

Unit BP100

**Implications of scholarly electronic journals for users: a  
literature review**

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## 1. Introduction

Remote access electronic journals are now a major part of academic library resources. E-journals have been proliferating in most academic disciplines, especially in the fields of science and technology, and many libraries are currently engaged in developing a collection of relevant titles. In the meantime, traditional bibliographic database providers have been expanding their services to cover full-text journals and users are offered integrated access to various electronic services.

E-journals offer a number of potential benefits for readers, authors, publishers and librarians, but some studies observe that the movement towards acceptance of e-journals within the academic community has been relatively slow compared to their apparent potential (Speier, C. et al., 1999).

The library, information science and publishing world are engaged in a lively debate over the future of both print and e-journals. E-journals have the potential to revolutionize the traditional scholarly communication system that so far has been dominated by paper journals, but this process is still at the beginning (Harter, S.P. and Kim, H.J., 1996; Kim, H.J., 2001; Rowland, F. et al., 1995).

As e-journals are a multi-faceted subject (Chan, L., 1999) - several factors affecting their success within the academic community – the purpose of the following literature review is to examine e-journals from the user point of view, and to provide an account of the implications of e-journals for their users, as these appear in the research and professional literature. The sources are mainly from journal articles, monographs and the Internet, from 1990 to the present time.

For the purpose of this literature review both print/electronic versions of existing journals by commercial publishers and free peer-reviewed electronic-only journals are considered. The first section of the report describes the emergence of interest in e-journal users, the developments in this area of research and some of the main investigations conducted on scholarly e-journal users. The second part explores critical aspects of e-journal services and their impact on users. Finally, the last section is devoted to discussing the solutions and strategies currently employed to overcome existing barriers to use and to increase e-journal services acceptance.

## 2. E-journal user studies

The first studies on e-journals were mainly focused on technical developments in networking, browsers, search engines and interfaces, and on the conversion of print-only journals into print and electronic journals, with a major emphasis on authors rather than on readers (Eason, K., Yu, L. and Harker, S., 2000; McKnight, C., 1997; Woodward, H et al., 1997; Woodward, H. et al., 1998). But since e-journals have become more generally available and the number of titles has increased, the need to concentrate on the unexplored area of user studies has been widely recognised (Meadows, J., 1996; Okerson, A., 2000; Roes, H., 1999; Woodward, H. et al. 1998; Yu, L. and Apps, A., 2000). The views of users are now considered as a vital form of analysis of the e electronic resources effectiveness (Ray, K. and Day, J. 1998). As Stewart (1996) observes, the success of scholarly e-journals highly depends on the users' ability to assimilate them into their work habits. The user behaviour towards e-journals involves a complexity of sociological, cognitive and personal factors, which need to be studied in a wider perspective (Eason, K., Richardson, S. and Yu, L., 2000; Kim, H.J., 2001; Wyly, B.J., 1998).

The published literature on user studies includes a fairly large number of articles and monographs devoted to analyse user attitudes, behaviours and working habits with e-journals. For many commentators, the whole study of journal use has known a

great impulse with the advent of e-journals. As Jenkins (1997) shows, until recently the study of user behaviour with scholarly journals has been a thorny subject. The main obstacle to journal use investigations is the fact that in most libraries journals are not allowed for circulation, which makes it difficult to collect tangible records of use and to monitor what users have been using and how. The emergence of e-journals has allowed the application of new research methods such as logging software to collect hard data on usage, and has encouraged the development of theoretical models for the study of scholarly journal use (Eason, K., Richardson, S. and Yu, L., 2000; Eason, K., Yu, L. and Harker, S., 2000). What follows is a synthesis of the most important research methodologies applied in this field.

## **2.a Methodology**

Some e-journal user studies adopted a single research method to gain data, such as interviews to end users (Olsen, J., 1994; Stewart, L., 1996) or questionnaires (Brown, C., 1999; Liew, C.L., Foo, S. and Chepunnati, K.R., 2000; Ray, K. and Day, J., 1998; Woodward, H. et al., 1998). When the objectives of the study were broad or complex, and the survey was addressed to a differentiated user population, a mixed methodology was preferred: log analysis, questionnaires and focus group meetings (TULIP, 1996), questionnaires, focus groups, interviews, and log file analysis (Eason, K., Yu, L. and Harker, S., 2000; Jenkins, C., 1997; Pullinger, D. and Baldwin, C., 1997); usage statistics and questionnaires (Rusch-Feja, D. and Siebeky, U., 1999); usage statistics and interviews (Use of paper..., 1999); interviews and questionnaires (Rogers, S.A., 2001; Rowland, F. et al., 1995).

Dijkstra (1997) considers interviews to end-users as an easy method to investigate customer behaviour from a qualitative point of view. On the other hand, Eason, Richardson and Yu (2000) observe that although questionnaires, observation surveys and interviews are user-centred methods, they present a major disadvantage. As they note: "The limitation of such studies is that they rely solely on users' own accounts. When the sample is not large enough, the validity of the findings may be in doubt."

According to Pullinger and Baldwin (1997), these methods yield significant findings on what are the user expectations on e-journals, but if the purpose of the investigation is to find how users really work with e-journals, log file analysis seems to be the most appropriate methodology. Advantages of log file analysis include: the possibility to enable a large number of variables (Yu, L. and Apps, A. 2000); the feature of being economic, reliable, and able to offer detailed information on journal use (Borghius, M.G. 1997; Jenkins 1997), and unobtrusive and hence more objective than surveys (Eason, K., Richardson, S. and Yu, L. 2000). Nevertheless, some disadvantages remain: logged data reflect what the user does, but says little about why (Yu, L. and Apps, A. 2000); they are often ambiguous, for example they do not allow to recognise purposeful use and non-purposeful use (Bishop, A.P., 1998b). As a consequence, many studies recommend combining log file analysis with different research methodologies in order to develop a more complete study (Bishop, A.P., 1998b; Borghius, M. G., 1997; Eason, K., 1999b; Yu, L. and Apps, A., 2000). Yu and Apps (2000) outline that the log file analysis validity largely depends on the whole research design and on the methodological and analytical approach adopted.

Although the application of log files as a data source was adopted in several studies, such as TULIP (TULIP, 1996), DECOMATE (Dijkstra, J., 1997; Dijkstra, J., 1998; Jenkins, C., 1997), Red Sage (Arnold, J.Q., Badger, R.C. and Lucier, R.E., 1998), DeLiver (Bishop, A.P., 1998b), and Superjournal (Eason, K., Richardson, S. and Yu, L., 2000; Eason, K., Yu, L. and Harker, S., 2000; Yu, L. and Apps, A., 2000), the lack of standardisation in measurements, variables and analysis procedures makes it difficult to compare the user behaviours observed in the different projects (Yu, L. and Apps, A., 2000).

## **2.b Case studies**

From 1991 to 1995 The University Licensing Program (TULIP) produced a cooperative research project testing systems for networked delivery and use of journals to the user desktop (TULIP, 1996). The TULIP participants, a group of US universities and Elsevier Science publisher, conducted a study to investigate reader usage patterns under different distribution situations. The findings showed that the service was positively received by academic staff and students, who perceived some important advantages in the networked delivery of journal literature, such as ease of use, desktop access, easy reading and printing. However, the users complained about the limited coverage of the system, the encountered technical problems and slow response times. Students used the service more frequently than academic staff, but none of the groups of users revealed to be ready to move from print to electronic only access.

In 1992/1994 the ELVYN project investigated the use of a single e-journal by graduate students and academic staff across several universities (Rowland, F. et al., 1995). Although the preliminary study had suggested a high level of interest in e-journals, the research team had difficulties in recruiting users. The study concluded that a single journal was not of sufficient interest in itself to attract users to learn new techniques.

In 1994 Olsen (1994) interviewed nearly fifty scholars from different disciplines about their strategies in locating and using journal literature, and about their requirements for an electronic journal system. Olsen found scholars positive about electronic journals, although concerns were expressed about browsing, manipulating documents, ergonomics, and quality of graphics. Scholars' expectations on e-journals included access from one's home or office, reduced time of publication, and ability to create personal document collections.

Following Olsen's study, Stewart (1996) interviewed a group of chemists from Cornell University in order to investigate their satisfaction about the CORE project – a service providing access to the full text of twenty American Chemical Society journals – and the perceived potential utility of e-journals. The results showed that printing and browsing were the e-journal functions perceived as most important, and that updating and back issues availability were essential requirements. Chemists did not seem to believe that e-journals would allow users to experience serendipity and comfortable reading.

In 1996, the Commercial and Free Electronic Journals User Study (Café Jus) investigated the use of more than three hundred e-journals by postgraduate students, research students and academic staff at the Loughborough University (Woodward, H. et al., 1997; Woodward, H. et al., 1998). The surveyed people recognised a number of advantages of e-journals vis-à-vis printed journals, such as searching capabilities and wide availability, while the main disadvantages perceived were problems in gaining access, unpopularity of reading from the screen, need of training, multiplicity of interfaces and of required passwords.

The European project DECOMATE, which consisted in the development of a bibliographic database that carried links to full-text articles from a wide range of e-journals (Dijkstra, J. 1997), conducted a user evaluation study with the aim to establish the usefulness of e-journals to the academic community and to understand the users' requirements for an electronic document delivery service (Jenkins, C. 1997; Dijkstra, J. 1998). The surveyed population was the academic staff of the three partner Universities, Tilburg University, Universitat Autònoma de Barcelona and the

London School of Economics and Political Science. As the findings showed, the service was judged as a benefit to the research community, with some differences between the three sites. The perceived use facilitators were desktop access, 24-hours availability, speedy publication, printing and navigation tools facilities; the main barriers were found to be the reduced number of titles and the short time span covered, the discomfort with reading from the screen, the impossibility to manipulate e-articles, and the high cost of e-journals.

In 1997/1998 Tilburg University and Maastricht University carried out a project aimed to collect data on the use of printed and electronic journals by researchers (Use of paper..., 1999). The surveyed researchers showed a positive attitude towards e-journals, although they expressed the need to have one user interface, one method of authentication and a larger available collection. The possibility to have printed copies was perceived as important, because of the difficulties of reading from the screen. Technical problems with accessing and printing were also mentioned. The collected data showed that researchers from different academic disciplines had different behaviour towards the service.

In 1998 a group of scientists at the University of Oklahoma was surveyed through a questionnaire about their information seeking behaviour (Brown, C., 1999). The results showed that the majority of scientists preferred access to journal articles in a print, rather than an electronic format, and that those expressing preference for access to both versions, still wished the possibility to printing the electronic version.

Ray and Day (1998) conducted a study to investigate the student attitude towards electronic resources – e-journals, the OPAC, the Internet, CD-ROMs and databases. They analysed the data collected through two related projects: the IMPEL2 project and a MA information and Library Management Dissertation. The authors found that although many students used e-resources and were confident in doing so, the majority still used printed resources to complement the new technology. A low number of students used e-journals, the most popular resources being CD-ROMs and the Internet. Limited time and lack of effective information skills were considered the main barriers to using e-resources, while most students said to have acquired the skills necessary via trial error or through guidance of other students. The authors reported that responses were different, depending on the subject studied.

Rusch-Feja and Siebeky (1999), in a cross-disciplinary and organisational survey conducted in 1999, investigated the use and acceptance of a large collection of e-journals from different publishers among the Max Planck Society researchers. The authors found a high acceptance of e-journals, with a different level of interest between scientific and humanities researchers. The major perceived advantages of e-journals were desktop access, speed of publication and search facilities, while the disadvantages included discomfort associated with reading from the screen, dependency on networks, incomplete issues and absence of back issues. The researchers expressed a need of improved support from the library service and required an efficient local access system based on a unified search interface.

The SuperJournal project represents the most exhaustive research conducted on e-journal use. This project was realised as part of the UK Electronic Libraries (eLib) programme with the aim to investigate the major factors leading to the success of e-journals, and involved a group of UK Universities and commercial publishers (Pullinger, D., 1999a). During a three-year period (1996-1998), SuperJournal made available 49 journals in four subject clusters. The use of these journals was studied through log file analysis, while a large amount of contextual data about user behaviour and attitudes were collected through interviews, questionnaires and focus

group meetings (Pullinger, D. and Baldwin, C., 1997). The analysis of contextual data gathered during the first phase of the project provided information about user expectations on the service. Users indicated accessibility, portability and easy use as the most important features for a useful e-journal, but they said to not expect these characteristics to be actually realised. The major perceived barriers to use included discomfort with reading from the screen, the consequent need to make printed copies of articles, and uncertainty about the fact that all journals with the backfile would be made available electronically (Pullinger, D. and Baldwin, C., 1997).

An other study analysed logged data on usage together with survey data on user satisfaction, in order to investigate the value to users of a range of e-journal functions, and to compare the real use of these functions with the user evaluation of the same (Eason, K., Yu, L. and Harker, S. 2000). The study found that e-journal functions had different value for users, the most important ones – also defined as ‘core functions’- being browsing and printing, followed by searching. Other functions such as alerting, saving, customising and communication resulted to be used as ‘peripheral functions’. The number of titles available was found to affect the usefulness of some functions, such as browsing and searching. The researchers sometimes noted a substantial disparity between the use of a function and its perceived importance by the user.

Based on the logged data and contextual information analysis, Eason, Richardson and Yu (2000) identified a typology of categories of users characterised by different behaviour with the SuperJournal service. The study found that the ‘enthusiast users’ were only a minor part of the user population; the larger groups consisted of the ‘restricted users’, who accessed the service infrequently and used a small number of journals, the ‘lost users’, who used the service only for a transient period, and the ‘tourists’, who never came back to SuperJournal after a first brief visit.

A study conducted on the e-journal use and perception by graduate students at the Nanyang Technological University of Singapore (Liew, C.L., Foo, S. and Chennupati, K.R., 2000), showed a wide strong acceptance and enthusiasm for e-journals. The students perceived the speed of publication, the navigation tools, easy access and links to additional information as the main e-journal advantages compared to printed articles. Problems with reading from the screen, inability to make notes and dependence on computer hardware and software were the main reported disadvantages. Asked to express their opinions on features of future e-journals, students said that e-journals should be enhanced through a more effective information environment that integrates various information resources and tools; that they should be interactive and let the reader actively manipulate and transform documents; that e-articles should be transformed from static into dynamic documents, whose content will be in the control of users.

Three annual surveys were conducted at the Ohio State University between 1998 and 2000, in order to assess the level of awareness and use of e-journals and to document changes in use patterns as the number of titles available in the e-journal collection increased (Rogers, S.A., 2001). Students and academic staff cited as major advantages of e-journals the 24-hours availability and easy access, while the most frequently cited disadvantages were the lack of computer or online access, the discomfort associated with reading from screen, the impossibility to manipulate electronic articles, concerns about the level of authoritativeness and prestige of e-journals vis-à-vis their printed counterparts. The study also found that between 1998 and 2000 the frequency of e-journal use did increase as the number of titles increased, while the use of printed journals decreased even at a slower rate. According to Rogers (2001), this finding shows a significant progress in acceptance and use of e-journals.

### **2.c. Interpretations**

E-journal user investigations results have lead commentators to quite different interpretations.

McKnight (1997), for example, analysing the experiences conducted in Digital libraries at the Loughborough University, notes that although some potential advantages of electronic delivering of journal literature is widely recognised in terms of easy access and availability at any time, e-journals tend to be negatively perceived by users. The functions connected to the use of articles delivered electronically are particularly disappointing. Users still prefer to print an article when they want to read, annotate or manipulate it. Other critical issues seem to be the multiplicity of interfaces and providers, which are perceived as an obstacle to browsing; the problem of back issues availability; the little interest on sophisticated search engine offered by many systems; the lack of stability in interface design and in technical requirements for access. This problematic vision of the current implications of e-journals for their users is also shared by Meadows (1996; 1997).

On the contrary, Tenopir and King (2001) infer from their survey on recent user studies conducted in the US that the use of e-journals is continuing to grow, even if attitude and use vary with the different science fields. According to the authors, users prefer e-journals rather than print journals, there is more e-reading now than in the past years, and desktop access to journal articles allows users to read more, from a variety of sources. However, users declare to spend more time in identifying and locating e-articles compared to printed ones. This finding somehow confirms that accessing and manipulating e-journals is a problem for many users.

According to Eason, Richardson and Yu (2000), existing evidence suggests that e-journals are attracting an increasingly large number of users, and that some critical issues are widely emerging, such as demand of adequate back issues, importance of printing and different behaviour among the various subject areas. User studies also clearly show that: "there are a number of different ways people use electronic journals and a number of benefits that they seek" (Eason, K., Richardson, S. and Yu, L. 2000). All service providers will need strategies to cope with these different patterns of use.

Rogers (2001) outlines the difference between the early e-journal use studies, which were designed to test the viability of the electronic format, and the studies conducted after large collections of titles became available. The comparison shows that clearly the success of e-journal is increasing. However, she notes that although comparison between various studies shows an increased use and acceptance of e-journals, it is not possible to relate this finding to the sole available critical mass. Other aspects may have influenced use, such as the Internet dramatically increased popularity, growing emphasis in distance education programmes, and increasing number of links from citation databases to full text articles.

## **3. Factors influencing the use of e-journals and their success**

According to Eason (1999a), users access an e-journal service by making cost/benefit decisions about what to use and how to use. Their decisions are based on many factors, some of them being facilitators, other being barriers.

Numerous studies have tried to define the main factors influencing user acceptance of e-journals and then also the success of the new medium within the scholarly communication system. Bishop (1995), for example, identifies awareness, ease of access, usefulness of content, usability and new functionality as the main areas affecting e-journal usage, while Meadows (1997) indicates user-friendly/easy access, and portability. Other commentators argue that the perceived quality and

level of credibility are the most important factors affecting the acceptance of e-journals within the academic community (Kim, H.J., 2000; Kling, R. and Covi, L., 1995).

The SuperJournal project in particular has tried to identify the different factors, which together join to form the multidimensional patterns of user behaviour, and has analysed their interactions and combinations. Based on SuperJournal results, Eason (1999a) found that the relevance of the material and the ease of use/access were the most important factors for users, while value added features such as browsing, searching, links, alerts, etc., should be considered as secondary factors. Users assess these aspects, which then lead to their decisions about using and non-using the whole service, at every step: examination of the content, technical access, authentication, location, assessment and study of the article (Baldwin, C. 1999a; Eason, K. 1999a). In a later article, Eason, Richardson and Yu (2000) identify the 'casual factors' – coverage of the service, relevance of journals and ease of use/technical support – and the 'mediating factors' – tasks, disciplines and status of users, use of competitive services, and habit of information management. They find that the major factors affecting patterns of use are service contents and technical problems: for example, experiences of content limitation and technical difficulties in accessing the service led users to infrequent usage. However, perception of these problems by individual users is mediated by other factors such as disciplines and the availability of competitive services. In this way, both casual and mediated factors converge to form different patterns of use.

### **3.a Awareness and access**

Many commentators agree that awareness and easy access are the main factors influencing the success of e-journals. As Bishop (1995) shows, if scholars are not aware of e-journals, they do not use them as source of information and they are reluctant to publish their work through a medium they perceive as too limited. The resources playing a key role in improving user awareness of e-journals are library discovery systems and standard indexing and abstracting sources (Bishop, A.P., 1995; Fosmire, M. and Young, E., 2000; Harter, S.P. and Kim, H.J., 1996; Woodward, H., 1995; Wyly, B.J., 1998).

The user perception of easy access is related to availability at any time and from any location, to speed of access, to user-friendly interfaces and technologies. Technical difficulties experienced in this area may lead to significant delays and great frustration (Bishop, A.P., 1995; Harter, S.P. and Kim, H. J., 1996; Liew, C.L., Foo, S. and Chennupati, K.R., 2000; McKnight, C., 1997; Woodward, H. et al., 1997; 1998). Existing evidence from electronic projects shows that technical constraints are the major causes of non-return (Eason, K., Richardson, S. and Yu, L., 2000). Easy access can be influenced by dependence on network and on appropriate hardware and software, lack of standardisation of data formats, poor efficiency in terms of readability, portability, and manipulability (Kim, H.J., 2001, Meadows, J., 1997; Woodward, H. et al., 1997); by the amount and helpfulness of instructions offered to readers (Bishop, A.P. 1995); by the local technical resources needed to access the service and make effective use of it, and the knowledge necessary to use it (Eason, K., 1999a).

From the user's point of view passwords are a barrier to access (Bishop, A.P., 1998b; Eason, K. 1999a; Publicker, S. and Stoklosa, K. 1999). Bishop (1998b) identifies the following reasons why users perceive systems incorporating user authentication and registration processes as an obstacle: technical problems with access, privacy concerns, length of the registration process, the fact that people feel registration forms as signals of a fee-based service, the fact that people do not know their password. The need of providing a password is especially frustrating when researchers try to access a full-text from an indexing and abstract database search,

and they have to take separate steps for identification and access (Publicker, S. and Stoklosa, K. 1999). Most of the present problems with access should be overcome by the technological progresses in e-journal services provision. As Kim (2001) argues, “when we consider the trends in the rapid development of computer technologies, it is unlikely that the current technologies disadvantages of e-journals will become a major obstacle in the transition from paper to e-journals”. However, according to Rogers (2001) improvements in design and delivery are still needed by e-journals to achieve full acceptance among the academic community.

### **3.b Content**

The first user approach to the e-journal service is the evaluation of the materials offered: if the content available through the service is not sufficiently relevant, the user can judge it is not worth the effort to use it (Eason, K. 1999a). The content factor is related to the relevance of material – users want to access the right journals for their information needs – and to the coverage of the service – users want electronic access to back issues (McKnight, C., 1997). At a deeper level, content is also related to the volume and the quality of the contributions published in single e-journals (Bishop, A.P., 1995). Many commentators recognise the need to offer a critical mass of electronic journals in order to improve user interest towards the service and avoid the need to search both electronic and printed collections (Arnold, J.Q., Badger, R.C. and Lucier, R.E., 1998; Eason, K., Yu, L. and Harker, S., 2000; Jenkins, C., 1997; McKnight, C., 1997; Pullinger, D. and Baldwin, C., 1997; Stewart, L., 1996; Use of paper..., 1999).

According to Baldwin (1999a), users of Superjournal service did not seem to be interested in interactive multimedia content. E-journal users tend to be conservative in their approach to journal literature: when the DeLiver project participants investigated if journal components were used in a disaggregated manner, the results showed that very little use was made in this way, users preferring to view the totality of articles and place the study of each component in context (Bishop, A.P., 1998a).

### **3.c Searching, browsing and other value-added features**

The electronic format offers readers significant benefits, such as communication functionalities between authors and readers, search and navigation tools, improvements in dissemination of published materials (Bishop, A.P., 1995).

Existing evidence shows that users have a different behaviour towards browsing and searching e-journals (Eason, K. 1999a). McKnight, (1997) notes that many people do not necessarily want to search e-journals, while Meadows (1996) argues that users are often not aware of the powerful search engines offered by e-journals. Olsen (1994) found diversified behaviour towards searching between researchers from different disciplines. This finding was confirmed by the Superjournal project data: while users of all disciplines and status used extensively the browse function, which was perceived as a “an easy way to manage the accelerating growth of journal literature and an opportunity to find new relevant journals the users had not seen before” (Eason, K., Yu, L. and Harker, S., 2000), the search function was used more by social science users than by science users, and more by students than by academic staff. The use of searching may be influenced by technical problems, lack of related skills and number of journals and archived files available (Eason, K., Yu, L. and Harker, S., 2000). If browsing is an essential function, McKnight (1997) complains that browsing e-journals is often a time consuming and frustrating task for users, because of the several different levels to pass, and the different interfaces and types of lists to browse. Users often seem to prefer printed journal browsing (Tenopir, C. and King, D.W., 2001). Some commentators reveal that researchers are often concerned about the possibility to make serendipitously discovering with electronic journal services (McKnight, C., 1997; Olsen, J., 1994; TULIP, 1996).

Other value-added features generally offered by e-journal services, such as alerting, customising, saving, communication and linking with external resources, seem to have less significance for users (Eason, K., Yu, L. and Harker, S., 2000; Meadows, J. 1996).

### **3.d Reading and printing**

Baldwin (1999a) notes that users tend to study e-articles in the same way they study print: they currently use electronic and printed journals in a complementary way, as printed journals are easier to browse and read, while e-journals enable easy access and are always available. Almost all published user studies reveal that people prefer to read from paper, and that printing is considered one of the most important features of e-journal services. Studying large amount of text on screen is difficult for most users (Bishop, A.P., 1995; Eason, K. 1999a; McKnight, C., 1997; Olsen, J., 1994; Woodward, H. et al., 1998). Besides, users are accustomed to read articles in a variety of location and situations, they are also used to annotate and manipulate them. Currently all these functions are not supported by e-journals, for which portability is still a challenge (McKnight, C, 1997; Meadows, J., 1996; Rogers, S., 2001).

### **3.e Credibility and prestige of electronic journals**

Kim (2001) believes that one major barrier to the successful transition from paper to e-journals in the academic community is the acceptance and credibility of e-only journals. This is a sociological factor more than a technical one, and it is related to the role of the scholarly journal within the scholarly communication system. As Kling and Covi (1995) argue, since a scholar's reputation is enhanced by the prestige of the journal in which his work is published, the prestige of a journal has been the most important factor in selecting a journal to which to submit an article. Numerous studies revealed that academic staff and students perceive the quality of articles published in the electronic medium as to be generally lower than the printed traditional counterparts (Rogers, S.A., 2001; Speier, C. et al., 1999; Woodward, H. et al., 1998). In particular, the issue of credibility concerns free electronic-only journals, which represent an alternative publication route to the expensive products of commercial publishers (Rowland, F. et al., 1995). Yamamoto (1997) believes that digital libraries can play a role in promoting acceptance of e-only journals among their potential authors and readers. Digital libraries can help e-journals to gain visibility through their front-end functions, and to assure content immutability and longevity of e-journals by providing an archival site. Moreover, Wydy (1998) suggests that at least some libraries should take the archival responsibility for freely available scholarly e-publications. In this way libraries "would be helping to transform the scholarly communication system by making those publications more easily available to a dramatically larger readership than expensive print publications".

### **4.f Local factors**

Numerous user studies revealed that local factors play a large role in the success of an e-journal service. As many commentators argue, the user behaviour towards e-journals seems to be highly related to the local conditions in which he/she is operating, and to the individual experiences with information management (Dijkstra, J., 1998; Eason, K., 1999a; 1999b; Pullinger, D., 1999a; 1999b, TULIP, 1996). The local factors affecting the e-journal use include: accessibility of traditional library services, promotion of the electronic service by librarians; access to electronic services provided and integration with the OPAC; the number of passwords required; the computer equipment available; the degree of training and support provided; the type of discipline represented (Dijkstra, J., 1998; Pullinger, D., 1999a; 1999b). Individual factors include discipline, status, habitual approach towards information management and purpose of use (Eason, K., Richardson, S., and Yu, L., 2000). As

Pullinger notes (1999a; 1999b), local factors play an important role for e-journal publishers and providers, who need to provide flexible products to meet the needs of different organisations, and for librarians, who must find the appropriate way to introduce the electronic service and to support university members in its use.

## **4. Discussion**

The published literature on e-journals reveals that, although the acceptance of e-journals among the academic community is generally increasing, many critical issues still surround scholarly electronic publications. What follows is a discussion on the solutions and strategies currently employed by libraries and publishers in order to overcome existing barriers to use and increase e-journal services acceptance.

### **4.a Access issues**

Several options are available to users for accessing e-articles from their desk. All these options must be carefully considered by libraries if they intend to facilitate the use of e-journal services. Woodward (1995), suggests to develop the following levels: access to information about what titles are available; access to information about the articles within individual journal issues; access to the actual text of the journal. Based on a survey on ARL and non-ARL libraries, Shemberg and Grossman (1999) identify the following methods available for users to access full-text journals:

- Searching an electronic index, finding a citation and being linked to the full text
- Searching an electronic index, finding a citation and searching the library's OPAC
- Searching an e-journal web page
- Searching the OPAC

Shemberg and Grossman (1999) consider access through an electronic index as a particularly attractive method for undergraduates or novices in a subject area, while academic staff and researchers seem to be more inclined to browse journals or to follow authors and citations found in other materials, and should be better served by access through OPAC or web pages. On the other hand, the SuperJournal project data revealed that researchers use different techniques to identify relevant articles: scientists use online bibliographic databases as their main technique, where social scientists tend to use a variety of techniques (Baldwin, C., 1999b). Given that the choice of a method for providing access to e-journals depends on the libraries mission and their user needs, some authors suggest to maintain multiple access routes (Knudson, F.L. et al., 1997; Shemberg, M. and Grossman, C., 1999).

Many commentators recommend including e-journals in the online catalogues because: a) readers only need to check one source to learn what is available (Woodward, H., 1995; Woodward, H. and McKnight, C., 1995); b) integration between printed and electronic materials improve visibility and discovery activities (Kling, R. and Covi, L., 1995; Wyly, B.J., 1998); c) it is wrong to keep the owned material separate from that which is remotely accessed, even if the catalogue interface should clearly differentiate owned resources from accessed resources and allow users to limit searches only to one part of them (Duranceau, E.F., 1995).

However, the current system for providing users with access to e-journals is often based on a separate list of titles accessible from the Web page (Moothart, T., 1996). Rich and Rabine (1999) argue that a standard method of managing and providing access to e-journals in libraries had not yet been established. In two studies conducted in 1998/99 and 2000/01, Rich and Rabine (1999; 2001) tried to determine how US academic libraries were providing access to their e-journals. The first study revealed that most libraries were constructing their own e-journal websites, rather than turning to an aggregator service or a library consortium service. In the second

study, Rich and Rabine (2001) found that, although many of the libraries surveyed were adding e-journals to the OPAC, they were also continuing to maintain e-journal web pages. E-journal websites were increasing in size and complexity. The authors recognised four basic models for e-journal pages:

- High-maintenance HTML (a hand-built HTML list of individual titles with annotations)
- Low-maintenance HTML (a list of e-journal packages)
- Catalogue driven model (which uses the catalogue as the basis for e-journal access)
- Database-driven model (the development of local database of e-journals)

According to Rich and Rabine (2001), the database-driven model is the best answer to managing access to e-journals, because it provides the flexibility of access needed by users, and can be integrated with other available electronic resources to provide access to all material in electronic form.

Many commentators suggest libraries to provide access to e-journals through multiple interfaces, by both creating records for them in the catalogue and providing links from the library website or developing specific online interfaces (Chaney, E., Bulliard, C. and Christiansen, C., 1999; Knudson, F.L. et al., 1997; Publicker, S. and Stoklosa, K., 1999; Taylor, A. 1999; Tobia, R. et al., 2001). As several studies show, users seem to prefer access through an e-journal web page (Knudson, F.L. et al., 1997; Rich, L.A. and Rabine, J.L., 2001; Tobia, R. et al., 2001).

#### **4.b Authentication and registration processes**

At present, e-journal publishing is a complex area, where many titles are available from many content providers and are managed through various licence agreements and access conditions. In such a situation it is not easy to provide users with a simple authentication solution, and different approaches are currently in use (Lynch, C.A., 1998).

The issuing of passwords and the IP filtering seem to be the two most commonly used methods of restricting access to subscribers only (Krieb, D., 1999; Machovec, G. 1997). IP filtering has been often adopted by publishers because is easy to maintain, but presents the major disadvantage to exclude distant students and remote users from the service (Breeding, M., 2001; Lynch, C.A., 1997). On the contrary, a password access has the advantage to allow accesses from any location, but users can find it difficult to remember and manage a proliferation of usernames and passwords (Duranceau, E.F., 1999; Krieb, D., 1999; Lynch, C.A., 1998).

Many suggest that the use of proxy servers can represent a better alternative, as it allows remote access to e-journals and requires that users prompt their unique user name and password to initiate the service (Breeding, M., 2001; Krieb, D., 1999). However, it presents some disadvantages: users can find it too difficult to configure their web browsers; the proxy host can often represent a single point of vulnerability; proxy processing can introduce a response-time delay; some publishers refuse access to their e-journals via a proxy server; finally, proxies do not work well when a user is affiliated to more than one organisation (Krieb, D., 1999; Lynch, C.A., 1997). Lynch (1997) believes that credential-based authentication, which consists in providing user with a cryptographic certificate of its identity within a community, is a good strategy for managing access to resources in a large-scale information environment. However, the requirements in terms of infrastructure and engineering are often too onerous for libraries (Krieb, D., 1999; Lynch, C.A. 1998).

All the currently available systems present obvious disadvantages for the user, who is often confused by the different things he must do in order to get access to resources depending on whether she or he is in the office, in the library or at home (Lynch, C.A. 1997). An ideal authentication system from the user's point of view

should consist in a Single Sign On: a system where the user only has to sign on once to access multiple systems and applications (Authentication ..., 2000).

#### **4.c User interfaces**

At present, e-journal services are not effectively integrated, multiple interfaces need to be navigated in order to find information, and interfaces themselves do not communicate, with great frustration and discomfort for users (McKay, S.C., 1999; Meadows, J., 1997; Okerson, A., 2000; Publicker, S. and Stoklosa, K., 1999). Baldwin (1999a) points out that "seamless environment for discovery will become more important as more journals develop electronic versions and inter-article linking becomes more widespread". According to Rowland (1996) users should ideally be offered a single, user-friendly graphical interface, which provides access to the local OPAC, to abstracts and index databases, to networked CD-ROMs, and to electronic journals. Machovec (1997) believes that access to e-journals via an aggregator service is a benefit for users, because journals of several publishers are available through a single interface and search system. On the contrary, Blosser et al. (2001) question the idea that aggregators could give a satisfactory solution to the library need to provide the users with a simplified and seamless access to e-journals; libraries should rather work towards a more seamless integration of bibliographic databases and e-journals, and towards a complete representation of e-journals into the online catalogue.

As these studies suggest, libraries have an important role of mediators to play in e-journal provision services: they should facilitate access and e-journals use by providing a seamless access to the resources available and by educating users (Davis, S., 2000; McKnight, C. et al., 2000; Woodward, H. et al., 1997); they should control e-journals through selection and acquisition policies (Woodward, H., 1995); finally, they should work on making interfaces and search procedures more uniform across a range of publishers' offering (Woodward, H. et al., 1997).

#### **4.d Reference linking**

Linkages are making the lines of demarcation between types and sources of electronic resources less apparent, and are improving seamless access and integration (Caplan, P. and Arms, W.Y., 1999; Okerson, A., 2000; Rogers, S.A., 2001).

Some major initiatives are currently emerging in the field of reference linking. The publishers participating in the CrossRef initiative have developed a system enabling reference links in scholarly journal articles across various publisher sites (Pentz, E., 2001). At the moment the system has only partially impacted on end-users, because of some major limitations to overcome: Crossref connects only publisher sites, the number of participating publishers is growing but still limited, and a solution for enabling links to the appropriate copy of an article, when multiple online copies are available through different services, is still under development (Beit-Arie, O. et al., 2001; Pentz, E., 2001).

A significant development towards seamless access and integration between different electronic resources is being introduced by products such as SFX. This service offers, through "extended service-links" (Van de Sompel, H., 2001), the possibility to connect all the sources available to users in a hybrid information environment - Abstract and Indexing records, OPAC records, citation in full-text paper, bibliographic data of a full-text document- including local and remote, licensed, acquired or freely available sources (Van de Sompel, H. and Hochstenbach, P., 1999a; 1999b; 1999c). SFX technology offers various advantages: to enable effective integration between the existing different levels of access to information; to provide users with an interlinked information environment; to allow libraries to maintain the

control on the sources to be interlinked and on the type of links to provide users. As reference linking is an area still under development, it was not possible to find in the literature relevant studies about practical implementations of SFX technology in library services, or about the impact of reference linking developments on scholarly research and communication.

#### **4.e Promotion and education**

The task of identifying and locating relevant information through e-journal services is becoming increasingly complex. Users have to cope with the fragmentation of journal literature among various publishers, to master different interfaces, to search engines and special features in different journal services. Many commentators agree that users need greater assistance and training from librarians (Davis, S., 2000; Huber, C.F., 2000; McKnight, C. et al., 2000; Meadows, J., 1997; Publicker, S. and Stoklosa, K., 1999; Woodward et al., 1997). Evidence from user studies shows that users require from library services training and support with e-journal access. Based on their study of the role of librarians in the delivery to users of the SuperJournal periodical service, McKnight et al. (2000) argued that librarians' activities of user support/training yielded a notable impact on end users. These activities involved promotion of the service through publicity and marketing initiatives, and user education and training.

The studies of Ray and Day (1998) and Woodward et al. (1998) show that students are often at a disadvantage in accessing e-resources: this might be related to insufficient networked computers available to them, to limited awareness of electronic information services and to lack of information retrieval skills. Ray and Day (1998) outline that 'further research is necessary to show how best to encourage students to make effective use of the electronic resources that are available'.

## **5. Conclusions**

This examination of published literature suggests that views about e-journals implication for users are problematic. Existing evidence shows that e-journals are attracting an increasingly number of users: according to Tenopir (2000) about half of US academic staff now prefer e-journals to paper, while the success among students is still higher. As the user studies examination has showed, technological progresses have overcome some of the initial barriers for users. Moreover, it is likely to expect that with more experience in using e-journals, with more critical mass of content available, with growing interest in distant learning programmes, and as new generations of computer-literate students enters university, the success of e-journal services will increase. On the other hand, the findings about user behaviour, attitudes and working habits with journal literature, reveal that currently e-journals do not satisfy many of the user requirements for easy access, relevant content, credibility, and portability. Several improvements in design, access, interfaces, readability and standardisation are still needed. Moreover, a number of local factors, related both to the institutional library service provision, and to the user individual approach to information management, affect on the real success of the e-journal service. The existence of these different attitudes, behaviour and requirements cannot be underestimated by publishers, suppliers and libraries, if the purpose is to provide services addressed to the whole academic community. Only focusing on the users, their need, their wants, and their practice of using information, it is possible to develop effective and integrated e-journal services.

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