

COMMUNITY, COMMUNICATION, COLLABORATION: SCHOLARLY PRACTICE IN TRANSFORMATION

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Abstract

This paper reports on the results of a survey and focus groups exploring the use of the Internet by academic staff and research students at Curtin University of Technology for the purposes of scholarly communication.

The survey included questions regarding the respondents' formal and informal scholarly communication practices and the way in which these have changed as the result of access to the Internet. The survey also asked a range of questions regarding respondents' use of library services, the frequency of their use of these services, and the manner in which their use of the library had been impacted by the increasing availability of Internet based access to services and collections. Whilst focus group discussions suggested some ambivalence towards the enabling potential of ICTs on scholarly communication, the evidence gathered indicates the extent to which research and communicative practice is changing and the resultant impact on scholarly communities. The paper concludes with some preliminary observations about changes to scholarly communities and the opportunity this offers for academic librarians to enhance their role in the development of research literate communities.

1 Introduction

The ongoing revolution in information and communication technologies (ICTs) has fundamentally altered the work of scholars and researchers. For many this is true of *what* they research, but for almost all it is true of *how* they research. ICTs have transformed the way in which scholars conduct literature reviews; collect, store and mine research data; prepare and publish written research outcomes; communicate with editors and publishers; prepare and apply for grants; exchange preprints and reprints; and maintain informal networks of contact and information sharing with their peers.

Much of the research into the higher education and research environment has centred on the nature of the impacts of ICTs on teaching and learning and the more formal aspects of research such as publishing processes. For the most part the focus has been on the Internet and the transformed processes that have emerged as a result of the shift to technologically mediated research and learning communities. Few studies to date, however, have investigated the impact of the Internet on the idealised notion of a 'community of scholars' – which is 'more about the ongoing conversation within a group of scholars than it is about the production and consumption of scholarly 'information' or knowledge' (Lally, 2001, 82).

The research reported in this paper begins with a study of changing habits of 'scholarly communication', but is particularly interested in extrapolating from this data in order to understand the way in which changes to scholarly communication are impacting upon the

notion of a scholarly community. The term 'scholarly communication' is used in this paper to refer to the communication practices of scholars and researchers in the production and consumption of information, and also to the ongoing conversations, collaborations, and cooperative endeavours that are essential to research and knowledge production. That is, scholarly communication incorporates both the formal and informal communication practices of scholarship and incorporates scholarly publishing. Whilst the impact of ICTs on both scholarly publishing and formal communication channels have been the focus of existing research, the impact on the more informal communication and its relation to the practice and understanding of scholarly community have received surprisingly little attention to date.

1.1 Previous research

The research reported in this paper is working at the intersection of at least four existing bodies of research and publishing.

First, there is research into the established and changing patterns of scholarly communication. Many of the ground breaking studies in this field were conducted in the late 1960s and early 1970s, resulting in classic studies of scholarly communication in the sciences (Meadows, 1974) and the social sciences (INFROSS, 1971), and an awareness of the importance of informal communication channels – the 'invisible college' - in the transfer of scholarly information (Crane, 1972).

Interest in researching scholarly communication has been rekindled in the last decade as ICTs, and particularly the Internet, have transformed 'traditional' research and communication practices. For the most part these studies have focussed on the formal channels of scholarly communication, although it is difficult to separate these entirely from informal methods of communication, and many studies have included at least some consideration of the latter (Bruce, 1996; Appleby, Clayton & Pascoe, 1997; Houghton, Steele & Henty, 2003 – these are some of the major Australian studies only). There has also been a smaller body of research focussing on changes in informal scholarly communication practice (Hert, 1997; Costa & Meadows, 1999; Koku, Nazer & Wellman, 2001; Henry, 2002). The term 'virtual college' (Walsh & Bayner, 1996) has been coined to describe the Internet dependent version of the 'invisible college'.

Secondly, there has been a related literature generated by librarians, scholars and publishers on the evolving mechanics of scholarly publishing. This has been fuelled by the ongoing 'scholarly publishing crisis', which has seen universities able to acquire ever less of the published scholarly record as both the rate of publication and the cost of acquiring the published research record have risen alarmingly. Much of this research has centred on the revolutionary changes to scholarly publishing that followed the advent of electronic journals, and on understanding the dynamics of a commercialised and globalised publishing industry. This research has taken in the advent of the digital library; the rise of electronic journals and Internet based publishing; and library and publisher led responses such as e-journal aggregations, consortia, licensing and portals. Much of the associated discourse has investigated various 'solutions' to the scholarly publishing crisis with a recent emphasis on open access publishing and institutional repositories (Lynch, 2003).

This second body of literature has focussed on scholarly publishing rather than scholarly communication. This is not surprising, given that it has been the collections of published artefacts – the scholarly journals and the academic monographs - that have traditionally constituted the interface between the research process and the library. This literature has therefore been concerned with the outcomes rather than the process of scholarship, and as such the dynamics of change within scholarly communities have largely been overlooked in favour of more immediate issues.

Thirdly, there has been a further literature investigating the ways in which universities must transform their information resources and scholarly practices at an institutional level in order

to ensure that they adapt to their changed environment (Gibbons, 1994; Hawkins and Battin, 1998). Changes in information technology have impacted upon the wider society and its expectations of higher education, and governments have responded by restructuring the financial and regulatory frameworks under which universities operate. These changes have in turn required university managers to constantly monitor their internal operating environments to ensure that they are fitted to an increasingly competitive, globalised and deregulated market.

This literature has produced, *inter alia*, a consideration of how universities need to manage the research process including research related information needs. This has included speculation on the need for reconfigured organisational and reporting structures, and campuses being physically redesigned to accommodate the coalition of information related services (Wainwright, 2004). A related issue has been the emergence of the 'information commons' as both a physical and virtual entity, and recent contributions have sought to theorise the information commons based on previous discourses around the concept of the 'commons' and 'common-pool resources' (Hess & Ostrom, 2003; Kranich, 2004).

These three bodies of research and publishing are clearly related, and they have each informed and drawn from the others. For although their emphasis shifts between research practice, scholarly communication and higher education management, they are all concerned with aspects of how the ongoing revolution in ICTs has altered the work practices and environment of those engaged in the production and transmission of knowledge. In each of these literatures there is more immediate concern with 'communication' than 'community', but there is also an underlying acknowledgment that the communities of practice which form around scholarship are being irrevocably changed. These literatures regularly stress the need to react to environmental changes by forming new partnerships and new patterns of cooperation and collaboration. In doing so they are recognising some of the important shifts they are taking place in the formation of scholarly communities enabled by Internet based communication.

There is also a fourth literature on ICTs and community or group interaction which is relevant to the current research but which is less frequently drawn into the discussions shared by the others. This ranges from the well-established field of virtual community research to the more specialised studies of virtual teamwork, and HCI-focused studies of groupware, and more recently 'social software' (Allen, 2004). Most relevant to this project is the work on social networking which is loosely shaped around theoretical concepts of community and the manner in which Internet based communication is altering understandings of communities and their interactions (Wellman, 1999; Castells, 2000). Some of this literature has argued that these emerging technologically mediated practices might be better conceptualised as 'networks' rather than communities, and at times particular attention has been given to understanding the changed relationships between scholars (Gaines, Chen & Shaw, 1997; Beagle, 2001).

2 The Study

2.1 Survey

A pilot study undertaken in August 2003 preceded the study reported here. The pilot was conducted with academic staff and postgraduate students from the Faculty of Media, Society and Culture at Curtin University, and the results were reported in Genoni, Merrick and Willson (2004). The survey reported in this paper was undertaken at Curtin University of Technology in Perth, Western Australia, in September and October 2004.

The survey population was all current academic staff and postgraduate research students of the University. Possible respondents were contacted by using email distribution lists intended to reach all of the members of these two groups. Recipients of the email were directed to a website if they wished to complete the survey. Given the nature of this method

of distribution it is not possible to know how many staff or postgraduates received notification of the survey. Curtin currently has approximately 1300 academic staff and 1600 postgraduate students.

246 copies of the survey were returned, 107 (44.5%) by staff ranging in rank from Associate Lecturer to Professor, and 135 (56.5%) by postgraduate students. 135 (54.9%) respondents were female and 109 (44.7%) male, with two cases missing. The respondents were drawn from all Divisions of the University, with 86 (39.6%) identifying themselves as belonging to the Humanities; 84 (34.1%) from the Sciences, and 47 (21.7%) from the Social Sciences. 29 respondents failed to report a disciplinary affiliation.

The survey consisted of two parts. Part A collected demographic information and asked respondents about their current use of the Internet for scholarly communication purposes. Part B was to be completed by only those respondents who had participated in scholarly communication prior to the introduction of the Internet, in order that they could make assessments of the impact of the Internet on their scholarly communication practice.

Part A of the survey asked questions relating to a range of scholarly communication practices. Each of the Tables below reports valid responses only.

Table 1. Use of Internet communication tools (%)

	Daily	Weekly	Occasionally	Never
Personal email	72.7	17.6	8.6	1.2
Read discussion lists	17.1	25.7	32.7	24.5
Post to discussion lists	4.6	8.7	41.5	45.2
Read bulletin boards	7.9	19.9	40.2	32.0
Post to bulletin boards	0.8	5.4	34.0	59.8
Read Blogs	3.8	5.4	22.2	68.6
Write/Maintain Blog	2.1	3.0	10.2	84.7

As would be anticipated the respondents are frequent users of Internet based communication functions for the purpose of informal scholarly communication. These figures do not, however, record the 'saturation' usage that might have been expected, with some respondents (9.8%) reporting that they only 'occasionally' or 'never' use email – surely the most pervasive of Internet-based communication tools.

Table 1 also records that researchers were considerably more likely to use these various Internet communication tools as readers rather than contributors. Nearly half of the respondents (45.2%) reported that they never post to discussion lists and over half (59.8%) never post to bulletin boards.

Respondents were also asked to indicate the extent of their Internet-based participation in scholarly communities by the frequency with which they used the Internet to initiate or receive contact from other researchers.

Table 2. Internet initiated contact (%)

	Daily	Frequently	Occasionally	Never
With unknown researchers	0	18.7	53.3	27.2
By unknown researchers	0	20.6	52.5	26.9
With colleagues I know well	41.7	33.1	19.8	5.4
With colleagues I have never met	6.2	19.8	58.4	15.6

As would be expected these results indicate that the most frequent communication is with colleagues who are well known to the respondents. These figures also indicate, however, that Internet communication initiated with or by unknown researchers is at least an occasional occurrence for over half of the respondents in each case. It is also the case that nearly 20% of respondents have entered into a collegial relationship – measured by daily of frequent contact – with other researchers who they have not met personally.

Perhaps even more indicative of the capacity of the Internet to influence the formation of scholarly relationships are the figures reported in Table 3, wherein respondents were asked to indicate the impact of the Internet on the likelihood of them contacting, or being contacted by, previously unknown researchers.

Table 3. Internet influenced changes to scholarly contact (%)

	More likely	No change	Less Likely
Contacting an unknown researcher	72.8	21.0	6.2
Being contacted by an unknown researcher	70.8	21.7	7.5
Responding to contacts	58.1	35.6	6.3

A majority of respondents indicated that as a consequence of Internet use they were both more likely to initiate contact with, and more likely to be contacted by, researchers to whom they were hitherto unknown. Equally important for the formation of scholarly communities is the response from over half of the respondents (58.1%) that they were more likely to respond to unsolicited contacts than they were prior to the Internet. Obviously the ease and informality of email use is an attractive feature of the Internet and a powerful inducement to initiate informal communication.

The ease of Internet communication was further explored in questions that probed respondents on their use of the Internet to entice them beyond the boundaries of their established communities.

Table 4. Internet influenced changes to informal scholarly communication (%)

	Agree	Neither	Disagree
Made it easier to find other scholars and peers	82.9	14.6	2.4
Made it easier to approach senior scholars	69.5	26.8	3.7
Increased flow of cross-disciplinary information	78.5	17.8	3.7
Extended Scholarly networks beyond disciplines	65.2	28.7	6.1

A clear majority of respondents reported that Internet communication has both eased the path to locating fellow researchers and to approaching those who are 'senior' in rank. Responses also indicate that ease of communication and contact is assisted not only in hierarchical but also in disciplinary terms, with nearly two-thirds (65.2%) of those surveyed 'agreeing' that the Internet assisted scholarly networks to move beyond their usual subject limits.

Given the responses recorded in Tables 2 – 4 it is not surprising that when asked in a further question about the impact of the Internet on their level of informal correspondence with colleagues, 68.7% of respondents indicated it was 'more'; 23.3% reported 'the same', and only 8% reported 'less'.

Table 5. Use of the Internet for collaboration (n, %)

	Yes	No
Have you participated in a collaborative project using the Internet?	108(44.1)	137 (55.9)

Table 6. Frequency of use of the Internet for collaboration (n, %)

	Daily	Frequently	Occasionally	Never
How frequently do you undertake collaborative research and writing that would be impossible without the Internet?	19 (7.9%)	67 (27.8)	91 (37.8)	64 (26.6)

There is some discrepancy in the figures reported in Tables 5 and 6. In Table 5 137 respondents reported that they have not participated in collaborative projects using the Internet, but in Table 6 only 64 provided essentially the same response.

When asked which description best applied to the nature of their collaborative work, 52 (40%) indicated 'International', 38 (29.2%) 'National', and 40 (30.8%) 'Local' (note that some respondents provided more than one response to this question).

What impact then did this increased Internet-based access to colleagues, peers and scholarly networks have on participation in the establishment of scholarly activity and communication? In Part B of the survey respondents were asked to indicate changes in their level of participation in traditional forms of scholarly communication.

Table 7. Changes to participation in 'traditional' scholarly communication activities (%)

	More	Same	Less
Reading research journals	76.1	19.0	4.9
Contributing to professional literature	32.9	59.1	7.9
Attending Conferences	25.2	63.8	11.0

Reading of research journals in particular experienced a substantial (76.1%) increase. This is presumable because this 'traditional' activity is now delivered in a far more accessible manner via the Internet. The result that 32.9% of respondents now believe that they contribute more actively to their professional literature could be attributed to one or both of two reasons. Firstly, that the increased Internet-based collaboration is resulting more publication, or secondly, that the Internet has delivered a new range of publishing options in the form of freely available Internet-only journals.

It is perhaps more surprising that 25.2% of respondents reported that they now attend more conferences, given that it might be assumed that the ease of electronic communication would have reduced the need for physical meetings and conferences. For over a quarter of respondents, however, the opposite has been the case.

The survey also investigated the impact of the Internet on respondents' use of the University Library and its services. As would be expected most of the Library's electronic services were well – and even heavily – used, with 17.1% indicating that they used the Library's Internet based services on a daily basis, and 48.8% indicating frequent use.

In Part A respondents were asked to record the frequency of use of various library services delivered via the Internet.

Table 8. Frequency of use of Internet based library services (%)

	Daily	Frequently	Occasionally	Never
Online Catalogue	12.3	53.7	24.6	9.4
Electronic Databases	9.9	48.8	29.3	11.4
E-Reserve	4.5	27.5	39.3	28.7
Book Ordering	1.2	14.0	51.9	32.9

In Part B of the survey those respondents with experience of scholarly communication prior to the introduction of the Internet were asked to indicate the impact the Internet has had upon their frequency of library use for 'research purposes'.

Table 9. Changes to frequency of library use and attendance (%)

	More	No change	Less
Use of University library and services	62.5	19.4	18.1
Attending the Library in person	18.6	29.2	52.2

Nearly two-thirds of respondents reported an increased use of library services since the advent of the Internet and web-based library services. Contrary to some speculation that the Internet would marginalise libraries, or at least make the library difficult to identify as the source of particular services, 62.5% of those surveyed reported an increase in the use of library services opposed to 18.1% who reported less use. Perhaps more surprising is the response that 18.6% found they were attending the Library in person more frequently.

The survey included two questions related to institutional repositories. Curtin University Library established a repository (e-space@curtin; <http://espace.lis.curtin.edu.au/>) in late 2003, and its use has been promoted to researchers. Respondents were firstly asked if they were familiar with the 'concept of an electronic (open access) institutional repository'. 87 (36%) indicated they were, and 155 (64%) replied that they were not.

Respondents who were aware of institutional repositories were then asked to indicate the categories of material they believed should be added to repositories.

Table 10. Choice of content in institutional repositories (more than one response invited) (%)

Peer-reviewed published articles	83.7
Pre-prints (not yet published articles/ conference papers)	72.1
Teaching materials (e.g. lecture notes)	64.0
Unpublished research material/ data	52.3

These figures suggest that although peer-reviewed material remains the preferred content for institutional repositories there is also a high degree of tolerance of other categories of content being included.

Although the general impression provided by the survey data is of the use of the Internet to favourably impact upon research and communication, the results are also interesting for the degree of resistance they record. For while activities using the Internet to access bulletin boards and discussion lists; engage in personal email; contact unknown researchers; use electronic databases, and undertake collaborative projects are a daily or frequent occurrence for some researchers, for other respondents these activities are undertaken rarely or even never. That is, what might be thought to be ubiquitous practice is some way from being the case.

2.2 Focus groups

Two focus groups were conducted subsequent to the survey in November 2004. Invitations were sent to members of the academic staff and postgraduate student body using the same emailing lists used to distribute the survey. In all 13 staff and postgraduates attended the focus groups.

At least some of the reasons for this being the case were expressed in the focus groups, which by-and-large recorded some scepticism about ICTs and their influence on research practice and outcomes. For while participants in the focus groups were all ICT adept, they were hesitant to embrace the Internet as being an unqualified success in furthering either the quantity or quality of their research, or indeed as being a crucial transformative agent in redefining the sense of community between scholars.

Indeed for some focus group participants it was clear that the increased ease and functionality of informal scholarly communication is something of a mixed blessing. That is, whilst they might have adopted the technology enthusiastically at the outset they were becoming increasingly aware of its pitfalls or shortcomings. Some of the issues expressed included:

- spamming
- poor 'netiquette'
- information overload
- unsolicited contacts
- re-forming of undesirable established hierarchies in the electronic environment

Indeed such were the problems that several participants reported that they had forsaken some of the community activity that was initially attractive about the medium. As one reported:

I myself have withdrawn hugely from electronic communities in the sense of people who are discussing topics and things. When we first had the opportunity I did it all the time but I found that things got so far and somehow they kind of disappeared and the new 'in' things of the moment came up. And that's really where the problem arose for me that I couldn't see how you could parley that into genuine research projects. And it didn't seem to work for me so I gave up on it.

Even in raising the various problem areas, however, attitudes were marked by ambivalence. For example, even those who were most concerned by these issues were also quick to acknowledge that on occasions unsolicited email contacts had been invaluable, or that the absence of formality on the net had allowed them to effectively break through the hierarchies which often impeded scholarly contacts.

The focus groups also produced some reflections on the type of research and community that are (or are not) enabled by the Internet. Once again, ambivalence was the keynote. On one hand, there was a ready acknowledgment that the Internet was a powerful means of supporting research that required effective communication rather than a developed sense of 'community'. As one participant noted:

In terms of what I do, there is someone in Alaska that is into what I do, [and] someone in Colorado, some of whom I've met, some of whom I haven't met, ... I find I don't need to be their friend. It would be great if I met them but they might turn out to be completely unlikeable people. But for the purpose of doing a project together it's nice.

On the other hand, however, for another participant personal contact ('friendship') was an essential component of community, and in its absence she believed that the Internet was limited in its use for research communication.

I personally find it very easy to communicate on the net but I don't find it easy to say I have made friends on the net. I don't know to what extent scholarly community means friendship, but to me it means friendship... There is a real barrier between what you might call communication – just messages and discussion and so on, and real research projects and productivity. It's actually quite difficult on the net to move a relationship over that barrier.

Another participant emphasised the importance of the Internet as a 'way of being engaged in a wider community', but also agreed that some types of scholarship don't transfer to the Internet.

I do think that it is correct to say that there are projects that you simply cannot conduct through these means and it seems to me dangerous if increasingly we are moving towards that idea. I think it is important that people realise that this kind of virtual community cannot substitute for some kinds of research.

Several participants pointed out the difference between networking and community, emphasising that the Internet was potentially a great networking device, which may or may not be a prelude to the establishment of some more traditional form of community.

Personally I think the advantage [of the Internet] is the breaking in, that doesn't involve someone saying do you know so-and-so. You can actually identify someone to whom there is no threat of introduction, but you can identify them by what they are writing about and find them wherever they are. But then it is in a way not productive unless it moves into more like the older style of communication.

There was of course a wide variety of relevant matters discussed in the focus groups, and these can't be done justice here. The quotes provided above are selected simply to give an impression of the general tenor of the responses. Indeed the discussions could be characterised by saying that in some ways the participants were surprisingly non-reflexive about the key issue of 'scholarly community'. For although they were generally positive about the information gathering and networking possibilities of the Internet, they were at times puzzled by the suggestion that the Internet could have implications for the types of community they share. When the issue of community was addressed it was usually in order to affirm the value of the traditional forms of scholarly community and the prospect of using the Internet in support of this.

3 Discussion

The outcomes of the research to date are suggestive rather than conclusive, and what is strongly suggested is the extent to which ICTs have infiltrated research practice. There is sufficient evidence to indicate that the researchers who responded to the survey have shifted considerably towards the forms of communication expected in a transformed university, one which in the influential term used by Gibbons et al (1994) is engaged in the desirable Mode 2 knowledge production. That is, a knowledge environment that increasingly favours interdisciplinary and multidisciplinary activity; the increased use of collaborative teams; an emphasis on diverse communication methods, and an increasing dependence on informal communication. According to the evidence gathered in the research reported above, these shifts are all being enabled by the adoption of ICTs for research and scholarly communication.

What is still less clear, however, is the way in which these broad shifts in communication and research practice are influencing the formation and nature of scholarly communities. One point in particular which requires addressing – because the issue is raised so frequently in the various literatures referred to in the introduction – is that of collaboration. Just who should researchers be collaborating with in order to transform effectively their research practice for the new environment? Some of the possible collaborative partners are

acknowledged in the responses to the survey and the focus groups: that is, partners across disciplines; or located in other institutions or other countries, or previously unmet scholars with shared research interests.

The survey results also record the ongoing – and indeed growing - importance of the library and its services to researchers. It is easy to speculate that in an environment in which electronically sourced information overload is an ongoing problem for researchers, that libraries are becoming an increasingly important ally in both filtering the information environment (portals) and in developing outlets for scholarly content (institutional repositories). The indications from the focus groups, however, is that to this point researchers' vision of their scholarly community has not yet expanded to include librarians or other collaborators from the information sector.

It is the case, however, that librarians and ICT providers have increasingly been drawn into close collaboration with academics in the teaching and learning environment. It is now common for librarians and academics alike to refer to 'learning communities' (Lynch, 2004), an acknowledgment that in universities there is little point in maintaining distinctions between teachers, the library and learning support including ICTs. The concept of the 'information commons' is but one expression of the recognised importance of bringing these parties into collaborative relationships in pursuit of high quality teaching and learning outcomes. What librarians have brought in particular to these collaborations is the increasingly important skill of information literacy, which is now recognised as an integral component of effective learning (Bundy, 2004).

There has, however, been less recognition of the increasingly active role played by libraries in enabling the research outcomes. That is, the academic library is no longer a passive collector of research publications, but an active player in the whole research life cycle. As David Robins has noted:

digital libraries are open systems that allow themselves to freely exchange resources in an environment charged with information. By fostering collaboration among information community members, and by participating in the research of community members, digital libraries become involved in the invisible colleges associated with their clientele. (Robins 2002, pp. 69-70)

Robins here uses 'information community' as a broader term inclusive of the 'scholarly community', but extended to include other collaborators who share the research process.

And if information literacy has been the common ground that has united teachers and librarians in collaborative relationships, then perhaps a concept of 'research literacy' could be used to promote and further engage librarians in research focussed collaborations. Research in an ICT environment has become a far more complex process, which is no longer adequately expressed by the term 'research methods'. The 'literate' researcher now needs to be able to manage many more elements of the wider research environment. This includes drawing upon the skills of librarians to help with designing personal portals and current awareness services, structuring access to electronic journals, developing and maintaining repositories, and managing access to the exploding body of grey literature.

And perhaps all collaborators in scholarly/ information communities also need new skills in developing and 'managing' their various teams, networks and communities. These formations now seem to be characterised by their dynamic and provisional nature. Whereas the term 'community' once implied a sense of monolithic permanence, it is in the nature of many postmodern communities that they will be fragmented, purpose-specific and temporary. Participants in research and scholarly practice have the choice of many communities to which they might belong, and a key skill of the 'research literate' scholar will be in selecting, gaining access to, or building, the communities which can best achieve a desired outcome.

4 Conclusion

The evidence gathered to date by this project indicates the extent to which research communication is changing to enable more dynamic and flexible scholarly interactions, both formal and informal. Whether they be viewed as extensions of the traditional 'invisible college', or the emergence of a new form of 'virtual commons' or 'symposia', the development and maintenance of such forums constitutes an important facet of contemporary academic life.

On this basis it is argued that institutions, scholars and librarians need to support new and more open paradigms for scholarly communities. By building on the established collaboration which now underpins 'learning communities', it should be possible to extend these collaborative practices in support of new forms of research literate scholarly communities.

5 References

Allen, C. 2004. 'Tracing the evolution of social software', *Life with Alacrity*, posted on October 13, http://www.lifewithalacrity.com/2004/10/tracing_the_evo.html

Appleby, A., Clayton, P., and Pascoe, C. 1997. 'Australian academic use of the Internet', *Internet Research*, vol. 7, no. 2, pp. 85-94.

Beagle, D. 2001, 'The sociotechnical networks of scholarly communication, *portal: Libraries and the Academy*, vol. 1, no. 4, pp. 421-443.

Bruce, H. 1996, *Internet, AARNet and Academic Work: A Longitudinal Study*, Canberra: Australian Government Printing Service.

Bundy, A. 2004, 'Beyond information: the academic library as educational change agent', Paper given at the 7th International Bielefeld Conference, Germany, 3-5 February 2004, <http://conference.ub.uni-bielefeld.de/proceedings/bundyrev.pdf>

Castells, M. 2000. *The Rise of the Network Society*, 2nd ed, Blackwell, Malden.

Costa, S., and Meadows, J. 2000. 'The impact of computer usage on scholarly communication among social scientists', *Journal of Information Science*, vol. 26, no. 4, pp. 255-262.

Crane, D. 1972. *Invisible Colleges: Diffusion of Knowledge in Scientific Communities*, University of Chicago Press, Chicago.

Gaines, B., Chen, L. and Shaw, M. 1997. 'Modeling the human factors of scholarly communities supported through the Internet and World Wide Web', *Journal of the American Society for Information Science*, vol. 48, no. 11, pp. 987-1003.

Genoni, P., Merrick, H., and Willson, M. 2004. 'Virtual symposia: an investigation into scholarly communities online', *Breaking Boundaries: Integration and Interoperability: 12th Biennial Conference and Exhibition of the Victorian Association for Library Automation*, Melbourne, February 3-5, 2004. <http://www.vala.org.au/vala2004/2004pdfs/28GeMeWi.PDF>

Gibbons, M., Nowotny, H., Limoges, C., Schwartzman, S., Scott, P. and Trow, M. 1994. *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, Sage, London.

Hawkins, B. and Battin, P. 1998. *The Mirage of Continuity: Reconfiguring Academic Information Resources for the 21st Century*, Council of Library and Information Resources, Washington.

Henry, P. D. 2002. 'Scholarly use of the Internet by faculty members: factors and outcomes of change', *Journal of Research on Technology in Education*, vol. 35, no. 1, pp. 49-58.

Hert, P. 1997. 'Social dynamics of an on-line scholarly debate', *The Information Society*, vol. 13, no. 4, pp. 329-360.

Hess, C. and Ostrom, E. 2004, 'Ideas, artefacts, and facilities: information as a common-pool resource', *Law and Contemporary Society*, vol. 66, pp. 111-.

Houghton, J. W., Steele, C., and Henty, M. 2003. *Changing Research Practices in the Digital Information and Communication Environment*, Department of Education, Science and Training, Canberra.

INFROSS [Investigation into the Information Requirements of Social Sciences] 1971, *Information Requirements of Researchers in the Social Sciences*, Bath University Library, Bath.

Koku, E., Nazer, N., and Wellman, B. 2001. 'Netting scholars: online and offline', *American Behavioral Scientist*, vol. 44, no. 10, pp. 1752-1774.

Kranich, N., 2004, 'The role of research libraries in conceptualizing and fostering scholarly commons', *Workshop on Scholarly Communication as an Information Commons*, <http://dlc.dlib.indiana.edu/archive/00001249/>

Lally, E. 2001, 'A researcher's perspective on electronic scholarly communication', *Online Information Review*, vol. 25, no. 2, pp. 80-87.

Lynch, C. 2003. 'Institutional repositories: essential infrastructure for scholarship in the digital age', *ARL Bimonthly Report*, 226. Available from: <http://www.arl.org/newsltr/226/ir.html> [5 September 2003].

Lynch, C. 2004. 'The new dimensions of learning communities', *Threshold: exploring the future of education*, <http://www.ciconline.org/aboutcic/publications/threshold.htm>

Meadows, A. J. 1974. *Communicating in Science*, Butterworth, London.

Robins, D. 2002. 'From virtual libraries to digital libraries: the role of digital libraries in information communities', in *Libraries, the Internet and Scholarship: Tool and Trends Converging*, ed C. F. Thomas, New York: Marcel Dekker Inc., New York, pp. 45-76.

Wainwright, E. 2004. 'People, networks, books: new strategies for university academic information and service delivery', Paper presented at the Biennial Conference of the Australian Library and Information Association, Gold Coast, October 2004,

Walsh, J. P. and Bayma, T. 1996. 'The virtual college: computer-mediated communication and scientific work', *The Information Society*, vol. 12, no. 4, pp. 343-364.

Wellman, B. 1999. *Networks in the Global Village*, Westview, Boulder.

