CHAPTER 5

INFORMATION BEHAVIOUR OF ACADEMICS AND RESEARCHERS IN INSTITUTIONS OF HIGHER LEARNING

5.1 INTRODUCTION

In the previous chapter, the information needs of academics and researchers were examined. It was found that they require information mainly for their research, teaching and publishing or authorship activities and that they need the information to be quickly and easily available to them. Academics and researchers also require an array of formal and informal channels of information to meet these needs, and still show a marked preference for print publications, especially scholarly journal articles. As they continue to discover and use electronic media and find the potential value of these media, their need for electronic information resources is increasing.

Reneker (1993:495) says that academics are:

> ... proactive, successful information seekers, actively engaged in building their information sources and in both negotiating and creating their environment to satisfy those needs they experience most often.

Because their scholarly activities depend on the creation, assimilation and transfer of knowledge, it follows that they have an advanced level of interaction with information and information resources and of retrieval of these. In this chapter, the ways in which scholars go about finding the information they require will be dealt with.

As scholarly communication develops, so the information behaviour of the academics and researchers who are involved in this form of communication changes. During the past few decades, developments in ICT have been rapid and far-reaching. This has led to some uncertainty and insecurity in those who are involved in scholarly communication. Although certain technological advances have now been accepted as

standard practice in the communication of scholarly information, there is still no certainty as to which developments will have lasting value and which will be no more than a passing fad to scholars and publishers alike.

Much has been written about the information behaviour of academics and researchers and also about developments in scholarly communication. In order for collection development in a university of technology to be appropriate and valuable, it is essential to investigate findings in these areas.

5.2 SCHOLARLY COMMUNICATION

For knowledge to develop and progress, it is essential that scholars communicate with one another in an orderly way. Traditionally scholars and scientists have gathered data to try to test their hypotheses and theories. When enough results were obtained, scholars would publish a paper describing their findings and including the data substantiating the conclusions they reached (*University libraries and scholarly communication* 1992:123). It has always been important for scholars to describe their work for their peers to critique and then for future generations to use these writings for references in their own work (Glicksman 1990:342) so that knowledge can continue to expand in this way.

Mgobozi and Ocholla (2002:83) state that scholarly communication has three roles:

- Teaching.
- Provision of knowledge to the scholarly community.
- Development of new knowledge.

Vassallo (1999:232) sees scholarly communication as the output side of knowledge or publishing.

Ding's (1998:5) explanation of the scholarly communication process is both succinct and comprehensive:

> Reporting the results of one's research is an essential step in the scholarly communication process. Every author is a link in an information chain, on one side receiving scientific advances from his own and other fields of interest, on the other side processing the results of his own experiments into information for the benefit of others.

Papers submitted for circulation in the scholarly community must always relate to new research and contain scholarship that does not overlap with either the author's own or with anyone else's previous work (Cox 1997:44). This is to ensure that scholarship builds on previous research and expands on this. Scholarly output differs from discipline to discipline. Humanists, for example, focus on enquiry that is not always discrete and seldom relates to a physical entity. Research in this field does not depend on measurement and observation but rather on interpretation and exegesis (Budd & Harloe 1997:6). In the SMT fields the objects of study are physical entities. Results are communicated according to a model and there is a level of standardisation of methodology and of reporting. Research in the SMT disciplines follows discrete stages and steady progress in the field of study is the aim. Researchers in these fields are competitive as they strive for scholarly prestige, academic rewards and potential funding. Researchers have to report quickly in order to stake intellectual claims (Budd & Harloe 1997:5; Fjällbrant 1997:7). Social scientists share characteristics of both humanists and SMT researchers in their creation of information. Scholarly communication in this field has led to a growth in periodical literature and also in books. Some researchers take the stance that the object of study is similar to physical objects - so methods of physical sciences apply. Therefore the means of communication is similar. Others maintain that the object of study is human, not merely physical. Social scientists use more interpretative methods in their research and journals and books are used to communicate (Budd & Harloe 1997:6).

There are certain basic cultural values underlying scholarly communication if it is to be valuable to the scholarly community. There must firstly be freedom of exchange of ideas and results. Secondly, the communication process must have a professional infrastructure that will validate the authors who communicate their views and findings to other scholars (Waaijers 2001:2). The system of scholarly publishing can survive only as long as the values that support it survive, the funding survives and the

institutions and administrators want it to survive. The scholarly community seems to be saying that everybody has to publish, but that they will only buy back the good material (Kaser 1997:63).

As more emphasis is placed on research in tertiary education and as research becomes increasingly important in faculty evaluation (Budd & Harloe 1997:24), the volume of scholarly communication is bound to increase exponentially.

Scholarly journals developed as serial publications issued under the authority of a learned society and carrying its scholarly stamp of approval. As scholarly communication developed, the scholarly article became the main form of scholarly communication (Chodorow 2000:86) and remains so to this day.

At present, there are vast numbers of scholars working and creating information and millions of books and journal titles are being published. There is no single place to which scholars can go and expect to read anything but a small portion of the work relevant to their research (Glicksman 1990:343). This is why academics and researchers use many different ways of disseminating and acquiring information. They communicate with other scholars at meetings, symposia and conferences. They contact other scholars personally via telephone, fax and electronic communication channels such as email, discussion groups and bulletin boards, or they might publish in popular periodicals. Scholarly communication can take place by integrating research findings in lectures and offering training courses for other scholars in their field. It is also possible to give presentations for study groups (Glicksman 1990:343; Meyer 1996:17). Meyer (1996:15) found that research results are disseminated through transfer systems including research reports, articles, electronic storage media, abstracts, subject indexes and people. The aim of the scholarly communication process is to get the information from the producer to the user of the information.

5.2.1 Factors influencing developments in scholarly communication

A variety of factors have contributed to changes in scholarly communication. Some of the changes have been gradual and others have been thrust on scholars almost too

rapidly to allow for their assimilation in the way scholarly information is disseminated.

One of the fundamental factors is that academics (also known as faculty) at universities and colleges are constantly urged to publish in refereed and accredited scientific journals in order to qualify for tenure and promotion, merit pay and professional recognition (Calabrese & Roberts 2004:336). Research funding is often based on the number of publications a researcher has to his credit, which adds to the "publish or perish" syndrome. The result of this pressure is that many inconsequential papers have been published, many of which remain unread and uncited by other scholars (Calabrese & Roberts 2004:340). In some cases, research funds are granted on a formula basis calculated on the number of publications and citations a scholar has. As long as the printed word is seen as the most authoritative medium for scholarly communication, the crisis of information overload will continue (Cox 1997:46). This emphasis on quantity rather than on quality has led to the repeated recycling of the same information and to the trial submissions of inferior articles. This in turn has created a crisis in the refereeing process as the vast number of submissions takes up many hours of reviewing (Waaijers 2001:4).

Not surprisingly, it has been found that the number of scientific researchers is increasing in line with the number of scholarly articles being published (Watkinson 2001:195). As a large number of articles are not used as a basis for further research, being neither read nor cited, questions are being asked whether the practice of basing tenure and promotions of publications by scholars needs to be reviewed. The information overload created by the present system is causing those involved in the scholarly communication process to rethink the practice of basing decisions concerning the merit of a scholar on the number of publications he has to his name.

Although the scholarly press and research activities that produce the editorial output have always been subsidised by governmental or private grants, professional societies and other backers (Kaser 1997:60), the number of articles submitted for review and publication today is placing a burden on the financial resources of the bodies who fund research.

Another major contributor to changes in the way in which scholarly communication is conducted, is the crisis that has evolved around the scholarly journal. There are a number of reasons put forward for the rapid rise not only in the number of journal titles published, but more particularly in the subscription rates for these journals. As the volume of scholarly knowledge increases, leading to increased specialisation in research, so new journals are being created to disseminate the information created in these fields (Tomney & Burton 1998:419). Another reason given for the rapid increase in subscriptions is that scholars and scientists have put pressure on journal publishers to increase the size of their journals. This meant that the prices of these publications soared (Budd & Harloe 1997:5; Watkinson 2001:196). Even when electronic versions of journals became available, subscriptions remained high and in some cases were even higher than print subscriptions – despite obvious savings on paper, ink and the physical distribution of the journals. Scholars, as users of information, need to access new information quickly and sometimes find that the cost, availability and language of the information are barriers to such access (Fjällbrant 1997:8). Prices of online database subscriptions have also risen extremely rapidly – in one case by over 350% in just one year (Milne 1999:76).

One of the most far-reaching changes in scholarly communication has come about as a result of developments in the field of ICT. Computers can now be used to link scholars to one another no matter where they are working physically. They can also be used to link scholars to their libraries, to networked databases and to information resources available through the Internet. Academics and researchers can now access all of these sources of information from their own desktops as long as they are linked to the Internet in some way. Not only can scholars now access a vast array of resources through the Internet, but they can also disseminate their own findings and research reports through this network. Through Internet access, scholars have found that many of the scholarly communication processes have been accelerated. They are no longer slowed down by having to work through traditional information workers like librarians. They can use facilities like teleconferencing and virtual conferences to share scholarly information. Unfortunately, however, the proceedings of these conferences are seldom made available to other scholars (Myburgh 1997:42). The Internet has been found to be particularly valuable in developing countries because scholars have found that ICT has resulted in the vanishing of spatial and time barriers

and has sped up international scientific communication. Through ICT there is increased access to important data worldwide as well as to foreign literature (Aparac & Vrana 2001:140). An added benefit of using digital information is that information has become dematerialised. This means that libraries can specialise in collection development and collaborative collection development because information that is not held locally can be accessed quickly from other institutions through consortial agreements (*University libraries and scholarly communication* 1992:109).

By the 1980s prices were rising so rapidly that individual scholars and even libraries had to be very selective in their selection of journal subscriptions (Chodorow 2000:87). As more and more scholars published, university presses and learned societies could no longer cope with the volume of publishing and decided to contract out with commercial publishers to publish their journals. These commercial firms also began publishing new journals. The authors give their research to publishers free of charge and then the publishers sell it back to their university libraries at high prices (Chodorow 2000:88). Because of this, libraries and scholars have started investigating other scholarly communication avenues.

Another factor that is influencing scholarly communication is the tendency for researchers to work cooperatively on research projects. This is possibly because (Agre 2000:497):

> … a style of research has begun to mature that works systematically back and forth between network architecture and the technology and sociology to network applications.

Research institutions create powerful incentives for researchers to network amongst themselves and to cooperate professionally and technically with their peers (Agre 2000:497). Due to advances in ICT, it is now easy for researchers in different countries or locations to communicate with others on their teams. Communication is instantaneous and documents, images, etc. can be distributed to every member of the team at the touch of a button.

Hirshon (1998:67) found that several factors have an impact on scholarly communication today. These are:

- Changes in society. There is no longer much societal support for higher education and scholars have to work without this support.
- Changes in technology. Scholars have had to progress from print indexes to librarian-mediated online searching for information. They have also had to move on from CD-ROM as a medium to web-based systems.
- Changes in higher education.
- Changes in scholarly research itself.
- Changes in the publishing environment.

The environment in which scholarly communication takes place has become very volatile in the 21st century and everyone involved in this field has begun making changes to try to come up with a new model which will serve their needs more efficiently and effectively.

5.2.2 Participants in scholarly communication

Scholarly communication is far from the domain of scholars only. Many different sectors are involved in the distribution of scholarly information.

Nelson (2001:214) maintains that the scholarly communication process entails a complex relationship between authors, users, libraries and publishers. According to Milne (1999:70) the partners in scholarly communication are scholars, academic libraries, publishers of journals and books and the learned societies. "Scholars" in the latter scenario correlate with the "authors" and "users" in Nelson's list of stakeholders and learned societies are rightly added as important partners in the interplay of participants. Rao (2001:174) believes that control of the scholarly communication systems lies in the hands of authors, learned societies, commercial publishers, libraries and the research community. It could thus be summarised that the participants are scholars as both readers and authors of information, publishers who may be commercial publishers, academic presses or learned societies and libraries or

other institutions that exist to distribute scholarly information. There are also those who serve as watchdogs or gatekeepers of information in specific fields. These could be academics, institutions or even professional associations and journals that review and publish research findings and are responsible for ethical research (Calabrese & Roberts 2004:336). Universities traditionally police themselves and the watchdog function is shared with editors and reviewers of scholarly journals. Taking into account the electronic media that prevail today, all electronic channels of information dissemination are also instrumental in the communication of scholarly information.

It must be borne in mind that a great deal of scholarly communication takes place in commercial organisations and amongst practitioners such as doctors, engineers and so on, not just in academic institutions. This is true especially in the sciences and business sciences. In such cases a new set of partners emerge. Meyer (1996:18-19) found that the first receivers of research reports within organisations are usually in the top management strata. They circulate reports to the divisions for research and extension services. If relevant for specific service areas, the subject specialists take further action. At this point the information can be transformed into technology or existing technology can be adapted for local requirements. Now the information can be repackaged to make it more comprehensible and acceptable. Extension officers then act as a link between the adapted information or technology and the end-user. They transfer appropriate information or technology in the form of discussions or demonstrations that can be understood by end-users. As this form of scholarly communication falls outside the ambit of this study, these partners in the process of communication of scholarly information will not be discussed further.

As scholarly communication has developed, publishers have become increasingly important, to the point where publishers, and commercial publishers in particular, have become indispensable. Publishing has become the main means of communicating scholarship and research to the global scholarly community. This industry has accumulated procedures and policies for deliberative peer review and revision if necessary and offers the permanent availability of published papers. First a paper is prepared by the author and submitted to a publisher. Then it is peer reviewed, prepared editorially, copy-edited and proofread before being published, archived and indexed (Cox 1997:44). In these ways publishers add value to the

material received from authors. They bring their professional expertise to scholarly communication, coordinate the peer review process and act as gatekeepers by soliciting opinions regarding the quality of manuscripts submitted and making judgments about the importance of papers as contributions to scholarship in a certain field (*University libraries and scholarly communication* 1992:106). They actually select which material should be made public. These decisions are motivated as often by economics as by the quality of the papers (Milne 1999:73).

The process of adding value to scholarly communication is important to the scholarly community because the latter requires easy access to research findings which have been organised, checked and validated. Such enhancing procedures are carried out during the publishing process (Watkinson 2001:198). In defence of the beleaguered commercial publishers, Watkinson (2001:196) claims that what authors, editors and learned societies need is a professionally run, efficient, adequately-funded publishing infrastructure which protects peer review and the documentation of scientific development. Whether commercial publishers are the only institutions that can offer these value-adding processes to scholarly communication is contested by many of the other partners in scholarly communication.

What is beyond dispute is that publishing which adheres to the basic values of scholarly communication is extremely important to scholars. They need access to research findings, results, observations and views arising from a researcher's work and need to have these published in either printed or digital form. Advantages of publication are that the information can be spread to a scattered group of readers, detailed information can be given, the research can be critically examined and verified and documents can be referred to when necessary. Publishing also ensures that priority of academic work can be established and this again contributes to building the academic merit of the author (Fjällbrant 1997:2).

Towards the end of the 20th century, growing discontent arose regarding the role of commercial publishers in the scholarly communication chain. Backlogs occurred in accepting journal articles for publication. Milne (1999:75) believes that this took place because the volume of scholarly information is increasing "faster than the

ability of researchers to deal with it, publishers to print it, libraries to collect it, and scholars to read it."

Publishing is generally considered to be too slow and there is growing doubt about the system's reliability. Publishing through commercial publishers is becoming unaffordable because universities have to pay repeatedly for these publications; they have to pay staff salaries to conduct the research, pay the salaries of the reviewers and then also buy back the published papers. In addition they have to pay for the storage and archiving of the publications. Authors then have to assign their copyright to the publishers in exchange for publication of their research papers (Savenije 2001:3; Waaijers 1997:77).

5.2.3 Traditional print media as a vehicle for scholarly communication

Scholars are proving to be unwilling to move away from print media (especially scholarly journals) as sources of information and also as the preferred media in which to publish their own writings. This can probably be attributed to age-old methods of working with the information in these traditional media. Another reason for this is that these are the journals most recognised for purposes of grants and promotions. In the ongoing concern of the scholarly community to communicate with other scholars, many methods have been tried, but the scholarly journal article came to dominate as the most suitable artefact (Fjällbrant 1997:1). The system of scholarly communication used today has been mainly determined by practices used with print technology (Milne 1999:71). Once selected as the most appropriate vehicle for scholarly communication, the journal article has developed into a specific genre in writing. According to Bishop (1999:257) "The scientific journal article as a genre has remained relatively stable for several hundred years."

Research has shown that components of articles, such as abstracts, are used by researchers to help them find relevant articles and to make decisions about which articles to obtain. They read the papers and then extract, organise and incorporate some parts of these articles into their own writing (Bishop 1999:262). The usable pieces found by researchers are reaggregated, compiled and ordered and formed into presentations, papers and other scholarly writings (Bishop 1999:268). Books are less

used mainly because they are "sluggish" and because it was found that their character makes them less suitable for descriptions of detailed investigations (Savenije 2001:2).

Over the course of time, certain journals have become recognised as authoritative to both authors and readers and are seen as "brand names" in the disciplines concerned. The editors and editorial boards of journals are appointed by the publishers or the societies that own the journal (Cox 1997:44). Their prestigious branding provides quality assurance and customer loyalty for that brand (Hirshon 1998:68).

Although print journals are still the preferred medium for scholarly communication, these are not without their disadvantages. They are slow (the average time between completion of a project and the publication of the article is often 18 months or longer), expensive and they take up a great deal of storage space. If the selected journal is well-established and highly regarded, the waiting list for publication could be even longer. In addition there are problems with the refereeing process (Fjällbrant 1997:12-13).

In spite of the disadvantages, print on paper will not disappear for a long time. Faculty will continue to write articles and these will continue to be published in new journals but it is possible that there will be a gradual increase in electronic scholarly publication as scholars become more used to electronic publishing (Harloe & Budd 1994:84). Because easy and open communication is now possible amongst scholars, there is too much information and mechanisms to control quality are not able to operate effectively in this new environment. As scholarship continues to rise, so does the cost of getting the information produced (Noam 1997:5). Libraries are finding that comprehensive collections are increasingly unaffordable and electronic alternatives are becoming more powerful in storing content and more efficient in retrieval. Materials budgets are falling and production of books and serials is constantly increasing, which leads to a fear that access to scholarly information may be narrowing (*University libraries and scholarly communication* 1992:3). It seems likely that scholars will be forced to embrace electronic publishing channels increasingly to overcome problems in scholarly communication.

5.2.4 Electronic means of communicating scholarly information

Scholars, publishers and libraries are making increased use of electronic channels for communicating information. Computer-mediated communication (CMC) has been used especially in the SMT fields. Use of CMC is slightly lower in the social sciences and is even lower in the humanities (Cohen 1996:50). Although there is not universal acceptance of CMC across the disciplines, Cohen (1996:58) has come to the conclusion that CMC is now an integral part of the scholarly communication system.

This is not surprising when one considers the possibilities of CMC as a means of communication amongst scholars. In the digital environment scholarly communication starts with an idea, theory, results or observation which is shared over the Internet through email lists, preprint postings and other digital means. So the paper begins to evolve. The owner of the idea writes a paper and sends it to a journal. The paper is refereed and it is published using electronic channels. This means that by the time the paper appears in a journal the information has already been disseminated through the other channels (MacEwan 1999:319).

Nelson (2001:210) found that electronic publishing methods could revolutionise scholarly communication for various reasons:

- Scholars can publish their own work, making it freely available to the scholarly community.
- Preprint servers are being developed in some subject areas, speeding up the publication process.
- Some learned societies are successfully publishing high quality peer-reviewed journals which are free or at least considerably cheaper than commercially published journals.
- The restrictions associated with the print formats are irrelevant in the electronic environment so separate articles could become the unit of publication.

- Authors or publishers can transform e-journal content by including links to other material, multimedia presentations and access to databases. In addition, there are many interactive possibilities through the use of these media.

CMC has also been invaluable as a source of scholarly data and information to scholars. Scientists have developed large community databases covering the fields of physics, molecular biology and crystallography *inter alia* (Lynch 1998:139). Research-related information such as genetic sequences or depositories of raw material are now stored on servers where they can be accessed by others who wish to build on these findings or include them in their own analyses (Hurd 2000:1281).

It is particularly in the area of informal communication amongst scholars that electronic communication channels have become indispensable. These channels have created new electronic or virtual scholarly communities wherein scholars can collaborate through computer networks. This makes collaborative research easier and the flow of information has become quicker (Noam 1997:4). Email is an easier and cheaper means of staying in touch with colleagues. This means of communicating also expands the number of peers with whom scholars can stay in contact (Myburgh 1997:43). Unfortunately, however, use of email amongst scholars creates a problem because information communicated in this way is seldom archived or documented. It is also exclusive because scholars in more developed countries tend to exclude from their circles those working in less developed countries where immediate access to networked computers and to the Internet and email is often limited (Meadows 1997:3).

Despite the many ways in which electronic communication channels can be of benefit to scholars in their drive to make their findings and opinions known, acceptance of formal electronic publishing channels has been slow and reluctant. As long as the lack of acceptance prevails, formal scholarly communication through electronic media is unlikely to become the norm.

The success of an electronic academic journal would depend on the extent to which members of a disciplinary community actually used it to take part in the routine

discourse processes through which knowledge was validated and distributed. (Milne 1999:83)

There are several reasons for the lack of support for e-journals:

i. They still have a lower status than print journals (Nelson 2001:206). This makes them fall outside the mainstream of scholarship which in turn makes it difficult for e-journals to attract quality submissions from scholars.
ii. Tenure committees and other reward systems still prefer that scholars publish in print journals (Budd & Connaway 1997:849).
iii. The number of e-journals is small compared to that of print journals (Budd & Connaway 1997:849).
iv. Users of e-journals have to change the way they interact with journals and also make adjustments to familiar cultural and social norms regarding scholarly communication. Although refereed e-journals have been available since the late 1970s, they have mainly been failures because using them for scholarly communication is not accepted by the larger social system. This means that few researchers are willing to risk having their work labelled as inferior because of the format of publication (Bradley 1998:19).
v. There is a lack of standardisation (Fjällbrant 1997:17).
vi. As electronic publications are susceptible to being altered, adulterated and plagiarised, copyright and issues relating to intellectual property protection are difficult to enforce and maintain (Fjällbrant 1997:17; Myburgh 1997:43).
vii. Costs relating to publication, data conversion and database maintenance are very high (Rao 2001:174).
viii. The issue of ensuring the archiving of electronic publications has not been resolved (Rao 2001:174).
ix. Ready access to e-publications might prevent researchers from browsing the subject literature and this could then narrow the reading habits of researchers (*University libraries and scholarly communication* 1992:135).

Research has shown that although some academics believe that universities may become more amenable to new means of publication such as e-journals, few of them will subscribe to, or publish in, e-journals (Budd & Connaway 1997:849). It was also

found that as far as academic publishing is concerned, traditional media and mechanisms have the advantage over electronic journals for the time being, but the situation is changing.

5.2.5 Electronic publishing of preprints

As a result of problems in both the print and the electronic publishing systems and in order to speed up the dissemination of research findings, researchers in some disciplines have begun publishing their preprints on the Internet (Hirshon 1998:71; Pfander & Martin 2000:27; Savenije 2001:3). The publication of preprints is particularly prevalent in the sciences and to a slightly lesser extent in the social sciences (Shoham 1998:114). This practice has developed over an extended period of time and there is currently an established system in place for this method of scholarly communication. Well-developed preprint services are now available through the Internet (Fjällbrant 1997:15). The circulation of preprints has become an accepted practice amongst scientists to such an extent that although scholars still publish in print journals, publication in this medium is generally speaking irrelevant to scholarly communication in the sciences (Landesman & Reddick 2000:109).

5.2.6 Self-publishing by scholars

Scholars have now reached a point where it is easy to publish their own writings on the Internet. In scientific and technical communication in particular, an author can create his original manuscript in electronic form and if the telecommunications facilities are available, can transmit it directly to the editor of a journal or publish it himself on the Internet (Ding 1998:14). Due to problems with journal prices and the loss of copyright through using commercial publishers, some academics have begun investing in the electronic publication of scholarship and some scientific societies are planning to publish electronic journals (Chodorow 2000:89). In a recent survey of the medical faculty of a large American university, it was found that researchers are publishing their research articles on personal websites and weblogs (blogs) as well as continuing to publish in traditional print and electronic journals (OCLC 2004:2). As virtually all societies, publishers and universities have their own websites that could

be used for the publication of papers, scholars now have an unprecedented opportunity to publish their own work (Cox 1997:44).

Yet in reality, scholars appear to be loath to follow this route to the publication of their material. Academics involved in research in an American survey showed little interest in playing a more active role in the publication of their work as opposed to using commercial publishers for this purpose (Pedersen & Stockdale 1999:49). There are various reasons for their reluctance to resort to self-publication:

i. Self-publication bypasses the process of peer review (Myburgh 1997:43), thus bringing the quality of their papers into question. Davis and Hepfer (1998:120) found that material published by the authors themselves on the Web has not been refereed and is not regularly reviewed or indexed.
ii. The reward and tenure systems do not recognise such articles as accredited publications.
iii. There is uncertainty about the archiving and continued availability of online versions of journals (Davis & Hepfer 1998:120).
iv. Many articles published by authors on the Internet are never read and as such contribute nothing to scholarly discourse (Davis & Hepfer 1998:120).
v. Most information published directly on the Internet will not be described by the metadata services used by scholars and will not be coded, indexed, abstracted and catalogued. This means that scholars cannot be sure that they have found all the relevant articles relating to their research (Myburgh 1997:43).
vi. Websites are unstable and Uniform Resource Locators (URLs) change constantly. This could mean that publications vanish and as such can contribute nothing to scholarly discourse.
vii. The lack of archiving of e-resources is an ongoing problem.

Although self-publication by either the author himself or his university or learned society is quite easy, it appears that it will be some time before this is accepted by the scholarly community as a valid means of disseminating scholarly writings. Some universities have been publishing the writings of their own faculty and researchers on the university websites, but as this is often the republication of articles accepted for

publication in peer-reviewed journals, this is a breach of copyright. Copyright would have been transferred to the publishers concerned in such cases.

Until reward systems and tenure boards recognise self-publication and until a refereeing system is in place to validate and accredit such material, the situation is unlikely to change.

5.2.7 Peer review in scholarly communication

Most scholars believe that the peer review process is essential to the scholarly communication process and many believe that it still works well in its present form (Pedersen & Stockdale 1999:49). Due to the serials crisis and rapid changes in ICT, however, there is growing concern about this process and some feel that peer review needs to be re-engineered and re-evaluated to make it more effective and efficient in the changing scholarly communication scenario (Cox 1997:44). Another concern is that the reviewing and editing of submitted articles are the most expensive parts of the publication process (Davis & Hepfer 1998:119) and scholars are looking for a more viable alternative.

Although there is currently some doubt as to the future of the peer review process as electronic ICT facilitates communication among scholars, the peer-review process is so fundamental to scholarly practice that it will probably continue to be vitally important (*University libraries and scholarly communication* 1992:128). The process is, however, sped up considerably if manuscripts are distributed electronically. Furthermore, as the manuscript is already in digital format, there is no need for original typesetting and changes can be made easily. By using the opportunities created in the digital environment, peer review becomes more cost effective and streamlined. The predominant method used today is that articles are submitted electronically, sent out to reviewers in this form and comments are transmitted electronically. Often even the script for proofreading is sent electronically.

5.2.8 Initiatives to combat the serials crisis

In response to the escalating costs of access to serial publications, several initiatives have arisen to find different ways to disseminate scholarly information. The serials crisis led to the creation of initiatives to provide alternate scholarly communication methods, because we are paying increasingly more for less information (Oliver 2000:38). There are business-to-business initiatives (like HighWire) where help is given to existing publishers or learned societies to make their paper journals available electronically in addition to versions in print. Archives are also being developed. These can be either institutional archiving of the output of academics at that institution, or they can be subject-orientated or personal archives. There are also projects that stimulate new models for academic publishing, such as the Roquade or Scholarly Publishing & Academic Resources Coalition (SPARC) initiatives (Savenije 2001:3).

The mission of the European Roquade project is "the enhancement of scientific communication by offering scientists a wide variety of facilities and organisational structures, helping them to gradually change their publishing manner". Roquade supports institutional open archives that store, conserve and provide access to the university's scientific output (Savenije 2001:4). Under the tutelage of Roquade, researchers can post their papers on their departmental websites or develop e-journals. They are provided with facilities for publication servers and with new peer-review models to assist them further (Savenije 2001:5).

America's initiative is SPARC, started by several Association of Research Library (ARL) directors. The initiative has undertaken to educate academics about serials issues and focuses on enhancing cost-effective access to peer-reviewed scientific, technical and medical research. It aims to work towards alternative channels of scholarly communication (Stoffle 2001:34). The ARL, its members, learned societies, university presses and other organisations are endeavouring to control the costs of scholarly communication (Stoffle 2001:34). SPARC aims to encourage new publishers committed to cost-based pricing. SPARC encourages the ethical use of scholarly resources, using technology to expand research, scholarship and the dissemination of information and aims to enable the permanent archiving of research

publications in both print and electronic formats. There are already several peer-reviewed journals issued in association with SPARC – all of which are significantly cheaper than similar journals brought out by commercial publishers.

Stoffle (2001:36) states:

> SPARC's commitment to high-quality, low-cost access to scientific information along with the financial support from member libraries and the commitment of such distinguished publishing partners as the Royal Society of Chemistry, Institute of Physics and the American Chemical Society, will make SPARC a significant force in the scientific publishing community.

In a Roundtable on Managing Intellectual Property in Higher Education, university presidents, faculty, librarians and members of learned societies concluded that universities now have it within their power to cooperate with one another and with scholarly societies to transform scholarly communication into a system of electronically reviewed publications which can provide greater access to scholarly information as well as relief from the high prices of commercial publishers (Case 1998:655). The academy can no longer outsource all its publishing to commercial publishers because this is leading to increasing lack of access to such information. They will have to take back some of the responsibility for scholarly publishing as a matter of urgency (Atkinson 1998:17). This is possible through the facilitation of initiatives such as SPARC and Roquade.

5.2.9 Predictions for the future of scholarly communication

There are such sweeping changes in scholarship, publishing, electronic means of communication and scholarly communication in general that it is inevitable that established processes and values relating to these should change as well.

Co-authorship of research reports is becoming commonplace and has increased dramatically in recent years (Cohen 1996:53) and solo researchers are being replaced by teams of researchers (Vassallo 1999:235). These cooperative ventures are facilitated by the breaking down of barriers of space and time due to access to

electronic communication channels, such as email and discussion lists. Research is also becoming increasingly interdisciplinary, which encourages researchers to work together. As co-authorship becomes increasingly prevalent, it is likely that grant money will flow more to specialised research centres or to electronic collaborations among research teams globally instead of to individual researchers (Noam 1997:5).

Although peer review is clearly necessary to scholars, some of the most far-reaching changes in scholarly communication will possibly involve the refereeing process.

Some journals are already using online reviewing where the Web is used to distribute submitted articles to reviewers and to receive reviewers' reports (Chodorow 2000:89). Formal websites of journals will foreseeably develop their own peer-review pages and open commentary by scholars on articles will advance the scholarly discourse on a subject (Chodorow 2000:90). Should the review process lead to a revision of the original article, both the original and the revised versions plus commentary regarding the article could be made available to the public (Waaijers 1997:78). It will be necessary to manage participation in discourse about subjects on the peer-review pages just as print-based editors and reviewers man the gate of scholarly communication in the print environment. The Roquade project supports open and public peer review (Savenije 2001:6).

Myburgh (1997:43) suggests a new model for the peer review process. He suggests that the scrutiny process should remain similar but that this should involve a wider and more fluid community of referees using email. The articles could be described in terms of metadata before they are posted onto a website. This would improve access to the article. Using this method, ownership of the articles could remain in the hands of the universities, and not of commercial publishers. Using this method, hypertext links could also be used. Articles could be linked to their references and audio and video clips could be inserted. Citations by other authors could also be monitored.

Due to the high costs of the peer review process and the volume of articles sent to publishers for review, it is possible that authors will have to pay for peer review of their output in due course (Youngen 2001:217).

It is also predicted that there will be an increase in the use of electronic and web-based resources for scholarly communication because the electronic handling of information is now an essential part of most research (Maughan 1999:362; Meadows 1997:2). Friedlander (1996:1) states that the major trends today are connectivity and end-user computing. The use of e-journals and full-text databases is also likely to increase in future (Maughan 1999:362) as it is already increasing amongst scholars.

The provision of free distribution rights of the record of scientific research and ideas is another prediction for the future of scholarly communication (Waaijers 2001:3). It is possible that a completed article will be consigned straight to the public domain through the Internet. For this purpose universities, learned societies and libraries should provide secure document servers (Waaijers 1997:78). Anyone would then be able to read, print, refer to or quote from the stored articles, transfer them to their own environment or forward them to others.

It is possible that the individual article will become the important item for scholars, as opposed to issues of a journal. Work has already begun on allocating Digital Object Identifiers (DOI) to articles which can be used to identify individual items (Youngen 2001:217). When the article's DOI number becomes the primary way of identifying items, it is possible that a new citation system will come into being where scholars refer to the article's DOI instead to the page number, volume and issue of a journal (Youngen 2001:220).

The publishing process is bound to experience some changes in future. "Publication" will come to mean that a publisher has found an author's work acceptable after it has subjected the work to review and has applied its imprimatur to it (Cox 1997:46). Noam (1997:5) predicts that the system of academic publishing will change towards a scenario in which authors deposit articles on various specialised and interconnected websites which are subject to refereed access. Both models include the peer review process. Many learned societies and university presses work with publishing partners which are usually commercial publishers and this will possibly continue (Watkinson 2001:196). It is possible that university presses will play an increasing role in scholarly communication (*University libraries and scholarly communication* 1992:134).

Scholars themselves made certain suggestions to combat the serials crisis and improve scholarly communication. Academics at the University of Washington suggested that scholars should publish in scholarly society publications. Those in science and engineering agreed that one should publish in lower-cost journals and refuse to serve on editorial boards of high-cost journals (Hiller 2002:9). Strategies suggested in Milne's (1999:81) study were that academics should accept that the serials crisis was their problem instead of regarding it as that of their library. Furthermore, institutions should decouple publication and academic evaluation for purposes of promotion and tenure. In these ways scholars would not continue to produce the vast number of unread and uncited articles.

5.2.10 Implications of changes in scholarly communication on collection development

Scholars, publishers, libraries and others involved in scholarly communication have been experimenting with new ways of disseminating scholarly information, especially that involving electronic communication. However, for the time being and foreseeably for many years to come, scholars prefer to publish in print journals and to a lesser extent in books. Most journals are still distributed in print form although some are now also available as e-journals.

Predictions have been made that the electronic dissemination of scholarly information will become the norm, but surveys and practices today show that acceptance of digital channels for scholarly communication is slow. It would be foolish to ignore the many advantages of digital scholarly communication methods. The value of access to full-text journal articles through the use of e-journals and aggregated journal services is immense.

Libraries need to take note of initiatives such as SPARC and Roquade which are working with publishers and the scholarly community to provide access to peer reviewed articles in less expensive journals and e-journals. Until acceptance of electronic information resources is greater, they also need to provide access to important articles in the journals in which their scholars will be interested both as

readers and authors. For the present, the journal article is the preferred medium for scholarly communication and a considerable proportion of the library's materials budgets should be spend on both print and electronic journals.

Access to preprints does not influence collection development in libraries as scholars have direct access to such preprints via the Internet. The best that the library can do in this case is to provide gateways through which scholars can access preprint servers. Similarly, access to self-published articles on university websites or scholars' websites or blogs does not affect collection development decisions. Academics and researchers must access these themselves and can merely be guided to these items through gateways or the library's website.

Modern trends in scholarly communication mean that scholars now have access to much more scholarly information than that provided through the library's collection development policy, but the authoritative refereed material is still the responsibility of the library and must be provided through the library's budget. The library must ensure, however, that academics and administrators at their institution are aware of the serials crisis and of developments in publishing and scholarly communication so that they share the responsibility and capital commitment to make important information resources available to academics and researchers at their institution.

5.3 INFORMATION-SEEKING METHODS USED BY SCHOLARS AND RESEARCHERS

Academics and researchers have had extensive experience in finding information because their scholarly lives are centred on the creation and use of information. This means that they have developed patterns for seeking information during the course of their lives and know which methods work best for them. Their choices of information channels and their information-seeking methods are embedded in old conventions (Herman 2004a:42). There is considerable evidence to support the theory that researchers remain fixed in time in the information-seeking strategies they use (Schmidt 1999:92). Schwartz (2002:254) found that the Principle of Least Effort applies to choices scholars make when seeking information. This principle states that researchers tend to choose easily available information sources even if they are of a

lower quality. Researchers tend to be satisfied with whatever can be found easily rather than pursuing better quality sources which would require more effort to find. This finding is in keeping with findings discussed in section 4.3 of this thesis. Ocholla's (1999:129) findings confirm this. He found that scholars are influenced in their information seeking by factors such as the accessibility and availability of the information, the uses to which it will be put, the cost to the user and the searching and retrieval time.

Various surveys dealing with this issue have been carried out and scholars have been asked to rank different methods available to them for finding information. There is a degree of conformity in the findings, but it is clear that academics are influenced in their preferences by what is on offer in their institutions and in their libraries.

Respondents in a South African survey carried out by Ocholla (1996:350-351) find the following ways of finding information useful, in descending order of preference: conversations with colleagues, scanning journals, subscribing to journals, following up on citations, common knowledge, preprints received from authors and abstracting services. Academics tend to scan journals, discuss with colleagues, look in library catalogues, use common knowledge, read reviews in articles and consult library staff.

These findings are closely reflected in those of Ericson-Roos (1997:215). This study revealed that references found in other publications were used by 62% of respondents as a means of finding information, browsing through journals in the library by 59%, contact with colleagues by 55%, checking of journals in the departmental collections by 42%, personal subscriptions by 37% and searching in bibliographic databases by 36% of respondents.

Herman (2004a:45) deals specifically with the ways in which researchers seek for information when they encounter gaps in their knowledge. One of Herman's interviewees said that when this occurs, the researcher could follow two courses of action:

- He can stop until the relevant piece of information is found.
- He can provisionally substitute a tentative hypothesis for the information needed and carry on.

In another survey, academics were found to prefer to browse through books and journals, search on OPACs and ask reference librarians with very little use being made of bibliographic databases (Van Zijl 2002:7). Another revealed that searching online bibliographic databases was the most popular method used to find information, followed by following up on references in articles and browsing issues of journals (Pullinger 1999:165).

Although it cannot be said that all scholars use identical methods for finding information because each library's facilities and services differ, some of the methods are more valuable to academics and researchers than others. Practices such as browsing through books and journals, following up on references in articles and asking colleagues are mentioned repeatedly. An information-seeker's quest for information includes a combination of electronic and physical searches, serendipitous browsing and successive information-seeking and searching episodes (Spink 2004:347). There is a complex process of task switching.

The various strategies used by scholars will be dealt with individually to evaluate their worth as methods used to find information.

5.3.1 Browsing

As seen in section 5.3, browsing or scanning through journals, is a very popular way of looking for information. In some studies, it was found to be the most important methods used by scholars. It has long been known that browsing is the preferred method of information seeking amongst humanists (Massey-Burzio 1999:628; Palmer & Neumann 2002:89; Stone 1982:295; Van Zijl 2002:8). Massey-Burzio (1999:629) found that browsing is a "key component of research in the humanities." Further research has shown that it is a valued information-seeking method amongst scholars in other fields of study. Browsing is used extensively amongst scholars in the

sciences and medical sciences and is sometimes the first choice of method amongst these scholars (Belefant-Miller & King 2001:102; Morrow 1999:7). It is of particular value when scientists are trying to keep up with developments in their fields. Some surveys have found that academics and researchers overall indicate that browsing is a significant component in their research processes (Belefant-Miller & King 2001:96; Forward-looking library use survey … 1998:217; Gorman 1990:154; Maughan 1999:356; Schmidt 1999:93).

Generally speaking, scholars still prefer to browse through the library shelves and physically handle the material as opposed to browsing online through electronic information media (Meadows 1997:5; Starkweather & Wallin 1999:649). They find it easier to browse through printed text. Those who do browse through journal articles online find this a powerful tool for finding information. Research into the ways in which researchers conduct such online searching shows that researchers usually perform such searches requesting that the search terms occur "anywhere in the article" without specifying which part of the article should contain their search terms (Bishop 1999:263-264). Bishop found that scholars and researchers prefer to view full-text articles rather than just extended citation screens and that they do a lot of filtering in searching for and reading articles in electronic databases.

Browsing is useful to scholars because using this method of finding information often leads them to serendipitous findings which add depth and breadth to their research (Barford 1997:56; Belefant-Miller & King 2001:102; Stone 1982:295). Sometimes this serendipity reveals information that could be missed in a keyword search.

Scholars find it valuable to browse through books in the library's stacks as well. Research shows that only a few scholarly monographs are actually read from cover to cover (Chroust 1998:377). Browsing through these monographs, however, leads researchers and scholars to important information that could not be revealed through OPAC searches. Browsing through books is particularly valuable to humanists who find it extremely useful to scan book titles in the stacks and leaf through books (Herman 2001a:399).

This confirms the need for an in-depth collection of books and journals to support the research needs of academics and researchers.

5.3.2 Conducting own searches for information

Academics and researchers prefer to search for information themselves and are loath to seek the help of information professionals. In Morrow's (1999:7) study, scholars indicated that they usually conduct their own searches from remote locations and only come to the library afterwards to supplement the outcomes of inadequate searches. This finding is confirmed by Day and Armstrong (1996:57) who found that computers now make it possible for faculty to bypass librarians for most of their information needs.

Schwartz (2002:255) investigated why academics prefer to work on their own when it comes to seeking information. She found that people do not like to approach reference librarians because they feel they should be able to help themselves and should know how to use the library. Schwartz (2002:260) found further that only a few patrons seek help in their online searching stating that they find the web to be more user-friendly and has the capacity to supply any information they require. She found that most users would not approach librarians for help with a research question whilst busy with a search. Unfortunately this could result in researchers working with an incomplete set of data, as many academics are not aware of available databases or of ways to search online resources optimally.

5.3.3 Following up citations in bibliographies

What is sometimes called "chain searching" is an important element and sometimes the only way in which researchers seek information. Each article, book or other information resource used gives several new references (Lönnqvist 1990:200) which researchers then access. These in turn lead to new items containing relevant information. Using this method of finding information sources, bibliographies and reference lists of books and articles lead the researcher to new references. The activities of monitoring information and chaining through the literature are an important part of how scholars develop the paths of their inquiries (Palmer &

Neumann 2002:101). Scholars in all disciplines rely heavily on the practice of chaining through references in order to follow the literature in their field of study (Folster 1989:9).

This method of finding information is particularly valuable in the early stages of research. The economist in Herman's (2004a:42) study finds it useful to start a project by reading a review article on the topic. This provides him with a good idea of the terrain and gives a summary of developments in the field as well as a good bibliography of salient publications on the topic. These in turn lead to further related pieces of information. This practise of using review articles is also mentioned by Ocholla (1996:351) as a valuable way of finding information.

The practice of chain searching underlines the necessity for research libraries to subscribe to review journals in either print or electronic format and to provide access to accredited journals in the fields of study offered by the institution. In this way scholars can follow most of the citation trails without the delays of getting information resources from other institutions.

5.3.4 Using current awareness alerting services

Many publishers and producers of aggregated services offer "alerting services" whereby information seekers can register to receive alerts via email of the tables of contents of all new issues of specified journals. Scholars select the journals that focus on their area of interest and they are kept informed of the contents of all subsequent issues published. *Emerald* and *EbscoHost* are examples of aggregated services that offer this service. These electronic alerting services help to meet the need for researchers to remain informed of all publications relating to their field of interest. An interviewee in Herman's (2004a:43) study expressed the need for a personalised electronic alerting service to keep up to date with his discipline.

Scholars have to extend their intellectual world through working with information. They need to receive information through "push sources" which are mechanisms for routing information to them as a matter of course. These mechanisms are provided

through such services as subscriptions, distribution lists, bulletin boards and postal mailings (Palmer & Neumann 2002:102).

One of Herman's (2004a:44) interviewees has registered with major publishers in his field for pre-publication announcements. He has also subscribed to 15 distribution lists (listservs) which keep him informed of new publications in his field. He quickly works through a lot of information that flows to his desktop, deletes much, delegates some to his private library and reads only items deemed to be truly significant. It is likely that other scholars who subscribe to alerting services work in the same way in their quest to be kept up to date with relevant information.

Direct access either through access to the full-text version of the articles sought or to print copies of the relevant journals or monographs would then make it possible for researchers to read the items they find.

5.3.5 Use of e-resources

Even the most traditional scholars have had to take cognisance of ICT in their information-seeking behaviour. New ways of communicating with peers and colleagues and new technologies which make it possible to access the Web, library catalogues and a vast array of content-carrying databases from their homes or offices, have had a large impact on the ways in which information is gathered by academics and researchers. In the new environment they use an increasing array of electronic information sources, including online databases, OPACs, e-conference, email, full-text databases, books, scholarly websites, preprint archives and bulletin boards (Jirojwong & Wallin 2001:68).

Surveys reveal differing levels of use of e-resources amongst scholars. In Maughan's (1999:358) study, for example, 75% of academics use e-resources through their PCs. Of these, 83% access full-text journal article databases, 77% browse the catalogues, 61% browse table of contents services and 58% access Internet databases. Hiller's (2002:4) longitudinal study at the University of Washington showed that there is a shift towards increased usage of e-resources, particularly in the SMT disciplines. The facilities used most in this study are searching the catalogue, using bibliographic

databases and full-text journal databases. Another study shows that network services facilitate communication with colleagues and make it possible to access online catalogues and databases from remote locations (Abels *et al.* 1996:155). One of the reasons for the increasing use of e-resources is that their searching mechanisms are superior to those used for print resources (Meadows1997:5).

Several studies show that academics continue to have reservations about these media (Herman 2001b:453; Shoham 1998:120). These studies show that scholars still do not use e-journals, current awareness alerts and other media very extensively. A reason given for this is that researchers do not like reading from a computer monitor and prefer to use paper formats (McKnight 1997:2; Nelson 2001:208; Tenner & Yang 1999:7). Another reason is that scholars like to annotate what they read and this is not possible with electronic resources (McKnight 1997:2). Herman (2004b:128) found that academics are cautious about the many initiatives involving IT in information work and do not readily accept that new electronic innovations are superior to formats they have used in the past. She found that the availability of a new technology does not mean that it will immediately be taken up by researchers and academics. Acceptance depends on the suitability of the technology to the person's circumstances, experience, capabilities and preferences (Herman 2001b:453).

The extent to which electronic resources are used by researchers and academics must be examined as an important part of the information-seeking behaviour of scholars.

5.3.5.1 Using Online Public Access Catalogues (OPACs)

Online Public Access Catalogues (OPACs) are used by scholars as a way to find information for their research, publishing and teaching needs. In surveys carried out in Australia and in Washington, respondents indicated that they considered OPACs to be an important, and in some cases, the most important research tool (Applebee *et al.* 2000:202; Forward-looking library use survey … 1998:219). OPACs are used by most academics in their quest for information. There are now also many combined catalogues which are information resources in their own right for scholars (Morrow 1999:2). The South African Bibliographic Network (Sabinet) is an example of such a combined catalogue of the holdings of South African libraries.

In the new, networked environment, many academics and researchers can now access OPACs from remote locations and show a preference for searching OPACs from their own desktops (Starkweather & Wallin 1999:646).

As scholars use OPACs as ways to find relevant information and information resources, it follows that the quality and breadth of the library's collection is important to them. Neglecting local collections in favour of providing access to electronic resources would be frustrating to many academics and researchers at a university of technology.

5.3.5.2 Using online databases

There is no longer a clear dividing line between bibliographic and full-text databases because aggregated services offer both bibliographic and full-text possibilities. Research into the ways in which scholars use online databases thus often fail to specify whether respondents are referring to a specific kind of online database. Unless clearly specified, information-seeking behaviour patterns discussed in this section refer to online databases in general.

Due to their advanced searching abilities, online databases are becoming increasingly popular amongst scholars as ways to find information, especially in the SMT disciplines. At King Research, searching databases was found to be the second most popular way of locating documents (Belefant-Miller & King 2001:96). Researchers in the health sciences check major databases regularly for new articles (Herman 2004a:43). Scholars and researchers find bibliographic databases useful in finding relevant material for their studies (Liebscher *et al.* 1997:502; Meyer 1996:17).

The level of use of online databases is not the same in all institutions or across all disciplines, however. Only moderate use of bibliographic databases is made by academics at the State University of New York (Adams & Bonk 1995:124). Likewise, in a study at the Stockholm School of Economics, respondents do not want to substitute subscriptions to print journals for a subscription to the bibliographic database, UnCover (Ericson-Roos 1997:218). Online databases are particularly

unpopular amongst humanist researchers, generally speaking (Lőnnqvist 1990:200). There are many exceptions to this "rule", however. A humanist in Herman's (2004a:44) study regularly searches for current data through the Internet and accesses the latest journal issues electronically.

Use of databases has increased and conceivably will continue to increase as scholars familiarise themselves with these electronic media. The cost of subscribing to these is high and the costs of providing the equipment that is necessary to access the databases must be included in their cost. Libraries are allocating increasingly large proportions of their budgets to database subscriptions, and this is sometimes at the expense of acquiring monographs and print journals.

5.3.5.3 Using informal networked communication channels

As scholars get increased access to the Internet, ways to communicate with peers, other experts in their fields and colleagues have grown accordingly. There are many networked services such as electronic mail (email), distribution lists, bulletin boards and newsgroups which extend the invisible college of academics and researchers to anywhere in the world, and communication is almost instantaneous. Abels *et al.* (1996:146) found that the networked services can benefit smaller institutions in particular, because academics and students have access to peers worldwide. They also have access to news and discussion groups, library catalogues of large research libraries, datasets (aggregated services) and databases, and even public domain software packages for teaching and research. This complements the print collections of such institutions and provides access to research information and data.

Although used by academics especially for keeping up to date with developments and for research purposes, discussion groups or distribution lists have only limited appeal as electronic communication media (Liebscher *et al.* 1997:501). Bulletin board users express only limited enthusiasm for these communication channels. Scientists are overall the more enthusiastic users of networked information resources and they make the most use of bulletin boards as sources of information (Herman 2001b:447).

Email is undeniably the most popular electronic communication channel amongst scholars and researchers (Adams & Bonk 1995:124; Cohen 1996:51; Herman 2004b:128). A survey carried out at University of Tennessee at Knoxville (UTK) revealed that researchers in the science faculty there spend an average of 2,4 hours per week on email (Belefant-Miller & King 2001:105). Another survey showed that email is the most frequently used internet-based resource by authors. In this study 94% of respondents indicated that they use it almost every day (Zhang 1999:753). These findings are not surprising taking into account that current estimates are that about 22 billion email messages carrying a message that is meaningful to the recipients will be sent every day by 2006 and the number of emails carrying actual content (part of a high level knowledge exchange) might be about 16 billion per day (OCLC 2004:4-5).

Academics indicated that email is not as useful for finding information for teaching purposes as it is for purposes of research, social communication and keeping current with developments in their fields (Abels *et al.* 1996:156). It is also the preferred way of collating relevant hits from electronic databases. In order to keep a record of relevant hits, scholars often email their results back to themselves (Morrow 1999:5).

Of all the informal communication possibilities available through networked Internet channels, email has the greatest following and can now be said to be indispensable to academics in their quest for information.

5.3.5.4 Relationship between IT skills and use of e-resources

There is increasing evidence that the apparent reluctance to embrace the use of e-resources is linked with the level of competence scholars demonstrate in the use of ICT media. The more competent scholars feel in manipulating computer-mediated communication media, the more they use these media.

It was found that a large proportion of potential users of electronic publications do not believe that they have the necessary skills to use these (Meadows 1997:4). Abels *et al.* (1996:151) found that there is a relationship between a user's perceived expertise in use of electronic media and the number of network services they use. It was found

at the International Islamic University Malaysia that the more computer literate academics are more likely to search OPACs (Majid & Abazova 1999:105-107). This group is also much more likely to access Internet sources and services.

Younger academics and researchers are in general more skilled in searching for information online and tend to conduct more comprehensive searches. Graduate students were shown to be particularly proficient in this skill in a recent survey (Kibirige & DePalo 2000:13). It is likely that, as younger academics mature, the use of e-resources will become much more popular amongst scholars. For this reason any collection at a university of technology must provide access to online resources which can be accessed at any time of any day by academics and researchers from their own workstations or in the library.

5.3.6 Information behaviour of humanists

There have been a number of studies into the information-seeking behaviour of scholars in the humanities and the findings are very homogeneous. In this section, the information-seeking patterns of humanists are generalised, based on research carried out in this field. Researchers agree that humanists adhere to the more traditional methods of finding information and cling to print-based media and the information retrieval methods linked to such media. It is the individualistic, subjective manner of conducting research in the humanities that explains these scholars' fondness for browsing and for searching for information in library catalogues (Herman 2001a:399).

Humanities scholars prefer to work alone because their personal interpretation of material is usually central to the conclusions they reach (Gorman 1990:139; Shoham 1998:114; Stone 1982:294). They also prefer to conduct their own searches for information instead of delegating their literature searches (Budd 1989:9; Gorman 1990:139; Lougée *et al.* 1990:232).

A preferred method of finding information is to follow up on citations found in footnotes, bibliographies and other publications (Broadbent 1986:26; Herman 2004a:40; Lougée *et al.* 1990:235; Palmer & Neumann 2002:89). Herman

(2004a:40) found that humanists chase references because new publications usually cite the most important works written on a subject – the so-called "classics".

Equally important to humanists is the practice of browsing as a way of finding information. Humanities scholars find it very valuable to page through books and journals and also to search through the library stacks in their search for information (Broadbent 1986:26; Lougée *et al.* 1990:235; Palmer & Neumann 2002:98).

Humanities scholars use library catalogues including OPACs extensively as a way to find information and information resources (Broadbent 1986:26; Lougée *et al.* 1990:235; Maughan 1999:360; Pankake 1991:10).

Other useful information retrieval tools are indexes and abstracting services as well as subject bibliographies and book reviews (Broadbent 1986:26; Herman 2004a:40; Lougée *et al.* 1990:235). Humanists' need for retrospective material is greater than that in the other disciplines (Gorman 1990:139). Material in the humanities remains relevant for a longer time.

Humanists tend to have diverse information-seeking patterns. They might travel to distant libraries, archives and museums and follow leads discovered in their information seeking ventures. In the humanities, information seeking is unique for each project (Palmer & Neumann 2002:98-99).

The adherence to print media in preference to electronic media is very much a part of the way in which humanists seek information. It was found that humanists still use paper products even when electronic access is possible. The number of full-text journals in the fine arts lags behind that found in the sciences and social sciences (Reed & Tanner 2001:232). Researchers even find monographs to be more important than print journals (Gorman 1990:139). At Trent University it was found that serials in the Humanities had the least use per registered student (Scigliano 2000:48). Humanists' interest in electronic media is lower than that in the other disciplines. Remote access to information resources is less important in the humanities. Reed and Tanner (2001:231) found that 43% of the humanists in their study do not access the online catalogue remotely and 54% do not access periodical databases remotely.

However, Adams and Bonk (1995:126) found in their survey that humanists make significantly more use of OPACs of their local or distant libraries than do scientists. Possibly this study refers to library use of OPACs instead of remote use of these.

Use of online databases and electronic journals is significantly lower in the humanities than in the other disciplines (Herman 2001b:435; Horner & Thirlwall 1988:227; Massey-Burzio 1999:621; Pankake 1991:10; Tomney & Burton 1998:428). Academics in the humanities do, however, use email and word processing more often than academics in other disciplines (Massey-Burzio 1999:622).

A comprehensive stock of print journals and books is required for humanists as well as access to, and training in the use of, bibliographic and full-text databases in their fields of study.

5.3.7 Information behaviour of social scientists

Information-seeking patterns in the social sciences are very much like those in the SMT fields, and as such are covered in section 5.3.8 of this thesis. Although they use the same methods, the degree of use of information retrieval methods differs (Skelton 1973:143). Social scientists' use of e-resources and electronic databases is significantly higher than that found amongst humanists. They check databases in their field of study regularly for new publications and to find out what work is currently in progress in their field of interest (Herman 2004a:43). Case (1986:99) also found that social scientists use computer-based literature to find information on a given subject.

Social scientists use print media as well. In this way their information-seeking patterns are not dissimilar from that of the humanists. It was found in a survey at the library of Stockholm School of Economics that young academics with a high research activity make more use of journals than do older researchers (Ericson-Roos 1997:215). This indicates that print journals will be in demand in the management sciences for some years to come.

5.3.8 Information behaviour in the sciences, medical sciences and technology

Generally speaking, scientists do not like the tedious task of acquiring information, as they are more interested in their own research process than in other people's results. Scientific investigation dictates that they must seek information because they cannot publish work that betrays ignorance of other discoveries and facts and repeating research would slow down their work (Herman 2001a:394-395). This is why they use ways of finding information that produce quick results and lead to recent findings. As it is necessary for researchers in the SMT disciplines to disseminate their own findings quickly, this group of scholars have experienced the greatest impact of the electronic publishing environment (Pedersen & Stockdale 1999:43).

It is possible that electronic resources are of the most benefit to researchers in the SMT disciplines because funding for research in these fields is more liberal and able to support the IT costs involved in accessing these resources (Farrell 1991:71).

Other findings about the information-seeking behaviour of scientists are that they prefer to do their own searching and consider it very important to have networked access to online databases (Morrow 1999:7). Scholarly journals are extremely important to scholars in the SMT disciplines. It was found that they read more than three times as many articles from one journal as do academics in other disciplines (Belefant-Miller & King 2001:98).

Networked online resources are important to these scholars and should be provided in a university of technology. Print journals are also of great value. Care should be taken to subscribe to all the core journals in each subject field in the curricula of the university of technology. It follows that access to the online resources should also be facilitated, that networked access be provided and that there are adequate networked workstations in the library itself.

5.4 CHANNELS USED BY SCHOLARS FOR THE TRANSFER OF INFORMATION

Academics and researchers use a variety of channels for finding their information. The channels that are mentioned repeatedly as important in their information-seeking episodes are: own private collections of research material, public and academic libraries, the Internet, colleagues and the invisible college, archives and museums, and conferences and seminars (Folster 1989:8; Ocholla 1996:353; Ocholla 1999:140).

Channels used for finding information in unfamiliar disciplines are sometimes different from those usually used by scholars. In certain cases, they embark on collaborative research ventures or decide to extend their knowledge bases to master unfamiliar domains. If not much depth is required they consult information resources at an elementary level and get help from expert colleagues to translate the information thus gleaned (Herman 2004b:120). Academics and researchers have been found to pursue different channels for locating information, depending on their requirements for a specific project.

5.4.1 Own private collections of information resources as information channels

Scholars rely heavily on their own private collection of information resources as a channel for finding information. Several researchers found that strong personal libraries are important channels of information (Gorman 1990:155; Palmer & Neumann 2002:89). In other studies, academics and researchers indicated that their private collections are their major channel for finding scholarly material (Epp & Segal 1987:65; Watson-Boone 1994:208). In a survey at the University of California, Berkeley, academics from the classics, political science and chemistry faculties were found to be the most dependent on their personal collections (Maughan 1999:360).

As academics and researchers are dependent on information to carry out their work, it is not surprising to find that they are the most likely of all information seekers to use their own personal collections to find information (Berger & Hines 1994:307). The survey carried out by the American Council of Learned Societies (ACLS) shows that

academics and researchers spend on average about 1,4% of their salaries to purchase books and journals in their fields of study (Epp &Segal 1987:64).

Due to large increases in publishing costs and especially in journal subscription fees, individual scholars are finding that their personal collections are becoming increasingly impoverished. This means that they have to rely more on library collections to meet their needs.

5.4.2 The invisible college as information channel

Informal communication amongst scholars and peers has been recognised as a valuable way for scholars to gain information since the need for scholarly communication began. Cohen (1996:42) defines the invisible college as:

> … that informal body of scholars who are active in a field, determine its direction, and control the channels of information distribution. Scholars in the invisible college edit the journals, provide peer review for the field's literature and distribution of grants, and in general, control the intellectual agenda in a given field.

Traditionally the invisible college serves as gatekeepers in that field and the number of people in the invisible college is small compared to the actual number of scholars in that field. In modern times, computer-mediated communication (CMC) is counteracting the elitist tendency of an invisible college. Most scholars can contact other scholars quickly and easily through email and in this way scholarly information is shared widely amongst peers. Previously this was not possible for new researchers, but now there are electronic invisible colleges based on email, electronic conferences and discussion groups (Fjällbrant 1997:2).

Scholars used to depend on meetings, letters and telephone calls to contact colleagues informally, but now contact is mainly electronic (Kaser 1997:65). To a certain extent, using these new informal information channels, researchers are not limited by their lack of reputation and prestige as a scholar as was often the case in the era before CMC came into its own. However, in an Australian survey, it was found that

academics who had completed master's or doctoral degrees were significantly more likely than less qualified academics to use personal communication with peers to gain information to write up research reports (Jirojwong & Wallin 2001:71). So, although CMC has broken down some of the old barriers of scholarship, the invisible college still appears to adhere to some of the older values of giving more credit to the writings of established and qualified scholars.

Scholars today rely heavily on the invisible college (being colleagues both in and outside their departments) as a channel through which they gain information about their field of study (Gorman 1990:155; Herman 2004a:43; Meyer 1996:17; Shoham 1998:117). In some cases, seeking out an expert in a specific field (such as a friend, colleague or a contact at a professional meeting) is the first channel approached when embarking on new research (Berger & Hines 1994:307). In addition, the invisible college is extremely valuable when trying to solve specific problems encountered in research or when seeking ideas for new research (Herman 2004b:130).

Personal contact with other scholars and researchers is also useful when a scholar cannot readily acquire a specific item from the library or through electronic means. When this occurs, he will not hesitate to ask the author to send him a reprint (Herman 2004a:42).

Ocholla (1999:128) found that academics in general prefer informal information channels because they are open, readily accessible and unstructured. Respondents in this survey indicated that they use private contacts and colleagues readily when they need information. Ocholla (1999:142) refers to the "Local Environment Syndrome" as the pattern that emerges strongly as a way in which academics seek information. By this, he means that scholars use colleagues, private contacts, personal and office collections and the Internet to access networks and services that are readily available to them.

The invisible college is unlikely to lose its value as a channel whereby scholars can communicate informally. This does not mean that the value of formal information channels is diminished in any way. In order to conduct research, to publish and to lecture scholars need accredited and published information resources.

5.4.3 Libraries as information channels

Several researchers have found that libraries (particularly academic libraries) are still used extensively by academics and researchers (Hiller 2001:619; Maughan 1999:357; Ocholla 1999:140; Palmer & Neumann 2002:101; Williams 1996:42). In these studies, academics indicated that their academic library is very important to them for their teaching and research requirements.

Main reasons for using the library as a channel for information differ slightly from study to study, but there is a degree of consistency in the findings. Using the library's collection of information resources is extremely important (Hiller 2001:616; Parrish 1989:646; Van Zijl 2002:5). It was found that as journal subscriptions rise, so the proportion of personal subscriptions to journals decreases and the use of these journals in libraries increases (Belefant-Miller & King 2001:103). Some academics use the library to solicit the help of library professionals who understand their information needs (Palmer & Neumann 2002:101; Van Zijl 2002:6), to follow up references or to make photocopies (Pullinger 1999:165). They also use libraries to arrange to get material from other libraries through interlibrary loans (Ocholla 1999:140).

There is evidence, however, that researchers are visiting their library less often than in the past. Hiller (2002:5) found that there is a decline in weekly visits to the library amongst the academics at the University of Washington. There are various reasons for this decline. The ability of academics to access electronic resources from remote locations has lessened the need to visit the library physically for information. At the University of California, San Diego, faculty and researchers use the library at least once a week but more often they visit it remotely rather than in person (Talbot *et al.* 1998:362). Another factor is that there is an indirect relationship between physical distance from the library and the use made of this facility (Ericson-Roos 1997:216; Hiller 2001:622).

Academics are frustrated when they cannot get what they want (Ocholla 1999:131) and this leads to the situation where they make less use of the library's collection and formal channels of information dissemination. Researchers in Pullinger's (1999:165)

study find the library frustrating because it takes time to find what they require as the collection is split between libraries. Another frustration is that there is a delay in receiving copies of journal issues and there are often copies missing off the shelves.

Another problem is that many academics are uncomfortable asking questions and prefer to struggle on their own. Massey-Burzio (1998:210) found that the researchers in her study perceive the library's information desk as unfriendly and unhelpful and would rather retrieve information on their own. At X Technikon nearly 50% of academics indicated that they visit the library occasionally, i.e. monthly or every few months. Only 36% visit the library often, almost daily (Van Zijl 2002:5). The main reasons given for not using the library are that the academics use either their own private collections or the Internet. They complained that the library is noisy and overcrowded and not conducive to scholarly work. This complaint was also lodged at the Queensland University of Technology. Furthermore, in the latter study, academics found that access to workstations is too limited (Stokker 1998:191).

Although academic libraries design their websites carefully in an attempt to provide seamless access to information resources and information retrieval tools that will assist users to find the information they require, surveys show that academics do not use these extensively as sources of information. It was found that very few academics and researchers explore their libraries' websites as a pre-selection tool for scholarly information (Massey-Burzio 1999:627; Maughan 1999:358).

In spite of these reservations expressed by scholars about academic libraries, it would appear that a well-stocked and well-organised library, which provides adequate access to all its print and electronic material, remains a valuable channel of scholarly information. Care must be taken to develop the collection in line with the scholarly and research needs of academics and also to manage the collection in such a way that it is readily accessible and easily found in the library's catalogue, website and stacks.

5.4.4 Information channels used in the humanities

An information channel that is extremely important to humanities scholars is a private collection of information resources (Herman 2004a:40; Lakshmi & Kanakachary

1994:39; Palmer & Neumann 2002:89; Reed & Tanner 2001:231; Van Zijl 2000:245). It follows that bookstores are also important channels through which information is sought because humanists must use these to build their private collections.

Most researchers agree that humanities scholars rely on their colleagues and on the invisible college to find information (Reed & Tanner 2001:231; Van Zijl 2000:245). This is never quoted as the most important information channel, however, as is sometimes the case in the SMT disciplines and the social sciences. This would lead one to conclude that the invisible college is less crucial to this group of scholars. Herman (2001a:399) even came to the conclusion in her study that humanists do not demonstrate much need for an invisible college.

Humanists place great value on libraries as information channels (Budd 1989:9; Lakshmi & Kanakachary 1994:39; Lönnqvist 1990:197; Palmer & Neumann 2002:111; Reed & Tanner 2001:231; Van Zijl 2000:245). Lönnqvist (1990:198) found that humanist scholars first seek information in their immediate environment, beginning with their private library. Then they consult the department library, the special library, local multidisciplinary research libraries, other multidisciplinary research libraries in the country and then those abroad. Department libraries were especially important to the information gathering process. Because humanists visit libraries frequently to find information (Lakshmi & Kanakachary 1994:39; Reed & Tanner 2001:230), an in-depth collection of information resources is critically important in any academic library to meet their research and scholarly needs.

Also of moderate importance to humanists as channels of information are conferences and meetings with peers (Van Zijl 2000:245) and archives and museums, particularly to scholars in the visual arts (Lönnqvist 1990:197).

5.4.5 Information channels used in the social sciences

The invisible college is a popular information channel in the social sciences (Folster 1989:9) as is a private collection of information resources (Folster 1989:10; Gorman 1990:148; Herman 2004a:41). The attendance of meetings, lectures and conferences

is an important source of information for most of these scholars (Case 1986:99; Folster 1989:10).

Libraries are also very important to social scientists (Gorman 1990:149). As it was found that social scientists, especially those in the business sciences, are the most frequent users of electronic databases (Eason *et al.* 2000:493; Tenopir & Read 2000:239), adequate access to electronic databases through the library is of particular importance to these scholars. Monographic and serial literature is also an important source of information (Gorman 1990:139) and should therefore be available to cover information in the social sciences. These findings indicate that a library should provide a good research collection of print as well as electronic resources for scholars in the social sciences.

5.4.6 Information channels used in the SMT fields

The invisible college is one of the most important channels used by scientists and medical and technology scholars. Their information is often communicated through personal contact with colleagues and teachers. Established researchers build up an invisible college or an informal communication network (Belefant-Miller & King 2001:96; Fjällbrant 1997:2; Maughan 1999:361; Shoham 1998:114). This channel includes attendance of meetings and conferences as an important means of transferring information amongst scholars (Fjällbrant 1997:2; Palmer & Neumann 2002:99).

Scientists rely mainly on journals (Palmer & Neumann 2002:99) and electronic journals for their information, which means that libraries are still very important channels through which they find their information (Hiller 2002:5). When accessing electronic resources, their use of the library as a channel of information is often from a remote site. It was found that science and technology researchers use the library's search services more than other researchers do (Horner & Thirlwall 1988:226), showing that they use the library's catalogue and electronic databases more than their colleagues in other disciplines. These researchers show a growing appreciation of innovative technologies and are the most enthusiastic users of file transfer and remote databases to support their teaching and research requirements (Herman 2001b:439).

Although the average serial price for scientific publications is higher than that in the other disciplines, these information resources are used very intensively by scholars (Scigliano 2000:49) and must be provided to cover the research and teaching needs of scholars in the SMT disciplines. Access to relevant electronic resources is also very important and should be available through the library. Another resource that should be available through the library is research reports, which also provide necessary information to scholars in the SMT disciplines (Gorman 1990:139).

5.5 RESOURCE SHARING AS A SOURCE OF SCHOLARLY INFORMATION

As physical collections of information resources are becoming impoverished due to lack of funding and the vast number of new publications produced every year, libraries are increasingly resorting to document sharing as a means of filling the gaps in their collections. Academics and researchers show ambivalent reactions to these services.

At Trent University, a document delivery alternative was introduced not to replace heavily used journals, but as an alternative to maintaining expensive subscriptions that were underused. Articles cost $2 each. Some users thought the service was too expensive or too slow but others thought it a viable replacement for underused titles (Scigliano 2000:45). In a study carried out there, it was found that unmediated and affordable document delivery is an appealing alternative to keeping up inefficient subscriptions, particularly when coupled with comprehensive abstracting services (Scigliano 2000:51).

In an Australian survey, 53% of academics reported never using document delivery services for their academic work, but those who did use them found them very useful for research and for teaching and publication. The researchers concluded that possibly document delivery services needed better promotion (Applebee *et al.* 2000:202). It was found that active researchers and those doing interdisciplinary studies use interlending services more extensively than do those who primarily teach (Ericson-Roos 1997:217).

Research into the use of the serials collection in the library of Stockholm School of Economics revealed that 11% of the journals were never read and that 34% were read only one to five times a year. The library tried a test offering access to *UnCover* and their document delivery service instead of supplying little-used journals. The new service was not successful (Ericson-Roos 1997:213) as scholars preferred immediate access to journals in their field of interest.

Whilst document sharing through either document delivery or interlending services is an invaluable means of accessing documents lacking in the library's stock, academics and researchers have some reservations about using these as an alternative to extending their library's collection. Firstly they are not very interested in using commercial fee-based document delivery services (Maughan 1999:357). They are reluctant to accept a pay-per-view document unless they are sure that the document is of real interest to them (Pedersen & Stockdale 1999:49).

At King Fahd University of Petroleum & Minerals (KFUPM) non-availability of documents and delays in interlending and document delivery were found to be major areas of concern. Scholars felt that gaps in collections have to be filled to strengthen the collection rather than to try to supply articles from other sources (Ashoor & Kanamugire 1996:177).

Although document delivery services and interlending are invaluable means of supplying information resources not held in the library and are used by scholars, they should not be used as an excuse for not keeping an adequate stock of information resources in a library. These services should be budgeted for to meet these needs but the main focus should still be to provide a research collection of books, journals, electronic resources and other non-book material for academics and researchers.

5.6 CONCLUSION

The changes in scholarly communication must be taken into account when developing and managing collections in universities. Because print journals are still the favoured media for scholars as authors and readers of scholarly information, important journals

must be available on the library's shelves. The increasing use of electronic journals and the potential value of these for scholarly communication is an important trend. Academic libraries must provide access to these journals as well through subscriptions to aggregated services and electronic versions of journals. The necessary hardware must also be provided by way of adequate networked workstations for scholars to use. Collection development librarians must keep up to date with trends in scholarly communication and with the initiatives undertaken to improve access to scholarly information. Younger researchers will make greater use of e-journals and other electronic resources.

The main methods used by scholars for finding information are browsing through the library's stock of monographs and serials as well as in online databases, following up citations found in other information resources and searching through the catalogues of local and other libraries. Electronic media, especially electronic journals, are also proving increasingly important to scholars and are being used more and more as a way to find information.

The main channels used for getting information are libraries with their collections of print and electronic resources, the invisible college as a network of scholars and colleagues, and the private collections of information resources maintained by scholars themselves.

Collection development policies for universities of technology should provide for a hybrid collection of print and electronic resources and equipment to provide access to electronic resources. Provision must also be made to acquire funding for document delivery and interlending services. In this way scholars will have immediate access to important information resources as well as quick access to other documents and books not held in the library's collection.

In the following chapter, the various information media will be examined with a view to discovering how these should be collected and/or managed in a university of technology to meet the information needs and information behaviour of academics and researchers.