reality. In D. Fetterman (Ed.), *Qualitative approaches to evaluation in education: The silent revolution* (pp. 176-205). New York: Praeger.

Marton, F. (2000). The structure of awareness. In J. Bowden & E. Walsh (Eds.), *Phenomenography* (pp. 102-116). Melbourne: Royal Melbourne Institute of Technology.

Marton, F., & Booth, S. (1997). *Learning and awareness.* New Jersey: Lawrence Erlbaum.

Marton, F., & Fai, P. M. (1999, August). *Two faces of variation.* Paper presented at the 8th European Conference for Learning and Instruction, Göteborg, Sweden.

McMahon, C., & Bruce, C. S. (2002). Information literacy needs of local staff in cross-cultural development projects. *Journal of International Development,* 14, 113-127.

McTaggart, R. (1991). Principles for participatory action research. *Adult Education Quarterly,* 41, 168-187.

Middleton, M. (2002). *Information management: A consolidation of operations analysis and strategy.* Wagga Wagga: Charles Sturt University Centre for Information Studies.

Neuman, W.L. (2001). *Social research methods: Qualitative and quantitative approaches* (4th ed.). Boston: Allyn and Bacon.

Oliver, R., & Towers, S. (2000). *Uptime: Students, learning and computers: ICT access and ICT literacy of tertiary students in Australia.* Canberra: Department of Education, Training and Youth Affairs.

Parboosingh, J. T. (2000). Tools to assist physicians to manage their information needs. In C. Bruce & P. Candy (Eds.), *Information literacy around the world: Advances in programs and research* (pp. 122-136). Wagga Wagga: Centre for Information Studies, Charles Sturt University.

Parker, N. (2001). Student learning as information behaviour: Exploring Assessment Task Processes. *Information Research,* 6(2). Retrieved 2 March 2005, from http://informationr.net/ir/6-2/ws5.html.

Partridge, H. (2002a, May). *The digital divide: a psychological perspective.* Paper presented at the Information Resources Management Association International Conference: Issues and Trends in Information Technology Management in Contemporary Organizations, Seattle, Washington.

Partridge, H. (2002b). Network literacy and the digital divide: the role of the public library. In D. Booker (Ed.), *Information literacy: the social action agenda: Proceedings of the Fifth National Information Literacy Conference …, 30 November-1 December 2001* (pp. 62-67). Adelaide, SA: University of South Australia Library.

Partridge, H. (2003, May). *Moving beyond the digital divide: developing a psychological perspective of digital inequality.* Paper presented at the 14th Information Resources Management Association International Conference, Philadelphia, Pennsylvania.

Partridge, H. (2004). Establishing the human dimension of the digital divide. In M. Quigley (Ed.), *Information security: social and organizational issues* (pp. 23-47). Hershey, PA, USA: IRM Press.

Patrick, C., & Crebert, G. (2004). A whole new ball-game: Generic skills in an engineering school: are they taught or merely caught*?* In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility*

and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004 (pp. 288-294). Rockhampton, Q.: Central Queensland University Press.

Pavey, J. (2003). A C&IT skills audit of staff and students. In A. Martin & H. Rader (Eds.), *Information literacy and IT literacy: Enabling learning in the 21st century* (pp. 186-193). London: Facet Publishing.

Reid-Searl, K., Dwyer, T., Jirojwong, S., & Hinton, L. (2000). Research and information literacy at CQU: An exp lanation of the attitudes of pre- and post-registration nursing students. In K. Appleton, C. Macpherson & D. Orr (Eds.), *Selected papers from the inaugural International Lifelong Learning Conference, Yeppoon, Queensland, Australia, 17-19 July, 2000* (pp. 216-221). Rockhampton, Q.: Lifelong Learning Conference Committee, Central Queensland University.

Salisbury, F., & Ellis, J. (2003). Online and face-to-face: evaluating methods for teaching information literacy skills to undergraduate arts students. *Library Review,* 52(5), 209-217.

Simpson, L., Wood, L., Daws, L., & Seinen, A. (2001). *Creating rural connections: Book 1: Project overview*. Brisbane: The Communication Centre, Queensland University of Technology.

Smith, E., & Martina, C. (2004). Keeping the dough rising: Considering information in the workplace with reference to the bakery trade. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 325-329). Rockhampton, Q.: Central Queensland University Press.

Stern, C. (2003). Measuring students' information literacy competency. In A. Martin & H. Rader (Eds.), *Information and IT literacy: Enabling learning in the 21st century* (pp. 112-119). London: Facet Publishing.

Talay-Ongan, A., Edmonds, T., & Gosper, M. (2001). *Information literacy for students in early childhood.* Paper presented at the ASCILITE 2001, Melbourne, Australia.

Todd, R. J. (1999). Utilization of heroin information by adolescent girls in Australia: a cognitive analysis. *Journal of the American Society for Information Science,* 50(1), 10-48.

Tucker, B., & Palmer, S. (2004). *Integration of information literacy training into engineering and technology education.* Paper presented at the VALA12th Biennial Conference and Exhibition, Melbourne, Victoria. Retrieved 1 August 2004, from http://www.vala.org.au/vala2004/2004pdfs/36TucPal.PDF .

Turnbull, D., Frost, D., & Foxlee, N. (2003, January). *Infoseek, infoFind! information literacy and integrated service delivery for researchers and postgraduates.* Paper presented at the Information Online 2003 Conference, Sydney, New South Wales.

United Nations Development Program (1998). *Info21: Information and communication technologies for development.* Retrieved 1 March 2001, from www.undp.org/info21/index5.htm

Urbis Keys Young (2002). *Women's information needs study* . Sydney, NSW: Department for Women.

Wadsworth, Y. (1998). What is participatory action research? *Action Research International* paper 2. Retrieved 2 March 2005, from http://www.scu.edu.au/schools/gcm/ar/ari/p-ywadsworth98.html.

Wallace, M. C., Shorten, A., & Crookes, P. (2000). Teaching information literacy skills: an evaluation. *Nurse Education Today,* 20, 485-489.

Williamson, K., Schauder, D., & Bow, A. (2000). Information seeking by blind and sight impaired citizens: an ecological study. *Information Research*, 5(4). Retrieved 2 March 2005, from http://informationr.net/ir/5-4/paper79.html.

Yashin-Shaw, I., Buckridge, M., Buckridge, P., & Ferres, K. (2004). Enhancing graduate attributes: Mechanisms for facilitating the transfer of academically-acquired generic skills into the workplace. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 396-402). Rockhampton, Q.: Central Queensland University Press.

Yu, F. (2004). Using problem-based learning in a second year chemical engineering information-skills workshop: an Australian case study. In P.A. Danaher, C. Macpherson, F. Nouwens & D. Orr (Eds.), *Lifelong learning: Whose responsibility and what is your contribution? Refereed papers from the 3rd International Lifelong Learning Conference, 13-16 June 2004* (pp. 402-408). Rockhampton, Q.: Central Queensland University Press.

DISCUSSION

[*C Bruce*] Funding of research is an issue. In our faculty, if research is funded it is regarded as 'real research'; if it is unfunded it is a perceived as a 'hobby'. We are also dependent on research students for the research focus, and many of these students are professionals with a desired focus. This approach to topic selection contrasts with, for example, the use of the UNESCO meeting of experts' recommendations for a research agenda. The profession is gradually building up the number of academics with PhDs, so the focus has been on gaining PhDs rather than applying for funding. A suggestion is to seek research funding from community centres in order to research community use of information.

The ARC SPIRT grants were mentioned in terms of facilitating finding new researchers [*M Middleton*]. This type of grant work needs to be done on a collaborative basis – practitioners and researchers working together on grant proposals.

[*C Bruce*] It is easier to attract funding if there is seed funding from a number of partners ($5-10,000 each). This approach also spreads the risks. Many organisations wouldn't be able to support (resources and infrastructure) the large grants ($100,000), however they would be able to do it in collaboration. It is hard work to apply for these types of grants, but even if you don't get them you still have a team and the publications generated from the grant proposal. There are strong synergies involved with collaborative research.

There are bigger groups in Scandinavia and the UK, and we must attract PhD students.

Potential partners are in government and business, but government is notoriously difficult to access. Government is 'opaque' in finding people to contact. Networking is fundamental.

Practitioners need time release to do research. Managers need to allow and encourage staff to do research.

[*D Schmidmaier*] The State Library of New South Wales has set up a research program for staff. It is critical for an organisation to fund a research agenda and allow staff to conduct research as part of their job in order to move forward. However, public and education librarians don't have the same access to research support. The limited number of practitioners at the seminar can be seen as indicative of the lack of support for practitioners by management.

[*L Giles-Peters*] Simon Kaplan (Dean of QUT Faculty of IT) mentioned the various 'ages' of IT: mainframe; PC; Internet; content. Each time libraries have said 'our time has come' but it still hasn't come, or we haven't taken the opportunities.

State libraries have a big client base in secondary and tertiary students. They are running user education and are interested in the information literacy research coming out of education. Where does information literacy begin? At birth? Perhaps by the way we learn, the way we are exposed to information and exposed to technology. Just announced are the Queensland State Library staff fellowships which involve taking staff offline in order to do research.

If you 'don't know what you don't know' life is difficult and information literacy is difficult. How do you engage the disengaged? The Queensland State Library is addressing the digital divide by supporting service points across Queensland, including a fully equipped online van. However, the Internet is not the be-all and end-all. The Queensland State Library has a very high population of international student users, therefore it is important for staff to understand the research into international students. This includes user education, systems development and website development. The State Library is interested in research into children learning to develop services for children and families, and takes seriously the ALIA Statement of Information Literacy for all Australians.

The State Library projects are ripe for research, e.g. indigenous knowledge centres. There is a need to research, to document and to generalise findings. The Library has been very busy in setting the services up, but as yet has not researched them.