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**ABSTRACT**

The Faculty of Medicine Library holds approximately 1100 living and approximately 2500 arrested journals. As a hospital library, it is focused on the information actuality and availability. As an academic library, it is responsible for emphasizing the value of an intellectual heritage. As a public non profit institution, it must guarantee open access to knowledge. How do we face these functions when decreasing buying power commands to continuously reduce the number of institutional subscriptions to periodicals? We propose to describe the different analyses performed to support decision making as well as the first attempts to organize consortium-level access to expanded electronic collections. From now, purchasing will be strictly correlated to usage, quality and interest. Consultation survey over a one year period allows to discriminate between the titles which are not, occasionally or regularly consulted. The hypothesis will be verified that journal use is dependent from criteria such as fame, quality and indexation in major databases like *Medline*. General quality assessment is possible for the journals indexed in the ISI databases, which will be ranked according to their impact factor and relative position in the Journal Citation Report's subject category listings. But an in depth analysis is also necessary at the Faculty level. Where do the physicians and Faculty members publish their results? What do they read? The *Web of Science* provides tools to answer such questions. Cited publications of the Faculty will be identified and sorted by journal title. In addition, interest for individual journals will be measured from how many times their contents is cited in the articles published by the Faculty. Statistical analyses of interlibrary loans will also be included in the overview.

As a consequence, hundreds of "second range" periodicals will be cancelled while the part of the budget dedicated to medical databases will be maintained, even increased if necessary. Indeed, these tools guarantee the access to knowledge, with the disadvantage that the library becomes the hostage of commercial companies for the access to primary information. Consortia have been signed by the universities of the Belgian French Community for the access to a core of major bibliographic databases and to electronic journals. The first statistics about *ScienceDirect* customer usage reports will be presented. But, in the absence of major governmental funding, the benefits of the consortia or of any kind of centralized purchasing remain limited. Moreover, they introduce discrimination between editors. The presented strategy appears as an answer to an emergency situation and long term solutions must be searched elsewhere. They will be discussed.

## INTRODUCTION

Medical libraries differ from each others by the type, size and content of holdings which are constituted and developed according to various criteria or circumstances. In our case, the historical point of view can not be ignored as the Faculty Library was created by merging documentation centers scattered amongst tens of medical departments. The backbone of the collections results then from choices made over decades. The educational mission of the medical school implies that preclinical sciences must be represented in the collections as well as biotechnologies are requested to support research. The close vicinity with the University Hospital Center brings up different populations of patrons made of physicians, physiotherapists and nurses who expect to find informations on all possible medical topics. On the other hand, the demand for remote access to electronic resources increases continually. The difficulty consists in satisfying all these expectations when budgets are regularly cut off.

Long after their American colleagues, the Belgian universities in the French Community decided to pool their incomes and negotiate centralized purchases of electronic periodicals and databases. The advantages and inconveniences of the current consortia will be discussed further.

Anyway, the recurrent financial cuts, on one hand, and the obvious advantages of the virtual library, on the other hand, lead to an inevitable reorganization of the expenses. The challenge consists in selecting the electronic resources that can not be missed and in pointing these titles that should remain on the library shelves during the shift from the traditional to the virtual library. Attention must be given to conditions that guarantee democratic and open access to information. Our strategies on these matters are presented below.

## METHODS

*FileMaker Pro* (Filemaker, Inc) has been chosen a long time ago to handle all kind of data in the library. *FileMaker Pro* offers intuitive and powerful development tools for creating professional custom solutions to be used by everyone in the library whatever the informatics skills. The acquisition department collected in a single database, named *GestaMed*, all types of criteria necessary for the maintenance and development of the periodical collections. Prices have been recorded over years allowing retrospective financial analyses. Beside bibliographic data, *GestaMed* indicates if a title is indexed in major databases like *Medline* or *Current Contents* or recorded in the Belgian

collective catalogs. For the journals indexed in the ISI databases, quality indicators are provided through their impact factor and relative ranking in the *Journal Citation Reports's* subject category listings. Keywords are also assigned to every journal allowing a classification by subject to evaluate the coverage of the different medical disciplines.

Advantage has been taken of the recent subscription to the *ISI Web of Science* for an in-depth analysis of the interest in medical journals. The *Web of Science* offers unique features like accesses to every author's address, full articles' cited bibliographies and articles' citation index. The method to extract and analyze that information is detailed in the following « Results » section.

*FileMaker Pro* was also used to record and analyze the interlibrary loans and the results of a one-year consultation survey.

## RESULTS

### A. Consortium purchase of electronic media.

From 2000, priority has been given to the collaboration between the Belgian universities in the French Community and to the centralized acquisition of databases and electronic periodicals.

In the absence of new external funding, the scope and choices of databases remained limited to products of general interest in order to satisfy essentials needs in the different fields (Table 1).

Database	Source	Provider	Discipline
<b>Bibliographie de Belgique</b>		Silverplatter /COI	Multidisciplinary
<b>CABCD 1990+</b>	CABI Publishing	Silverplatter	Agriculture, forestry, life sciences
<b>Current Contents Connect 7 editions</b>	ISI	ISI	Multidisciplinary
<b>ECONLIT</b>	American Economic Association	Silverplatter	Economics
<b>ERIC &gt;1966+</b>	U.S. Department of Education	Silverplatter	Education
<b>FRANCIS &gt;1984+</b>	INIST-CNRS	Silverplatter	Humanities, social sciences
<b>INSPEC &gt;1966+</b>	Institution of Electrical Engineers	Silverplatter	Physics, electronics and electrical engineering, Information technology
<b>Medline &gt;1966+</b>	National Library of Medicine	Silverplatter	Medicine, nursing, life sciences

<b>MLA International Bibliography</b>	Modern Language Association of America	Silverplatter	Humanities
<b>Psychinfo</b>	American Psychological Association	Silverplatter	Psychology
<b>SciFinder Scholar</b>	American Chemical Society	CAS – American Chemical Society	Chemistry, life sciences
<b>Web of Science</b>	ISI	ISI	Multidisciplinary

**Table 1 : Core collection of databases shared by the Belgian universities**

Beside this core collection, part of the budget is also set aside for essential medical databases distributed by Ovid Technologies. Even though *PubMed* is widely used by the scientists, *Medline* (Ovid) remains the first choice in the library for the educational qualities of Ovid search software and interfaces. The Windows version is available locally for teaching purposes and remains the favourite tool of the librarians for advanced searching. The combination of the *Medline online* version with the *OpenLinks* tool provides links from citations to full text articles and special limits to topic reviews in Ovid Evidence-Based Medicine products (*Evidence-Based Medicine Reviews* and *Clinical Evidence*). To complete the panel, the *AMED* database brings complementary information in the fields of physiotherapy, rehabilitation, "alternative" medicine, and other professions allied to medicine.

Regarding online publications, a three-years consortium has been signed with Elsevier for the access to all the editor's electronic journals through the *Science Direct* portal site. The winner is the user who has gained access to over one thousand of titles and benefits from the performance of a full text search engine.

From a financial point of view, the inflation rate has been limited by contract and the electronic access opened at low cost. But the final bill does not present a real saving. Moreover, since the funds are limited, it is clear that the *Science Direct* consortium has been signed to the detriment of other publishers or products. This is one possible criticism, all the more because *Elsevier* titles are not equally interesting or valuable.

On the other hand, electronic publishers do not provide the libraries with trustable and permanent archives. Archiving has thus an additional cost whatever the publication format, paper or electronic.

Moreover, the licence conditions imposed by the editors constitute the most controversial point. They drastically limit the authorized users to the members of the subscribing institutions. Not only, these clauses prevent the library from any kind of amortization of its huge investments. But they result in a discrimination between the library patrons, not all of them being members of the university. This is opposed to the democratic rule sustaining the function of a public library. The library loses the free disposal of what it pays for. Information and knowledge become commercial values accessible only to authorized users or to those who can afford them.

### **B. Searching the *Web of Science* for Faculty members' publications**

In the *Web of Science*, all the article's authors have their professional address displayed in a specific field of the citation. This unique feature allowed us to trace the publications of the Faculty of Medicine members and to list their

favourite journals. However, the address format is not standardized and a long tedious preliminary work consisted in considering all the formulations. We listed every department in the Faculty with the names of the leaders, professors or senior scientists. These names were searched in the « Authors » field of the database and the content of the « Address » field was analysed for the used terms. The combination of the building ID number and the city was sufficient in many cases (B35 AND Liege) to identify Faculty members' articles. The « SAME » operator was useful to associate different entities or locations (chu SAME Sart SAME Tilman ; hosp\* SAME univ\* SAME Liege). In several cases, we had to precisely name a department while excluding its homolog in the Veterinary Medicine Faculty (Neurosurg\* AND Liege NOT Vet\*).

The 3 databases, constituting the *Web of Science* (*Science Citation Index Expanded*, *Social Science Citation Index*, *Arts & Humanities Citation Index*), were searched simultaneously between 1996 and 2001 for 55 different address forms resulting in a pool of 5754 « interesting citations ». 60% of them were duplicates that had to be sorted out as explained below.

### C. Exporting citations for further analyses

The *Web of Science* has not been designed for bibliometric studies and the content of the « interesting citations » was not readily accessible for quantitative analyses in *Excel*. Neither was possible a direct transfer from the *Web of Science* to a spreadsheet. *Reference Manager* (ISI) was thus used to select the relevant information and to eliminate the duplicates generated by the overlaps between the addresses used for searching. *Reference Manager* allows to designate the fields to be extracted from the *Web of Science*. The « Authors », « Title », « Journal Name » and « Address » fields were exported as well as the « Cited references » field which contains article's bibliography. Batches of 100 citations were transferred at once to guarantee the integrity of the information during the export. At each step, *Reference Manager* was able to detect and eliminate duplicate citations. At the end, a last manual screening of the addresses was necessary to point out irrelevant citations which were also erased. The definite database contained 2286 records corresponding to as many articles published by the Faculty of Medicine members from 1996 to 2001.

For each citation, *Reference Manager* created a « Notes » field containing two types of information : the name of the journal containing the article and the article's bibliography. The data had to be exported into *Excel* for sorting the journals by name and counting their occurrence. This part of the work was very tedious since the relevant periodical names were mixed with unwanted data. Several manipulations were necessary to distribute the right information into the right columns of the spreadsheet. A detailed protocol will be provided upon request ([F.Pasleau@ulg.ac.be](mailto:F.Pasleau@ulg.ac.be)) to whose might be interested in. At the end of the process, two lists were available : the list of sources (journals containing the Faculty members' publications) and the list of cited journals (journals cited by the Faculty members in their bibliography).

### D. Quantifying interest

We tried to evaluate our local users' interest in journals by addressing the following questions : *Where do they publish their results ?* and *What journal do they read ?*

The first question has been answered by analysing the list of sources mentioned above and by counting the occurrence of every title. The results indicate that the 2286 articles written by the Faculty members between 1966 and 2001 have been published in 737 different journals. The number of published articles per journal has been calculated (table 2). It appears that 12 % of the listed journals (92 titles) collect 48% of the Faculty's publications (1093 articles). 4 titles contain more than 30 Faculty members' articles : *Gastroenterology*, *Blood*, *Dermatology* and *Acta Chirurgica Belgica*. All are indexed in *Medline*. The first two ones have the highest impact factors and are leader journals in their respective discipline. They are also indexed in *Current Contents*. *Dermatology* has a medium sized impact and is ranked at the 16th position amongst the 36 titles in the field. It is an European publication (Karger, Basel). That might be one reason for its success. Another explanation might be the strategy adopted by the Faculty members for publication. *Acta Chirurgica Belgica* has a weak impact factor. The interest is evidently local since the scientific editor is the Belgian Society of Surgery (Société belge de Chirurgie).

On the other hand, 354 journals published only one Faculty's article in 6 years. They can not be considered as interesting. 291 titles occupy an intermediate position with 2 to 5 articles. All these journals have been sorted according to a decreasing number of articles per title and the first 25 are displayed in table 3 (column 1 : source journals).

<b>Number of Journals (n=737)</b>	<b>Number of articles (n=2286)</b>	<b>Articles per Journal</b>
4	159	31 to 45
35	550	11 to 30
53	384	6 to 10
291	839	2 to 5
354	354	1

**Table 2 :** *Quantitative analysis of the articles published by the members of the Faculty of Medicine at the University of Liege during the last 6 years.* 2286 articles have been published in 737 different journals from 1966 to 2001. The number of articles per journal has been calculated for every title. 6 categories of journals were created according to their content : 1, 2 to 5, 6 to 10, 11 to 30 and more than 30 articles. Interest in the different titles is proportional to the number of publications in the different categories.

The second question (*What journal do they read ?*) has been answered by listing the journals cited by the Faculty members in their publications and by counting the occurrence of every cited title. The bibliographies of the 2286 articles written by the Faculty members between 1966 and 2001 contained 66531 references published in 7573 journals. The citations were pooled and the cited journals were listed according to decreasing citation numbers (table 3, column 2). The first 158 titles of the list contain half of the total citation (median value = 33266 citations).

Source Journals (number of articles)		Cited Journals (number of citations)	
Dermatology	45	Journal of Biological Chemistry	1191
Acta Chirurgica Belgica	44	PNAS	1130
Blood	37	Science	855
Gastroenterology	33	Nature	824
Circulation	27	New England Journal of Medicine	741
European Heart Journal	27	Blood	675
Investigative Ophthalmology and Visual Science	23	Brain Research	655
Journal of Bone and Mineral Research	23	Cancer research	641
Acta Neurologica Belgica	21	Endocrinology	535
Diabetologia	21	Cell	530
British Journal of Haematology	19	Lancet	530
Journal of Clinical Endocrinology and Metabolism	19	Journal of Immunology	509
American Journal of Medical Genetics	18	Journal of Clinical Endocrinology and Metabolism	496
Cephalalgia	18	Journal of Comparative Neurology	462
Diabetes and Metabolism	18	Journal of Clinical Investigation	438
Acta Gastro-enterologica Belgica	17	Circulation	415
Journal of Chromatography A	17	Neurology	392
NeuroReport	17	Journal of Nuclear Medicine	378
Pflüger's Archiv	17	Journal of Neuroscience	375
Archives of Physiology and Biochemistry	16	Journal of Experimental Medicine	339
Osteoporosis International	15	Radiology	334
Acta Clinica Belgica	14	Gastroenterology	333
Journal of Biological Chemistry	14	Journal of Cell Biology	307
Anesthesiology	13	American Journal of Physiology	299
British Journal of Anesthesiology	13	British Journal of Dermatology	296

**Table 3 : List of the top 25 source- and cited journals.** Source journals are those chosen by the Faculty members for their publications during the last 6 years. They are ranked according to a decreasing number of articles per title. Cited journals are mentioned in the bibliographies of the same Faculty members' articles. They are ranked according to a decreasing number of citations per title. Only the top 25 source- and cited journals are displayed. They are part of the *Core Collection* discussed below.

The cited titles were also classified into categories (table 4). The *Journal of Biological Chemistry* and *PNAS* received more than 1000 citations per title. 129 other titles collected 43% of the total citations. The remaining journals (7442) were occasionally, even rarely cited.

Number of Journals (n=7573)	Pooled citations (n=66531)	Citations per Journal
2	2.321	≥ 1000
10	6.495	≥ 500
119	22.041	≥ 100
788	22.481	≥ 10
2.498	9.037	≥ 2
4.156	4.156	1

**Table 4 :** *Analysis of the journals cited by the members of the Faculty of Medicine at the University of Liege during the last 6 years.* The titles are classified according to a decreasing citation index.

#### **E. Quantifying usage**

A consultation survey was conducted during one year on 1100 living titles. Only the issues published during the last 12 months were considered. Once consulted, they were systematically recorded. At the end of the survey, the consultations were counted for each title and expressed per issue, taking into account the publication periodicity. 400 titles (36%) have not been consulted in one year. For 430 other titles, the consultation per fascicule is lower than 1 ; it means that each fascicule has not been opened at least once. 54 titles only (5%) are regularly consulted ( $\geq 3$  consultations per issue). The remaining titles are poorly consulted. For some of them, a cost per consultation has been estimated ; the prices vary between 20 and 100 Euros and are much higher than the interlibrary loan rates.

#### **F. Interlibrary loans**

The articles provided by our interlibrary loan (ILL) service from December 2001 to April 2002 were systematically recorded, including the title, source, ISSN, date of request and category of the applicant. All the collections were taken into account, including the stopped ones or the reserve funds. 69% of the requests come from members of the Belgian loan network, named IMPALA, 23% come from the Belgian university libraries nonaffiliated to this network and 8 % are internal requests from our institution. A statistical study of the ILL has been made. The results show that 2.626 articles were provided, coming from 766 different periodicals (table 5).

<b>Journals (n=766)</b>	<b>Requested articles (n=2626)</b>	<b>Copies per title</b>
2	57	21 to 35
38	529	11 to 20
97	724	6 to 10
354	1041	2 to 5
275	275	1

**Table 5 : Analysis of the ILL requests addressed to the library during 6 months, from December 2001 to April 2002.**

The 5 most required titles are the *Journal of Vascular Surgery* (35 articles), the *Journal of Bone and Joint Surgery* (22 articles), the *British Journal of Obstetrics and Gynecology* (20 articles), *Circulation* (19) and *Neurology* (19). 35 other titles have been requested more than 10 times during the considered period. This result suggests that it might be worth to keep them on the library shelves. The survey is too short to decide if there is a constant need for the remaining titles.

#### **G. Defining a core collection of periodicals**

The results of the publication and citation analyses have been encoded in the *GestaMed* database as well as the data from the consultation survey and the ILL statistics. They are complementary to the panel of criteria already collected in our attempt to describe and compare the periodicals subscriptions (see Methods). A *core collection* has been defined, constituted by the titles which obtained the highest scores regarding the consultation (consultations per issue  $\geq 3$ ), usage (Faculty members' articles per journal  $\geq 6$ ), citation (citations per journal  $\geq 100$ ) or interlibrary loan (requests per journal  $\geq 11$ ). Several titles obtained high notes in more than one category so that the core collection counts 255 titles. Most of them have also good impact factors. Records have been created in the *GestaMed* database for those journals which are not subscribed to but deserve to be included in the holding.

## **DISCUSSION**

Giving access to the right resources that fit the users' needs has always been and will continue to be the major challenge for librarians. No miracle solutions have been found to anticipate users' expectations. To be realistic, choices must be based on as many different criteria as possible. We tried to measure and combine parameters such usage, quality and interest in order to select the right panel of medical journals. The method is valid whatever the format : print or electronic. Usage has been estimated from a consultation survey which was evidently limited for practical reasons. Also, this method was bended by the fact that users come less regularly to the library since they have access to relevant electronic resources on their working place. Quality has been deduced from the impact factors and other ranking performed by ISI through the *Journal Citation Reports*. These measures are widely used by

the medical community to evaluate each other's scientific production. A quick *Medline* search combining keywords such as «quality control», «impact factor(s)» and «periodicals» yields a bunch of controversial arguments regarding the validity of the method. We consider anyway that impact factors can be taken as quality indicators provided that they are used in combination with other criteria by librarians aware of the possible publication bias (1). Interest has been approached through a bibliometric application of the *Web of Science*. Tedious manipulations were necessary to point to approximately 250 titles (*core collection*) that might represent the favourite journals of the Faculty members. This work relies on the hypothesis that interest exists in the titles selected for publication or cited in scientific articles' bibliographies. Interlibrary loans may also reflect interest. ILL supplies were analysed to point to the journals that are too frequently requested to be cancelled. Alternatively, ILL requests might have indicated the titles to be subscribed to. Unfortunately, these data were not available.

Most of the time, these theoretical considerations are shortcut by pecuniary difficulties. If electronic publication facilitates the access to resources, it does not bring any kind of solution to the financial problems. In many cases, the journal electronic version is not cheaper. It is rarely free. At the best, consortia are just able to limit inflation.

During the last two years, the Belgian universities have set up a strong collaboration to give rise to the virtual library. Priority is given to the bibliographic databases which guarantee the access to knowledge. A consortium has been signed with Elsevier for the access to *Science Direct* journals. Technical solutions are elaborated for digital archive. In the mean time, paper archive of the current titles is maintained in collaboration and shared between the universities. Tools are also experimented to digitize scientific publications and to valorize older holding. But the problem is that many commercial actors appear on the scene with a lot of means and full disponibility. They are strong competitors for librarians who have to assume in the same time their new and traditional roles and who are not technically prepared to the digital mutation. The game is not fair.

However, the librarians have the advantage of their special relationship with the medical community. More than ever, they can be the guides to the right information. As an exemple, we have analysed the *Science Direct* usage reports. The access to *Science Direct* has been opened in March 2001. After one year, the monthly number of user sessions raised from 1734 to 3526. Requests come now from more than 800 distinct IP'S with an average of 4 monthly sessions per user and an average session duration oscillating between 10 to 15 minutes. A maximum average of 2 articles are downloaded per session with a marked preference for the PDF format (more than 85%). But most of these articles are found through browsing (85%), a few only through search (15%). Most of the time, searches are basic with less than 10% of users who take the risk of an advanced one. Very few users have activated a personal profile to access to their favorite journals or benefit from alerts. These observations emphasize the importance of training sessions. This is an indispensable task. This is a task librarians are prepared to. This is the task we will make every effort to succeed in.

## REFERENCES

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