# The changing paradigm of document delivery – exploring researchers' peer to peer practices

*Ari Muhonen*
Jyväskylä University, Jyväskylä, Finland, and
*Jarmo Saarti*
University of Eastern Finland, Kuopio, Finland

**Abstract**

**Purpose** – By definition, interlibrary lending is a process involving two libraries. The digital revolution changed the method by which the scientific documents were disseminated during the past couple of decades. Nowadays, researchers can exploit several software applications that enable them to upload, save and deliver their documents from one peer to another without the need for a middle man. This paper reviews this change via a study conducted in two Finnish academic universities. The aim of this study was to determine the extent to which researchers have adopted these new possibilities for document dissemination and how this change will affect the role of the libraries in document delivery in the future.

**Design/methodology/approach** – This paper is based on a survey conducted with the academic professors in two Finnish universities. The results were analyzed descriptively.

**Findings** – Academics mainly used digital resources when acquiring documents; library interlending (ILL) was the least widely used means. The majority of the academics usually transmitted their own documents to other persons by e-mail.

**Research limitations/implications** – This paper is based on data from two Finnish universities.

**Practical implications** – Libraries should be better aware of current peer-to-peer document delivery practices and evaluate how this will impact on their interlibrary loan services.

**Social implications** – Libraries should be more active in document delivery implemented through the various internet applications for academic document dissemination.

**Originality/value** – Peer-to-peer document exchange is an inadequately investigated topic, especially from a library perspective.

**Keywords** Finland, Resource sharing, Academics, Document delivery, Habits, Professors

**Paper type** Research paper

## Introduction

The dissemination of scientific ideas and research results has undergone several major changes throughout its history. In every era of scientific publishing, the technologies available for writing, printing and delivering documents have determined how they could be disseminated. The history of writing started with manuscripts that were scarce and valued resources. This soon led to the creation of archives and libraries; the main aim of these institutions was to preserve – often vigorously – these unique items. Furthermore, there was manual copying of these manuscripts in an attempt to minimize the risk of losing irreplaceable documents.

The move from a print-dominated world to a digital universe started in the 1990s. Scientific journals started to disseminate articles in a digital form, soon after that, the digitization of the printed resources started, and finally from 2000, the evolution of the electronic book has been rapid.

Many of these recent changes are now an everyday reality, but libraries and archives still adhere to the rules and conventions evolved during the printed era; the appearance and publishing procedures still resemble those created to deal with printed material. However, new restrictions have evolved; the most important of which are the paywalls created for protecting the

The current issue and full text archive of this journal is available on Emerald Insight at: **www.emeraldinsight.com/0264-1615.htm**

Interlending & Document Supply
44/2 (2016) 66–71
Emerald Group Publishing Limited [ISSN 0264-1615]
[DOI 10.1108/ILDS-02-2016-0006]





The authors are grateful to Dr Ewen MacDonald for linguistic advice. This research was funded by the Finnish Ministry of Education and Culture's Open Science and Research initiative [3].

Received 5 February 2016
Revised 24 February 2016
Accepted 25 February 2016

interests of the copyright owners and the work done by the authors and others involved in the publishing process.

The open access movement started to evolve side-by-side with the appearance of the paywalled digital science and the development of Web technologies in the 1990s. During the past few years, open access publishing has been placed firmly on the agenda due to the decisions and policies issued by some of the major research funders and even national governments (Laakso and Björk, 2012). In addition, publishing processes have developed so rapidly that today one can state that open access is viewed as a valid means of publishing one's research data, although there remain some criticisms raised about the validity of open access publications inside the academic community and by the publishing industry.

Open access publishing utilizes the same tools as traditional publishing, but its business model is very different; the publishing costs are collected from the authors and/or their parent organizations. The main difference is in the availability; when the documents are published, they are open to all and there are no fees for readers.

Digital repositories provide another way of opening publications to the general public. These are mostly organizational; they enable a university and its library to collect and disseminate their works openly. The repositories provide a so-called green way for researchers to publish or at least parallel publish their work (Nicholas *et al.*, 2012).

This also means that traditional interlending is starting to evolve and change. The digital repositories can be used wherever an internet connection is available: documents move rapidly and directly to readers. In addition, the peer-to-peer exchange of scientific documents has started to change the role of the library as an intermediator between academics.

We have recently seen a growth in different peer-to-peer technologies that have started to challenge traditional interlending and the digital repository philosophies of academic libraries (Jackson, 2004). Although by far the most widely used approach is direct peer-to-peer e-mail exchange of articles, the scientific community is also exploiting social media tools and applications, e.g. ResearchGate and Academia.edu, that combine the dissemination, evaluation, archiving and networking of the researchers and their output. Our paper focuses on this change by analyzing how academics in two Finnish universities disseminate their own documents and obtain the documents they need for their research.

## Resource sharing and its evolution

The basic idea of interlending has its foundation in the concept of a collection of printed resources and how this can be safely shared. Previously, due to the rarity of these types of resources, one needed specialized institutions, i.e. libraries, to manage the logistics of maintaining the collections including bibliographic access to these resources (Muhonen *et al.*, 2014). It is most likely that this type of activity will remain as long as printed collections exist.

Nonetheless, digitizing, i.e. permanent and customer defined, digital archiving and social peer-to-peer academic networks are starting to change this paradigm. In this type of operational environment, an individual can gain direct access to documents without any third party acting as an intermediary. The new social media tools for this electronic means of disseminating and publishing scientific documents challenge traditional interlending – we are entering an era of peer-to-peer resource sharing.

This means that there has to be a redefinition of the role of the library in the post-digital world moving from the concept of interlending to access to resource sharing. The change is depicted in Table I.

Printed materials needed – and still need – custodianship to maintain and store the printed documents. This environment also requires the presence of actual people to manage the logistics of scarce resources. The ultimate example of this is the premises that defined the use of some of the most valuable and unique examples of documents housed as national treasures in a venerable institution.

The digital and digitized closed environment requires libraries to function as paywall managers to grant access to their users. In addition, the role of the digital collection and systems manager becomes one part of the duties of a library. This environment sets enormous challenges to traditional interlending due to the copyright restrictions and agreement-based constraints on who can use the resources, in what way and for what purpose.

## Research questions and methods used

The data used in this paper were gathered via a survey conducted at the end of the spring term 2015. It was designed to be as short as possible to gather enough answers to allow a proper analysis. The questions are listed in Appendix 1. This paper focuses on the analysis of the access, dissemination and the impact on ILL of the documents used by the academics.

**Table I** From interlending of printed material to post-digital resource sharing

| Printed interlending | Digital access | Resource sharing |
|---|---|---|
| **Printed documents** | e-journal supplier/printed book warehousing | born digital |
| **Independence** | dependence | cooperation |
| **Storing and warehousing documents and collections** | digitization of the printed word | joint operation |
| **Local** | national | pathway to digital media |
| **Postal services** | using knowledge | global |
| **Storing knowledge** | e-mail and attachments | creating knowledge |
| **Buying separate documents** | buying services | digital workplace |
| **Library to library** | library to user | co-creating services |
| | | peer-to-peer |

The survey was sent to all professors in two Finnish universities; the University of Jyväskylä (JYU)[1] and the University of Eastern Finland (UEF)[2]. These institutions were selected on the basis of their similar size and multidisciplinary nature. JYU has seven faculties, 15,000 students and 2,600 staff. Its budget is €211m. UEF has four faculties, 15,000 students and 2,800 staff members. Its budget is €250m (Table II).

A total of 550 professors were employed in these two universities when this survey was conducted at the beginning of 2015. Retired professors who were still active were also included. The response rate was rather good; altogether 36 per cent of the professors replied to the questionnaire. The age profile and the division between the different disciplines were quite well-balanced (Tables III and IV).

There were two main research questions:

*RQ1.* How and where do professors acquire the documented resources that they need?

*RQ2.* How do professors disseminate their own publications?

## Results

Documented information acquisition was evaluated by asking how professors have used the following means of information seeking as the possible sources from which the participants had acquired documents during the previous six months (Figures 1–3):

**Table II** The number of professors and replies

| Universities | Professors | Professors who replied | (%) |
|---|---|---|---|
| **JYU** | 245 | 95 | 39 |
| **UEF** | 305 | 100 | 33 |
| **Not given** | | 3 | |
| **Total** | 550 | 198 | 36 |

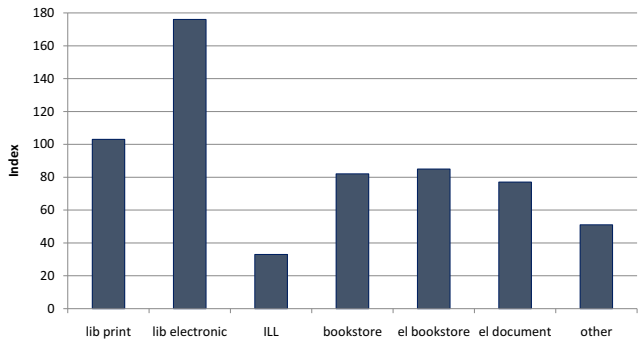
**Table III** Professors who participated in the survey by age group

| Age (years) | Persons | (%) |
|---|---|---|
| **35 or less** | 23 | 11.6 |
| **36-40** | 10 | 5.1 |
| **41-45** | 20 | 10.1 |
| **46-50** | 32 | 16.2 |
| **51-55** | 31 | 15.7 |
| **46-60** | 33 | 16.7 |
| **61-65** | 41 | 20.7 |
| **Over 65** | 8 | 4.0 |
| **Total** | 198 | 100.0 |

**Table IV** Disciplines of professors who participated in the survey

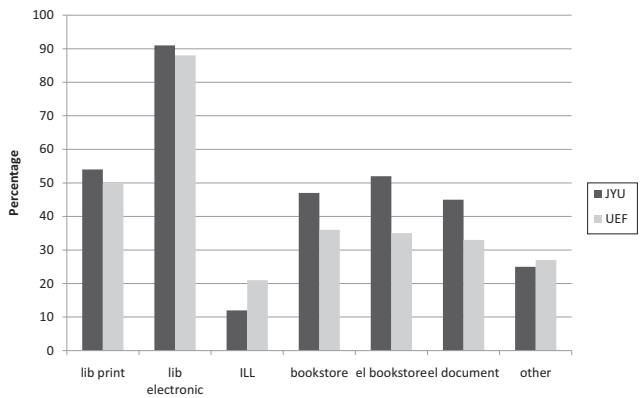
| Disciplines | Persons | (%) |
|---|---|---|
| **Science** | 50 | 25 |
| **Medicine and health** | 31 | 16 |
| **Social science** | 47 | 24 |
| **Humanistic** | 44 | 22 |
| **Other** | 26 | 13 |
| **Total** | 198 | 100 |

**Figure 1** The sources used by the professors to acquire documents



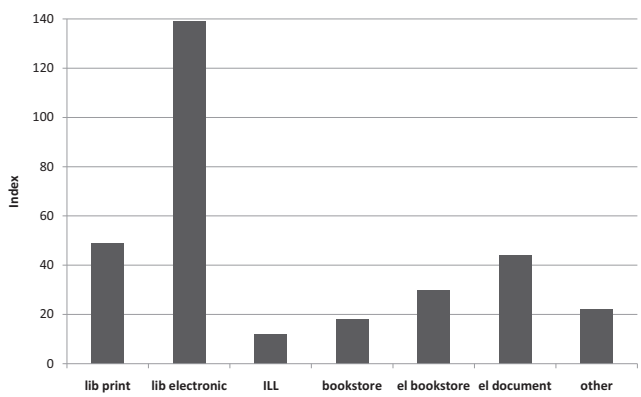

**Note:** Numbers on the X-axis are explained in the beginning of the Results section

**Figure 2** A comparison of how the professors in the two universities acquire documents




**Note:** Abbreviations on the X-axis are explained in the beginning of the Results section

**Figure 3** Relative importance of document acquisition




**Note:** Abbreviations on the X-axis are explained in the beginning of the Results section

- lib print – checked out printed material from the University Library;
- lib electronic – used electronic materials via the library;
- ILL – used ILL;
- bookstore – purchased books from a bookstore;
- el bookstore – purchased books from an electronic bookstore;
- el document – purchased electronic documents and/or materials; and
- other – other means.

Respondents could choose one or more of the above options.

The results are shown in Figure 1. It is clear that electronic resources were the most important materials for researchers. The vast majority of respondents (176 = 89 per cent) had used electronic resources during the six-month period of the survey. Printed materials checked out from library were also regarded as important being used by just over half (103 = 52 per cent). ILL was the least important means of document acquisition being mentioned by only 33 respondents, i.e. 17 per cent.

A substantial number (49 = 25 per cent) of the participants added "other means" to their choices, with 23 of them mentioning the internet. In practice, this meant open access journals, researchers' own Web pages and Google Scholar.

Ten professors stated that they have asked for articles from their colleagues or from the authors themselves. Academia.edu and ResearchGate were mentioned only once each. However, these numbers would surely have been much bigger, had they been among the choices in the questionnaire. Now the result gives the impression that these resources are not widely known by researchers as ways of acquiring information.

Figure 2 shows the information-seeking behavior, but with a comparison between the two universities. The general trends seem to be the same, although there are some discrepancies.

The professors at the UEF used interlibrary loans almost twice as much as their colleagues in JYU. The National Repository Library of Finland (NRL) is situated in Kuopio, very close to one of the campuses of the UEF. The UEF Library has very close connections with NRL, and therefore, it seems that this library has been better able to exploit the NRL resources. The JYU Library is farther away and does not enjoy this geographical benefit.

Professors at the JYU seemed to buy material for their own use somewhat more than their colleagues at UEF. The reason for this cannot be deduced from the survey; it is an interesting topic for further investigation.

The professors were asked to name the three most important means of document acquisition in descending order (1, 2 and 3). An index was calculated showing the relative importance of the different means using the formula: Index = $a_1 + a_2/2 + a_3/3$ where:

$a_1$ = number of times that this means was mentioned as being the most important;

$a_2$ = number of times that this means was mentioned as being the second most important; and

$a_3$ = number of times that this means was mentioned as being the third most important.

In this relative comparison, as depicted in Figure 3, the importance of the e-materials is highlighted even more than in the numerical comparison shown in Figure 1. Interestingly, the relative importance of purchasing electronic documents and/or materials is as high as borrowing material from a library. In addition, the purchase of printed books is less important than the purchasing of their electronic counterparts.

The least important means was interlending. Its importance seems to be diminishing due to the vast amount of digital information available to the researchers, and thus, the resources from other libraries are not needed as much as before.

Another topic in the survey was the means that the professors had used for delivering their own documents to individuals who asked for them. Professors could choose one or more means in the questionnaire. The results are shown in Figure 4.

Only 15 persons (8 per cent) had not disseminated their own articles during the six-month period of this survey. It can be concluded that this is now a normal, routine way for a researcher to disseminate his/her own research results to colleagues when asked. Although this has happened throughout the history of the sciences, e.g. by using offprints, it is so much easier in the digital era.

Again not surprisingly, e-mail is the most common way of delivery. Almost half (48 per cent) of the professors used websites (ResearchGate, Academia.edu and the like) for delivery and a third (33 per cent) still send the documents in the paper form (offprints, journals and hard copies). Practically, all answers in the category "Other" were different means of Web delivery: link to researcher's own website or open repository. It can be concluded that delivery is still highly concentrated on personal relations.

Figure 5 depicts the delivery type divided by the age groups of the professors. Professors between the ages of 46 and 55 years share less documents than their younger and older colleagues and this is irrespective of the means used to disseminate the materials. It can be assumed that at the age of 46-55 years, professors are active in running their own research groups, departments or even faculties, and they have less time for research. Interestingly, senior professors (age over 65) are at least as active as the other age groups. They are keen users of the paper format, but they also actively exploit other means.

**Figure 4** The ways used by the professors to disseminate their own documents to individuals who have requested them

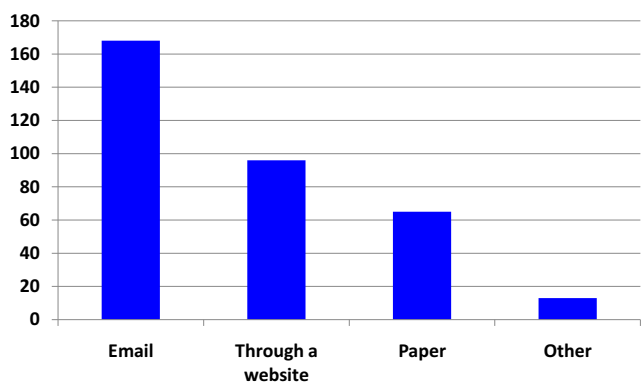
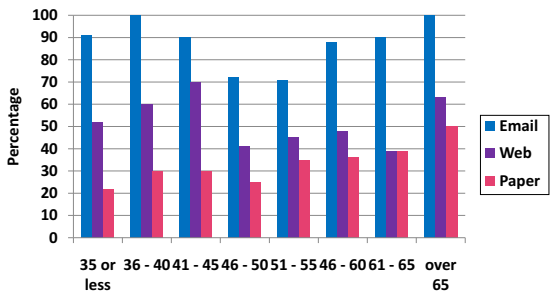


**Figure 5** Means by which professors have delivered their own documents to individuals seeking these materials by age




Web-based delivery seemed to be the most popular among researchers in the age group of 41-55 years compared with the other age groups. However, the difference was rather small for this type of activity. One can also assume that the researchers of that age probably have enough publications to be placed in Web services and they are young enough to use them.

## Discussion

Although it could be argued that electronic resources are the most important materials for researchers, it is clear that printed books checked out from a library are still being used extensively and printed journal articles are scanned and copied. Thus, especially in a multidisciplinary university, one cannot rely only on the digital resources (Talja and Maula, 2003).

Especially, from the point of the libraries, one important aspect of this study was that ILL was the least important means of information acquisition by academics. It was evident that there were some differences between the two universities, probably due to local cultures and types of services that the libraries were offering. Nonetheless, the overall conclusion was that professors in all of the disciplines use digital resources.

The personal delivery of one's own documents can be seen as a part of the professor's daily routines; 92 per cent of professors send their own publications to other persons, mostly by e-mail, but about half of the professors were exploiting websites for delivery.

Professors in the social science and humanities disciplines use more diverse means of delivering their documents than their colleagues in science, medicine and health. It also seems that those professors who have published open access papers are somewhat more active in delivering their own documents than their colleagues who have not used this publishing format.

## Conclusions

The emerging post-digital environment holds the promise of a world of academic freedom in its most idealistic sense: science and its results would be open to everyone. At present, this is more a dream than a reality, perhaps a never-to-be-realized fantasy, as the digital environment also needs an infrastructure that must be funded. In addition, there is already some evidence that especially the long-time costs of digital environment are not less expensive or more sustainable than those of its print counterpart (Goleman and Norris, 2010; Pinfield *et al.*, 2015).

The most challenging task for libraries is to analyze their present services, to determine how these are being used and how the academic community actually acquires and disseminates documented material. It seems that these aspects of a professor's work are more and more based on digital resources and on the personal dissemination of her/his own scientific results and achievements. There is a danger that in the future, the library is going to be side-tracked and neither needed nor used by the academic community.

Given that the survey results show academics are increasingly accessing and disseminating electronic resources, libraries will need to acquire new types of collection and access management tools, especially new networked tools and innovative ways of disseminating scientific documents:

- digitizing the printed resources and making them available openly when possible;
- developing the digital document repositories when possible;
- promoting open access and open publishing in a sustainable way – i.e. ensuring long-time preservation and preserving well-documented collections;
- networking;
- teaching researchers and students critically to use new software tools for peer-to-peer document dissemination; and
- enabling data mining and other techniques through which digital science can exploit digital resources.

This means that libraries and their staff need to adopt a more active role and tackle more diversified tasks. It also means that libraries will need to acquire new types of collection and access management tools, especially new networked tools and innovative ways of disseminating scientific documents.

## Notes

1 Available at: www.jyu.fi/en

2 Available at: www.uef.fi/en/etusivu

3 Available at: http://openscience.fi/

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## Appendix

### Questions of the questionnaire

Background information included following parameters:

1 Age;
2 University; and
3 Field of science.

Information seeking and distribution included the following:

4 During the past six months, I have:
- checked out material from the University Library;
- used electronic books via the library;
- used interlibrary lending to get material from other libraries;
- purchased books from a bookstore;
- purchased books from an electronic bookstore;
- purchased electronic documents and/or materials; and
- used other means to obtain source materials, namely.

5 Please number the three most important means mentioned above in the descending order (1, 2 and 3);

6 During the past six months, I have delivered my own documents to persons who have asked for them:
- via e-mail;
- through a website (ResearchGate, Academia.edu, etc.);
- in paper format (offprints, journals, hard copies, etc.); and
- in some other means.

7 If you have any comments on information seeking and distribution, please, do add them here.

Parallel publishing and networking information was obtained using the following questions:

8 How many joint articles have you published with person(s) from a foreign university or universities during the past six months?

9 How many international co-operation research projects have you worked in during the past six months?

10 How many research papers have you published in an open access journal during the past six months?

11 How many of your research articles have been placed in the digital repository of your University during the past six months?

12 If you have any comments on parallel publishing and networking, please, do add them here.

## Corresponding author

**Jarmo Saarti** can be contacted at: jarmo.saarti@uef.fi