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## Information Literacy Academic Curricula – A Case Study of Integration at the Biomedical Faculties of K.U. Leuven University

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## INFORMATION LITERACY IN ACADEMIC CURRICULA – A CASE STUDY OF INTEGRATION AT THE BIOMEDICAL FACULTIES OF K.U.LEUVEN UNIVERSITY

### Abstract

Since 2006, the Campus Library of Biomedical Sciences of K.U.Leuven University is reconsidering its role in education and research.

Giving access to scientific information is still our library's most important mission. However, teaching our students and academic staff the skills for efficient retrieval and use of scientific information is increasingly becoming an important task too.

In the past, instruction was limited to guided tours and short library instruction sessions, organized on an individual and unsystematic basis.

This changed in 2006, when we were asked by the Faculty of Medicine to reconsider part of the medical curriculum in the light of integrating information literacy in it.

The following considerations were made:

1. information literacy should be *integrated* in a systematic way in the curriculum
2. *minimal skills* of information literacy should be determined for each level
3. instruction in information literacy should be a continuous line starting in the first and ending in the last year (*vertical line*)
4. information literacy should be acquired in an active way in as many courses as possible (*horizontal line*)
5. instruction in information literacy is a *shared responsibility* of library and academic staff

As a result, the biomedical library was given the responsibility of information literacy in the beginning of the curriculum of medical students, while academic staff took the responsibility of the rest. At the same time, the library was investing a lot in providing our academic staff with tools, formats and learning objects for integrating information literacy in their lessons. We also started planning systematic trainings for keeping our academic staff up to date with major changes in scientific information.

The new curriculum of the Faculty of Medicine was put into practice in October 2006. It was soon followed by similar projects in all other biomedical faculties of our university.

### Introduction and background

Since 2006, the Campus Library of Biomedical Sciences (hereafter called the biomedical library) of K.U.Leuven is reconsidering its products and services and, more particularly, its role in education and research. Libraries used to be major information providers, making information available via structured databases (library catalogues) containing bibliographic records. Nowadays, libraries are no longer the only information providers, since a constantly growing quantity of information is available on the internet, outside libraries. Besides, the need for organization of information as libraries used to do, seems to have disappeared: powerful search

engines make us find information in the big internet “data soup”. Everybody produces, publishes, shares, tags ... information; the web is becoming a social environment and, thus, organizes itself [1]. It is clear that this has great implications for libraries. That is why van den Brekel [2] suggests libraries should undertake a focus shift: “a focus into the environments where the users are, instead of expecting them to come to us, or our resources”. Van den Brekel lists some characteristics of these users:

- fascinated by new technologies;
- multitasking is a way of life;
- staying connected is essential;
- interactive, not isolation;
- zero tolerance for delay;
- actions are more important than knowledge;
- learning by doing, not by being told;
- nintendo trial-and-error approach to improvement is a viable model for learning;
- cut-and-paste culture.

More specifically, our users have grown up in what some call the Google culture which makes them have the following expectations in relation to information [3]:

- one starting point for all information needs
- immediate information access
- the Web has all
- everything of equal credibility and substance

With this in mind our biomedical library organized a brainstorming with librarians, academic staff, clinicians and students which resulted in a strategic plan, presented in April 2006. This strategic plan defines the priorities for the coming years. To summarize, we could say that the library’s role is moving from an information collector towards an information mediator:

- drastical reduction of the paper collections and move towards e-only
- implementation of innovative tools (e.g. web/library 2.0) for more customer oriented access to collections (and scientific information in general)
- stress on the library’s role as an information trainer (information literacy) and a consultant (for example by assisting researchers with their systematic reviews)
- reorganization of the interior of the library as an information laboratory, where information skills can be actively trained

This strategic plan of the biomedical library should be situated in the context of the overall strategic plan of the university library and in the renewed education policy of K.U.Leuven.

## **Information literacy as part of the library's mission**

Selecting and providing access to scientific information resources remain essential to the biomedical library's mission. We keep investing in well balanced, be it mainly electronic, collections. We will intensify our contacts with the departments in order to better respond to their needs. We are also looking for new ways to present information resources to our patrons, by making use, for example, of web/library 2.0 tools. Besides all that, we will stress our role as an information provider by optimizing our interlibrary loan services for documents that are not available in our library.

However, we believe that a modern academic library's mission should not be limited to selecting and providing access to scientific information. We think that "educating users to [retrieve and] manage information and knowledge" [4] should increasingly be part of it. The large offer, the variety of access points and the short life time of information nowadays force universities and their libraries to invest in a systematic approach of information literacy in the academic curriculum. Indeed, there is a "need for information and knowledge skills in order to succeed in a knowledge-based society" [5].

In the past, our tasks as an information trainer had been limited to guided tours and short library instruction sessions, organized on an individual and unsystematic basis.

## **Information literacy and why it matters**

Already in 1989 the American Library Association gave a definition of information literacy: "Information literacy is an understanding and set of abilities enabling individuals to recognise when information is needed and have the capacity to locate, evaluate and use effectively the needed information" [6]. Since then, information literacy has constantly been a hot topic: many publications have talked about the subject, many definitions have been proposed and several standards have been published. For an overview, see for example [7].

K.U.Leuven University decided to use the ANZIIL-standard. This ANZIIL-standard (<http://www.anziil.org>) is in fact a set of 6 standards and gives a good idea of the many aspects of information literacy: the information literate person

1. recognises the need for information and determines the nature and extent of the information needed
2. finds needed information effectively and efficiently
3. critically evaluates information and the information seeking process
4. manages information collected or generated
5. applies prior and new information to construct new concepts or create new understandings
6. uses information with understanding and acknowledges cultural, ethical, economic, legal, and social issues surrounding the use of information

These 6 standards are worked out in competency indicators and learning outcomes that express which competencies students should develop in order to reach these standards and how they can be worked on during classes.

Information literacy is not only needed in order to excel in a knowledge-driven economy, but there is also a second reason why information skills should receive attention in health sciences, namely the emergence of evidence-based practice [5]. The methodology of evidence-based practice (EBP) in health sciences includes five steps, formulated explicitly in [8]:

1. translation of uncertainty to an answerable question
2. systematic retrieval of best evidence available
3. critical appraisal of evidence for validity, clinical relevance, and applicability
4. application of results in practice
5. evaluation of performance

Information skills are present in at least three of the five steps of EBP: in step 1 we recognize the definition of the information need; in step 2 the ability to translate this need in a search strategy and the ability to retrieve relevant information; in step 3 the appraisal of the relevance, reliability and quality of information. The link between information skills and evidence-based practice was clearly made in the Sicily statement on EBP: "Information skills are necessary to support life-long learning. [...] The teaching of EBP should, as far as possible, be integrated into the clinical setting and routine care so that students not only learn the principles and skills, but learn how to incorporate these skills with their own life-long learning and patient care" [9].

Indeed, information literacy "contributes to lifelong learning beyond the academic arena" [10]. The problem of people grown up in the Google culture as we mentioned before, is that it can lead to certain information naiveness. People are not always aware that not all information on the internet can be retrieved by search engines (the so-called invisible web) and that not all information can be trusted equally. Studies show that university students usually do not have enough information skills. It is therefore necessary to "overcome the prevailing students' mentality that we already know how to do this" [11-12].

Information skills are not only necessary for students and academic staff. A direct link has been demonstrated between health literacy and public well being. "Health literacy relates to the degree to which people can obtain, understand and process basic health information and services, and then act on appropriate health decisions. It is one of the crucial, enabling capabilities that could contribute to the realization of the goals of Healthy People 2010 as stipulated by the Center of Disease Control and Prevention (CDC)" [13]. Other studies [14-15] confirm this: improving the public health literacy is crucial in the pursuit of preventive health and appropriate management of diseases.

## Information literacy in the medical curriculum

In 2006, after the Biomedical Library had announced her ambition to work on information literacy, we were asked by our Faculty of Medicine to reconsider part of the academic curriculum in the light of integrating information skills in it.

Some members of the academic staff were a bit reluctant against integrating information literacy too explicitly in the medical curriculum. They felt information skills as “old wine in new bags”. Had they not themselves, be it in an implicit way, always integrated information skills in their courses before? Besides, the medical curriculum was already overloaded, so a more explicit integration of information skills could in no way produce a higher workload for the medical students and the academic staff.

On the other hand, many others felt it as a problem that students had very diverse levels in information literacy due to the unsystematic training. They agreed that a more systematic approach of information skills in the curriculum was necessary. They proposed to determine minimal information skills for every year of the medical curriculum so that we would know what information skills students could be supposed to master.

The importance of integration of information literacy programs into the curriculum can not be overestimated: it has a significant impact on acceptance of these programs by students. It formalizes, as it were, the support and cooperation of academic administrators, faculty and librarians [10].

Apart from an explicit integration and the definition of minimal skills, we also strongly insisted on both a horizontal and vertical integration. By vertical integration we mean that information skills should be worked on from the first until the last year of the curriculum. This allows systematic and progressive working on information skills. Others [16] call this “spiral training”, since the student’s knowledge-base spirals upwards as his knowledge is broadened and strengthened from one year to another”. At our Faculty of Medicine this was realized through the integration of information skills in the continuous line “scientific education”, starting in the first and ending in the last year of the curriculum.

Horizontal integration means that information skills should be made relevant to the needs of the students at a specific stage of the curriculum. Information skills should not *only* be taught in typical classes, like pre-clinical informatics [4], computer and information literacy [16], applied medical informatics [17] and so on, but they should also be closely tied to as many other courses as possible. “Key to the success of any solution proposed is that the students are presented with the material in a way that makes it relevant to their needs. Library and information literacy instructional solutions cannot be developed in a vacuum, but must be closely tied to the curricular needs of the students. Whether the material is taught in independent courses or in conjunction with regular curriculum courses, students must be made aware of how the material

being covered enhances their educational efforts. As a result of engaging in these instructional efforts students will produce higher quality assignments, receive better grades, and develop the life-longer learning skills that should help them in their future careers” [18].

This kind of systematic integration does not necessary imply a higher work load for academic staff: it can often be enough to make explicit your own scientific methodology, the way you use information for the preparation of classes and for publications, the way you make references etc. The library tries to make the academic staff aware of that during information sessions. Besides, the aim of making students information literate, is to enable them to work in a more efficient way, so to save time.

A final consideration we made was that the information skills trainings only will have an effect, if they are formally evaluated. This is confirmed by other experiences: “Most medical students tend to place a higher educational value on the knowledge and skills on which they will be examined” [17]. In our institution we accomplished this by evaluating the library’s modules through a pass/fail system.

### **A shared responsibility of academic and library staff**

Even if the biomedical library already had a strong reputation in the organization of instruction sessions and even if the library had been asked to work out the systematic integration of information skills in the curriculum, we still had to win confidence of the academic staff in order to get the actual responsibility of the basic modules in information literacy. At K.U.Leuven, most librarians do not belong to academic staff, so they are supposed to only *support* education and research. This is a situation we also find in other institutions and that sometimes causes tensions. Many articles have been written about this [19-23], and we will not enter into details here. Our experience is that there is indeed often a big gap between library personnel and academic staff, but that this gap can be bridged if both parties respect each others professionalism.

This is precisely what we wanted to achieve in our project: to combine the expertises of academic staff and librarians. We already mentioned that the integration of information skills in many if not all courses taught by academic staff is an absolute necessity. Librarians, on the other hand, could address the need for a systematic and progressive approach of information skills and are usually more familiar with the technical side of information sciences. Farber perceives that the true benefits of collaboration are the mutually *reinforced* and *shared visions* between classroom faculty and librarians [23]. The classroom faculty objectives are to help students attain a better understanding of the course subject matter. The library faculty objectives are to enhance the students’ ability to find and evaluate information which in turn enhances the students’ understanding of the subject matter and contributes to their life long learning skills. Many authors [24-25] indeed stress the benefits of collaboration. In our case, the biomedical library finally won the academic staff’s confidence, after we

presented them a systematic overview of all aspects of information literacy in such a way, as they said themselves, they had never seen before.

Before this project, only two of our librarians working in public services had experience with training sessions. Together with the campus librarian, they formed a pool that was big enough for the needs at that time. The structural involvement in information skills trainings (both organized for students and for academic staff) had an immediate effect on the organization of our library personnel. We had to prepare two more librarians for the organization of trainings and we had to redefine priorities within their tasks. The library is also working on a new recruitment policy where there will be place for highly skilled information specialists with educational, ICT and biomedical backgrounds.

### **Case study: information skills in the curriculum of medical students**

In the new medical curriculum information skills have a place in the line scientific education. In cooperation with the Faculty a scenario of this line was designed, which starts with the following considerations:

- we live in an information society, where information is available in large quantities; information is perishable; the student needs tools to find relevant information, to evaluate its scientific value and to manage it; these are tools for lifelong learning
- doctors in practice are expected to have those tools; besides, doctors do not have much time to do literature studies and should be familiar with the EBM principles

Within this line, information skills appear for the first time in the second bachelor year. The biomedical library is responsible for the following modules:

#### *Module 1. Retrieval of scientific literature: theory (1 hour)*

Objectives:

- The students are aware of the importance of reliable scientific information.
- The students are familiar with the variety of scientific information resources (e.g. reference works, manuals, journals, databases, internet).
- The students are familiar with the (electronic) information resources available in the biomedical library.

Content:

- Introduction to the line scientific education: situation in the curriculum, general objectives, practical course.
- Getting familiar with the biomedical library.
- Overview of the various (electronic) scientific information resources: reference works, manuals, journals, databases, internet.
- Getting familiar with PubMed.
- Explanation about terms like keywords, MeSH, index, thesaurus etc.

Getting familiar with the Web of Science: journal impact factor, science citation index.

Method:

Lecture by the librarian.

*Module 2. Retrieval of scientific literature: practice (2 hours)*

Objectives:

- The students are able to select relevant information resources.
- The students are able to actively find literature via a computer search.
- The students are familiar with bibliographic databases (PubMed, Web of Science).

Content:

- Exercises around information retrieval on a computer.
- Retrieval of manuals and reference works.
- Retrieval of references in PubMed.
- Access to (full-text) articles.
- Citation search in Web of Science.
- Searching in Cochrane Library.
- Searching and evaluation of internet resources.

Method:

The students work in pairs on the PC and make exercises around the retrieval of scientific literature.

Librarians assist the students.

The students finish their exercises at home and submit their solutions to the library.

The library gives them feedback.

Evaluation:

The sessions are obligatory and are evaluated through a pass/fail system.

After these two modules the students are divided in small groups (6-8 students), directed by a tutor. The tutor works with them around a specific topic, depending on his own specialization, and links it to the courses. In these and the next modules the following aspects of information skills are discussed:

- making correct references
- structure and types of a scientific article
- basics of scientific reviewing procedures
- critical reading, making an abstract and discussion of a scientific article
- principles of scientific methodology
- presentation of an own abstract of a scientific article
- principles and application of EBM
- critical appraisal of literature
- writing a scientific article and making references in a correct way

### **Information literacy in other curricula**

After the start of this project, the library was soon asked by other departments and faculties to start something similar. For the curriculum of Pharmaceutical Sciences a set of competencies was defined, of which one was information skills. Interestingly enough, these competencies are directly linked to specific courses. In collaboration with the Faculty we drew up the information skills competency for the bachelor years.

Information skills training starts in the first bachelor year and continues as a vertical line. Apart from the obvious differences in content, the program and the working methods do not really differ from the medical curriculum. At this moment, we are elaborating the vertical line in the master years.

In the curriculum of Audiology and Logopaedics information skills were introduced in the 3rd bachelor year. Here we also organized a combination of lecture and exercises. Some students complained about these modules coming too early in the curriculum. This is astonishing because especially in Audiology and Logopaedics these information skills appear relatively late if you compare it with other curricula. We discovered that they only saw a link with their master thesis at the end of their curriculum and that they did not make a link with other courses. This illustrates well how important it is to embed information skills both vertically and horizontally in the curriculum. This year we will therefore try to work on a better integration.

From 2007-2008 onwards the departments of Dentistry and Biomedical Sciences will also integrate information skills in their curricula.

### **The library as an information laboratory**

In the last years we noticed that the physical space of the library was less used by researchers while the number of students visiting the library increased significantly. The biomedical library is meeting this important change by reorganizing its physical space towards an information laboratory, where information skills can be actively trained in many aspects, namely retrieval, selection, evaluation, exchange, presentation etc., individually or in group. On the website and in the digital learning environment the biomedical library is also working hard to offer more customer-oriented services.

### **Lessons learned and projects for the future**

While writing the biomedical library's strategic plan we never hoped that the integration of information skills in the curricula of our biomedical faculties would be so successful in such a short time. That this happened so, is certainly due to the growing awareness of academic staff that information literacy is a key issue in our society, and particularly in health care. It is of course no coincidence that we especially got much support from staff involved in evidence-based medicine/practice.

From the many experiences we had, we are able to confirm the following principles, which, in our opinion, seem crucial for a successful training of information skills:

1. information literacy should be *integrated* in a systematic way in the curriculum
2. *minimal skills* of information literacy should be determined for each level
3. instruction in information literacy should be a continuous line starting in the first and ending in the last year (*vertical line*)
4. information literacy should be acquired in an active way in as many courses as possible (*horizontal line*)
5. instruction in information literacy is a *shared responsibility* of library and academic staff

A similar list of principles, formulated in a slightly different way, can be found in [17].

Of course our work is far from finished. From the feedback we got from our students, we learned that they generally appreciated the trainings a lot. Their remarks usually concern the need for linking to other courses. Indeed, in some cases the information skills training is not yet fully imbedded in the curriculum, and it will of course need some time to accomplish the vertical and horizontal lines in all biomedical curricula. The integration of information skills needs permanent care, and, therefore, the biomedical library is working on systematic support to academic staff in this respect.

Another important step we made, is the recent acceptance of information skills as a competency in our doctoral schools. A course module is currently under development and will start in 2008.

Furthermore, we plan to make a detailed comparison between the ANZIIL-standard and our biomedical curricula in order to cover the full spectrum of information literacy. In a new version of the medical curricula more attention should be paid, for example, to the issues surrounding plagiarism and intellectual property.

We will certainly benefit from the results of a project the biomedical library is participating in. This project explores the possibilities to convert information skills in learning objects that can be integrated in various courses in a flexible way.

We also want to make more use of online tutorials in our trainings. These can be a solution for the rising student numbers (and the limited library's resources) and, especially, they will enable the library to concentrate on the hands-on sessions. The rest of the training will be done by self study and self assessment, which is not only more efficient but also more attractive for students than a talk and demonstration session in a big auditorium.

Finally, we will explore the possibilities of evaluating our training sessions. Can we measure its effectiveness: do our students' information skills really improve after the training?

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