Electronic publishing in Brazilian academic institutions: changes in formal communication, too?

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Abstract
The use of electronic facilities for informal communication amongst academic researchers is a common place already. That is, according to a number of studies in different disciplines around the world, the adoption and use of electronic communication in the informal stages of the scholarly communication system is prevalent. Nevertheless, the same studies that testify such a ubiquity of the informal electronic communication in the academic world also show that the adoption of these media in the formal stages of the communication process, though occurring, has been slow and cautious. The reasons for that are many and have also been extensively discussed. In reality, these studies point out that the adoption and diffusion of electronic media for formal communication are in progress and therefore needs to be assessed in order to see to what extent, and in which way it has been occurring. The study discussed in this paper aims to provide a picture of the adoption and use of electronic facilities for scholarly publishing in Brazil within the academic environment. As an exploratory research, the study aims to see whether there have been electronic publications being produced by academic institutions – universities and learned societies- and, if so, which sort of publications have been mostly provided, what are their major features in terms of format, content, availability, accessibility, etc, and whether they can provide any basis for the identification of disciplinary differences in publication patterns. Since none of the sampling frames available from departments and institutes within the Ministry of Education and the Ministry of Science and Technology hierarchy, a number of procedures have been applied in order to define the sample. It actually consists of those academic institutions that have produced scholarly electronic publications - namely books, journals, serials, annual proceedings and secondary sources such as abstracts, reviews, etc. Some partial results show that so far, there has been electronic publications being produced by Brazilian academic institutions, but the adoption of pure electronic formal communication amongst academic researchers seems to be far from become ubiquitous, as can be observed in relation to the informal communication.

0. Introduction

This paper presents partial results of an ongoing research project that has been carried out in Brazil. The research constitutes an exploratory study of electronic publications produced by Brazilian academic institutions, namely universities and learned societies. Its main aim is to see to what extent scientific and scholarly publications such as journals, books and

conference proceedings have been produced and made available by those institutions either on the Internet or CD-ROM. The study also aims to analyse and describe, in the light of some insights from the literature on scholarly publishing, the main features of those publications from the perspective of both the project researchers and the editors of a small sample of the publications identified.

The research motivation came from three basic assumptions. Firstly, it has been assumed that technology infrastructure has increasingly been made available within those institutions environment and it might have an effect on the will for using it, as stated by the technological determinism approach. Secondly, electronic media has already become ubiquitous for informal communication amongst academics world-wide and it is time to see to which extent this adoption has migrated to the formal stages of the communication process, too. Finally, production costs of electronic publications have increasingly dropped over the past few years and it may also have an influence on the use of electronic media to provide research information.

As an exploratory research, the methodological procedures used for carrying it out was a tentative, and loose-jointed one, especially in terms of the construction of the research sample. It has been oriented by the qualitative paradigm in the sense that the study looks for identifying data from the publications identified themselves, which can be then analysed and used to describe them in terms of a selected set of features. It is expected that data from both the publication analysis and from the publishers points of view will contribute to some understanding of the use of electronic media for formal communication within the academic world in Brazil.

It is important to notice that it is largely known that electronic media have already been increasingly used for scholarly publishing. Most of the major printed scholarly journals, for example, are also available in electronic format, along with a number of other purely electronic ones, as well as a growing number of other electronic publications such us conference proceedings and some initiatives with monographs. However, a number of studies have pointed out that, although electronic media has been commonly used by academics for informal communication, its adoption as a formal medium for both publishing and reading research results still seems to be a matter of time (e.g. Costa, 2000; Hurd, Weller and Crawford, 1996). Nevertheless, changes in technology and its use grow quickly and need to be followed closely. This has been the foremost commitment of this study.

1. Background from the literature

It has been predicted by Richardson in the late 1980s that computer-mediated communication would soon be commonplace in organisations which have significant members of knowledge workers as members, such as higher education institutions (Richardson, 1990). In fact, the policy of universities over the past decade in most countries in the world has been towards provision of networked computers for all researchers. One can therefore state that Richardson's prediction has been fairly accomplished. As a result, there has been an increasing use of electronic communication amongst academics world-wide, despite the difficulties faced in Third World countries. In this regard, it is interesting to point out recent results from a study carried out amongst Brazilian academic researchers from the social sciences, which did not find significant differences between those researchers and their colleagues from the UK in terms of the use of electronic facilities for research communication (Costa & Meadows, 2.000).

In fact, over the last seven years or so -that is, mostly from Schauder (1994), which seems to be a sort of seminal work in this theme, as his work has received many citations in

the literature so far- a growing number of studies have highlighted the increasing use of computer-mediated communication within the scholarly community. Such a growing use of computers and electronic networks for communicating research, however, has been mainly driven to the informal stages of the process, from the initial discussion with colleagues to the submission of manuscripts to publishers (See Costa, op. cit.; Vorbij, 1999; Kaminer et al, 1998; Lazinger, 1997; Cohen, 1996; and others).

What about the formal stages, i.e., final publication? Well, there is plenty of evidence in the literature of the growing efforts in the use of electronic media for publishing scientific and scholarly literature, too. It appears to be an inexorable trend. There has been a sort of a slowly replacement process taking place, although there are differences related to both, the stages of the communication process and the type of publication. Accordingly, such a substitution can be observed regarding a continuum that ranges from books to conference proceedings. The print-on-paper production of the latter seems to have already been almost totally replaced by the electronic media (though there still is a co-existence of the electronic and the print-on-paper versions amongst those who can afford both) while in relation to the former such a substitution seems to be far from happen. In the middle there are the journals, which have shown a growing, yet slowly trend in this replacement process though, again, the same co-existence of print-on-paper and electronic versions are observed. In reality, so far it appears to be more appropriate to talk about complement than to consider substitution.

It is interesting to draw attention to the fact that, as any other issues regarding technology use, there are enthusiasts and adversaries of electronic publishing. Amongst the formers, it has been highlighted that

> "Although printing has for three centuries been an agent of change in scholarly communication, we should remain mindful that central values of scholarly communication ... pre-dated the first learned journals; so, too, can they post-date the paper paradigm. The journal as we have known it was successful because it was the best technology available to do the job. This is no longer the case." (Morton, 1997)

From the latter group there is a counterclaim that 'there is an apparent reluctance within the academic community to accept a replacement to paper-based journals' (Elliot et al, 1997).

Although such a debate relates to journals, it can easily be extended to other types of formal communication such as books. In relation to books, however, the reluctance is by far and large greater than that regarding journals and it seems that it is not the case of conference proceedings at all. In any case, what counts is that electronic publications have been increasingly produced and it directs the debate to issues regarding technology adoption and adaptation, as proposed by Borgman (2000, p. 9), who reminds everyone that 'underlying the design of any information technology are assumptions about how and why people use it'.

The adoption of information technology has been extensively studied and reported by Rogers (1995), who presents his results according to a model consisting of five stages. First, there is the knowledge stage, which consists of awareness of the existence of a new technology. Second, there is the persuasion stage, regarding a sort of assessment process developed by each individual in terms of technology characteristics and benefits. Third, the decision to accept or reject technology forms the stage that would allow going ahead in this adoption process, or not. Fourth, if, and only if accepted first, there is the implementation stage; and finally, there is the commitment to use (a confirmation to continue to use, if considered sufficiently useful). As highlighted by Borgman (op. cit.), in the case that the technology innovation is rejected (third stage), it is likely that the individual still may revisit the decision and adopt it later.

Informal communication amongst academics provides a good arena to observe the completely adoption of electronic media for scholarly communication purposes. The use of

email, for example, has become pervasive and this may reflect a 'global' adoption process that have already achieved its fifth stage. As regarding formal communication (publishing), however, the actual picture shows a slower adoption process than that relating to the informal. In this sense, one could dare (because without empirical evidence) to state that, taken in general terms, the process can be seen as in its third stage since it has still been rejected by many (keeping in mind differences relating to the type of publication stated above), while has found some acceptance in terms of the number of initiatives already implemented world-wide. That is, it does not yet show sufficient evidence of large scale implementation and confirmation to use (fourth and fifth stages of the adoption process), despite the apparent irreversible trend of this technology to prevail. Therefore, the majority of those involved in this discussion hitherto recognises that there will be (for some time to come) a co-existence of electronic and print-on-paper media.

As a provoking argument then, let us just go back to the last sentence in the paragraph before last and simply consider that those who have rejected electronic publishing so far, may revisit the decision and adopt it later. It actually would anticipate how the future might look. However, before such a scenario takes place, the amount of electronic publications produced and available can be taken as one way of looking at the level of adoption of computers and electronic networks for publishing research results to date. This, in turn, provides a feasible arena upon which studies have been carried out. In fact, electronic publishing constitutes an extraordinary topic for research, since it brings about paradigm shifts and, as such, challenges some of the (well) established issues in information science, at least.

One of these issues refers to the peer review process, which has appeared as an invariable question in a number of studies of the scholarly communication process in terms of changes brought about by the introduction of new technology within the academic environment. One example is that, although the information technology available allows free distribution of completed research reports, it is the classical model of the peer review process that has still mostly driven both their acceptance as 'scholarly work' and concerns regarding the recognition/reward system. This, in turn, has kept the communication process as a whole a hybrid one, in the sense that it has been partly based upon the print-on-paper paradigm and partly based upon the electronic/digital paradigm. Harnard, Varian and Parks (2000) and a number of other authors have contributed to a heated debate that shows how significant this topic is to be followed-up in any research that focus on electronic communication amongst academics.

Technology itself constitutes another (obviously) relevant issue in studies of electronic publishing. Changes in technology always bring about new discussion, by the extent to which it leads to changes in the research communication environment, too. Besides that, the endeavour for keeping abreast of technology innovations gives rise to a great dynamism in the process, which, in turn, produces more research interest. As a result, the use of technology is a mandatory issue in the study of electronic publishing. Questions like digital image production (see Chapman & Comstock, 2000), information extraction software (see Adams, 2001), metadata models such as the Dublin Core Metadata Initiative (see Weibel & Traugott, 2000), authors/institutions self-archiving models such as the Open Archives Initiative (see Van de Sompel, 2000) and a number of others are relevant to take into account in the study of electronic publications that have been made available.

In summary, the study of the literature in electronic publications brings insights to the discussion about changes in the scholarly communication systems in terms of its formal stages, and constitutes a fertile ground for discussion. It takes account of issues regarding adoption versus rejection of technology, the ethos of the scholarly communication environment, especially in terms of the peer review process and the rewarding/recognition system and, as a mandatory question, developments in information technology.

2. Methodological procedures

Studies of the use of electronic facilities by academic researchers have dominated the literature in information science over the last decade. A number of methodological procedures have been used in these studies, according to the focus chosen, the context involved, the theoretical foundation and, obviously, the nature of the problem investigated. In this study, which relies amongst the pioneers of this type in Brazil, an exploratory design has been chosen. The main reason for that was the lack of previous results upon which some analysis and discussion could be done. A qualitative approach has been adopted, since the data collected and analysed constitute a simple description of the main features of the publications identified from the perspectives of the project researchers via assessment of the publications themselves, and of a small sample of editors interviewed via email.

The theoretical approach: models of the communication process and use of technology

The study of electronic publications in information science constitutes one of issues encompassed in the body of knowledge in scholarly communication. In this sense, it can be looked according to any model of the scholarly communication process. One of these models has been proposed by Garvey & Griffith (1979) who have studied a variety of channels by which scientific information is communicated and ended up with a model that has been used as a basis to a variety of studies across the physical and social sciences. Throughout the 1990s, when the focus on scholarly communication has been driven by the use of technology, a number of investigations that looked at such a use of information technology for communication purposes within the academic environment have based the analysis in Garvey & Griffith communication model.

In this regard, Tenopir & King (2000) observes that, 'electronic alternatives ... can affect and be affected by the communication channels and distribution means'. In reality, the introduction of information technology into the academic environment has brought about changes in the scholarly communication process at all its stages, from the most informal to the most formal. Some of these changes have been the focus of the investigations carried out by Hurd (1996), who proposed new models that emerged from the Garvey & Griffith one, namely the 'no-journal' model, the 'unvetted' model and the 'collaboratory' model, all of them entirely electronic-based. Accordingly, the authors suggest that the scientific communication will, and should, evolve from a printed-based system to an electronic system. They highlight, however, that this evolution will be gradual, and acknowledge that print and electronic information sources are likely to co-exist for some time to come, although major changes in the scientific publication sector will probably occur.

Taking into account this co-existence, a hybrid model has been proposed by Costa (2000), in which the informal stages of the communication process are almost entirely electronic-based whereas the formal ones have still been mostly print-based, yet gradually evolving into an electronic one. In this sense, according to some of the results of Costa's study, this scenario stands for a complementary picture of these media rather than for a substitution process. Therefore, as the pervasiveness of the electronic media in the informal communication has been widely recognised, it seems needful to track changes in the formal communication, too.

The universe of the study and sampling procedures

The research reported in this paper aimed to identify and analyse, in the light of a set of selected features, the occurrence of electronic publications produced by academic institutions in Brazil in the fields of biology, physics, sociology, economics, linguistics and philosophy. The main reason for including these disciplines was to have the three divisions

of knowledge represented in the sample. It was decided to include two disciplines of each division in order to look for probable differences between and within each division. The universe of the study consisted of two types of establishments: higher education institutions which offer courses in these six disciplines, and learned societies comprising each of them.

Two kinds of initiatives have been initially, and simultaneously, tried in order to sample this universe. The first one was to look for a site on the Internet where an inventory of every course in the disciplines offered by academic institutions in Brazil could be available. It aimed to answer the question, 'how many and where are the university departments which offer courses in these disciplines'? These answers could then be used to contact them and ask about the occurrence of electronic publications produced in their compass. One government site provided the first results: the *Prossiga*[1] ('go ahead', in Portuguese) project, from CNPq (National Scientific and Technological Development Council), but, as the data available were both incomplete and out-of-date (in terms of the URLs and email addresses available) other government sites were tried, mostly from the Ministry of Education hierarchy. The *Scielo*[2] page also offered some hits, but all these data were either incomplete or out-of-date.

The second initiative consisted of inquiries made upon search engines in general sites such as Yahoo! Brasil, Google and Alta Vista by searching each discipline as a specific term (sometimes combined with terms such as 'department' or 'society'.) in order to identify both learned societies and university departments. This, obviously, provided some results, especially up-to-date URLs that led directly to the sites looked for. However, again, it did not give a complete inventory.

A personal inquiry was then decided to be made via telephone to the Higher Education Secretary, within the Ministry of Education. (It had been tried via email before but the reply was misleading because it did not take into account the six disciplines, only). As a result of this inquiry, an Excel file containing the inventory of every course offered in Brazil on the six disciplines investigated was sent to the research co-ordinator through email. As this inventory was arranged by discipline, and each university offer different courses, either at different levels or in different sub-disciplines, it contained around 2.250 entries. The file was therefore 'cleaned', in order to eliminate all duplications in terms of institutions. This allowed to end up with a inventory of 426 entries. From this list, a number of inquires were made upon search engines on the Internet to identify the specific, up-to-date URL of each institution, visit their sites, and contact them. Although it has not been a straightforward task, it allowed to send a message to all 426 institutions selected asking for information about either the department of interest (if not available on the institution web site directly) or the occurrence of any electronic publication (if there was a link to departments). The process described above was evidently iterative and, at the end, provided a final sample of 76 electronic publications, comprising 53 journals/serials, two books and 21 conference proceedings, all available on the web.

Because of many technical problems with electronic communication throughout the process of sampling, the chaos that has been found in this medium, the lack of 'computer intelligence' that can be observed in the construction of web sites in the country in many senses, etc., etc., it does not constitute a reliable sample. It can in fact be seen as the most that could be achieved, given all the difficulties found. It does not include publications on CD-ROM, either. None of the replies from university departments referred to publications

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[1] *Prossiga,* http://www.prossiga.gov.br, is a government project from the Ministry of Science and Technology that aims to be a discussion forum for scientific and scholarly information.

[2] Scielo (Scientific Electronic Library Online), is a Brazilian digital library, http://www.scielo.org.br, which aimed to build and make available an electronic collection of Brazilian scientific and scholarly journals.

on CD-ROM. However, it is well known that there has been a growing number of conference proceedings on that format, and this required a different approach, which was towards searching a database on scholarly events that is made available by the Nuclear Information Centre, from the National Committee of Nuclear Energy. As the availability of this information on the database depends on libraries that belong to a consortium on this, another strategy has been to contact those libraries individually in order to identify which proceedings are available on CD-ROM format. As an alternative approach, it has also been decided to contact researchers from the university to which this project researchers belong to, in order to ask them about the occurrence of CD-ROM conference proceedings in their disciplines. These procedures are underway and the results obtained will be described in the oral presentation of this paper during the conference.

3. Analysis of the preliminary results

3.1 General criteria, applied to all types of publications

The analysis presented here is a coarse one, in the sense that it has not yet been completed. Besides this, data obtained by asking editors have not yet been analysed, since these procedures are still in progress. This section therefore just presents the results of a first glance at the data collected from the publications themselves, up to now. Nevertheless, it does provide a suggestive general picture of scientific and scholarly electronic publishing in Brazil.

The results described below have been based on the criteria used to analyse general features of the publications identified. They actually offer a rough overview of the electronic publications made available by academic institutions in Brazil, only, and are expected to provide a basis for further analyses that are intended to be done.

Form of access
    This feature has been analysed to allow having a picture of the predominant form of access to electronic publications that has been produced in the country. That is, whether the electronic publications produced by academic institutions are available, paraphrasing Harnard and his colleagues, for free or for fee (S/L/P, i.e. subscription, site license, pay-per-view). So far, the totality of the publications identified are freely available.

Handling mechanisms
    This refers to mechanisms available for handling the content of the publication in terms of downloading as a file, directly reading on/printing from the screen, searching the content, and interacting with other publications eventually cited through links within it. Here a mixture of all these options is found. However, most of the searchable publications are those journals available on the Scielo site. Only very few publications identified include links to other publications cited either in the body of the text or in notes and references. Most of them are either downloadable PDF files or text files displayable on the screen, and that can be printed out.

Idiom of the content
    The Internet offer a great opportunity of visibility for authors. However, there is a language barrier for those who do not publish in English. Therefore, it appeared important to see whether there has been an influence of this on the scientific and scholarly Brazilian electronic publications. The data analysed so far showed that, although the majority of publications are available in Portuguese, there are a number of journals, mostly in the

sciences, i.e. Biology and Physics, and which are amongst the most prominent journals in those disciplines in the country, published originally in English.

Type and structure of content

This relates to whether the information provided is a full text document or the abstract only. There is a mixture of forms in this regard, too. In terms of the major journal titles available, the majority are full text documents. The two books included in the sample also comprise full text files. However, a number of links to publications available on some university sites refer to a sort of propaganda. That is, what is made available is the book cover (photograph) and summary, only, information for subscribing to journals, journals' table of contents, etc. There are also a number of journals that provide only the abstract and keyword of the articles. Some of the conference proceedings identified provide the full text of papers. The great majority of the publications consist of a sort of image file of a printed model, without any navigation tool.

Sponsor institution/Publisher

Most of the publications identified are published by a university department or institute. However, there is also a number of publications found that have been published by a learned society, especially those in biology and physics. According to the literature, the new information technology allow university presses to (re)take their function of delivering research information generated in their environment. However, according to the small number of electronic publishing initiatives found, universities in Brazil are not yet benefiting from this. As pointed out by Stumpf (1997), some universities have created their own journals, assuming an important role in the scholarly communication system. Within this context, individual editors have been key participants in the production of the Brazilian university journals and are often prominent researchers in their fields. It is expected that data collected from them will certainly contribute to complement, and better explain, this situation.

Web site

There is a great number of journals available on the Scielo site. Others, alongside the conference proceedings identified, can be found in universities or learned society sites. Nevertheless, the way of building these web pages or of just putting up the journal/conference proceedings, not always allow to find them by entering those sites. Here, a sort of lack of computer knowledge or 'intelligence' can be clearly observed.

Peer/Publisher review procedures

This information is available in part the publications found, only. In fact, some of them do not provide any information to authors and readers about the publication, its policies, norms, etc. However, all the scientific and scholarly journals available on the Scielo site are refereed, as well as a few of other journals, with plenty of information about review procedures. The two books found do not have any information about this, neither the conference proceedings.

Format

This relates to whether the publication is available either on CD-ROM or online (the Internet). As stated in the methodology section of this paper, publications analysed here comprise only those available online on the Internet.

Technology

This criterion of analysis relates to the sort of software used for digitising the content. It also aims to identify the language and format used to deliver the content of the publications, e.g. if it is html, xml; pdf, doc; etc. As stated above, most of the publications are PDF files. A number of others are available in Word for Windows or other text formats. Again, a poorly technology usage is observed. It will be the editor's interview, however, that ill allow better understanding.

3.2 Criteria applied to journals/serials only

Version

This criterion has been applied in order to see whether the journal or serial is electronic *ab initio*, a previously print-on-paper journal that has migrated to electronic media, or a hybrid one: printed-on-paper and electronic. As this information is mostly neglected in the journals identified, it has been left to the editors interview that will be analysed later on.

Interval of publication

Since the majority of journals identified appear to be electronic versions of print-on-paper ones, the majority is based upon this kind of publication model. Accordingly, most of them are made available at regular intervals.

Organisation of the content

Because of based upon the print-on-paper model, most scientific and scholarly journals are organised in terms of volumes/issues. None appeared to have adopted the deconstructed model proposed by Smith (1999) up to what this analysis has allowed to find.

Type of information

The majority of journals found publish articles, and only articles. Others are informative only, in the sense that they only publish news. A number, which have not been looked for, have been identified, and those publish secondary information only: abstracts and/or references and notes.

3.3 Criterion checked against books only

The only criterion used to analyse books is that concerning authorship, whether it is individual or organisational. At the individual level, there is also the observation of the occurrence of team work. The two books found are co-authored.

3.4 Criteria checked against conference proceedings only

Two arbitrarily selected criteria have been used to study conference proceedings. The time for delivery, whether before or after the conference itself, and, depending on the case, whether it includes discussion, video record of the speeches, or other complementary information.

4. Some remarks

There is a gradual adoption of electronic media in the formal stages of the communication process within the academic environment in Brazil. As a result, electronic

publications, especially scientific and scholarly journals, have been increasingly, though slowly, made available. In terms of the peer review process, most publications that provide information about it are those scientific and scholarly journals available on the Sicelo site. In fact, the Scielo Project represents a milestone in Brazil in terms of electronic publishing initiatives.

Nevertheless, there still is a great need for technology development which is necessary to this sort of initiative in the country. Even the information technology internationally available for handling metadata, building self-archives, extracting information, marking up documents, constructing (intelligent) homepages etc., especially those which need to be translated to Portuguese, appears to be poorly adopted and used so far.

Apparently, there has been a great need for computer intelligence. The chaos found in this environment, particularly in terms of intelligently delivering information on the Internet, must be a result of this lack of expertise in all these matters. There has been government initiatives within the Ministry of Education, the Ministry of Science and Technology, and a number of Universities. However, they need to grow fast, otherwise the country will be kept behind.

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