SHARING INTER-FACULTY TEACHING EXPERIENCES FOR IMPROVED TRAINING IN INFORMATION LITERACY

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Introduction

Acquiring effective information skills is essential for medical and veterinary students in order to complete their curriculum successfully, to become evidence-based practitioners and to establish themselves as life-long learners. Teaching the methods of literature search and retrieval is a quite recent concern in academic faculties. The need for this form of teaching became more noticeable as powerful information and communication technologies began to offer end-users the chance to perform sophisticated searches, which were previously the prerogative of specially trained technicians. In many universities, librarians started organizing informal workshops aimed at voluntary participants. These activities were sufficiently successful to incite academic authorities officially to introduce the teaching of information literacy into the curriculum. Creating a new course, in a new topic that has never been taught before, is a difficult exercise. In the absence of tested models, librarians can only rely on their education and experience in order to make decisions regarding the content and messages to be delivered during the course. Students, for their part, are rather reluctant to engage in an unusual learning experience, whose objectives are not obvious to them. In addition, they question the usefulness of such a course, disconnected as it is from major subjects such as Biology, Physics and Chemistry.
The aims of the present report are to show how we merged parallel and independent teaching experiences in order to offer educational programs where students are invited to participate actively in learning. Lessons, activities and exercises are mixed in order to trigger interest and sustain motivation. Efforts are made to strip our courses of any theoretical content that is relevant to librarianship, but that is not really useful for practitioners interested in information retrieval and evaluation. At the time these courses were created, no validated measures were available to evaluate the effects of different forms of training (i). We found discussion and the sharing of experiences were the best ways to improve our teaching. We also sought support and advice from local research departments specializing in e-learning pedagogy and in the evaluation of educational systems.

Material and Methods

Within the University of Liege, teachers can rely on two different educational centers named SMART and LabSET, both providing logistics and scientific support. SMART has designated a team of scientists specializing in pedagogical evaluation (ii). They have

optimized an optical mark reading apparatus used to collect data from satisfaction surveys and to automate the correction of exams based on multiple-choice test questions (MCQs). Moreover, SMART puts at the teacher's disposal a complete distance voting system made up of 100 individual voting devices and of a transceiver connected to a computer dedicated to harvesting, counting and analyzing votes. The system can also be connected to audiovisual equipment for use in large lecture halls.

LabSET is a European center for research and expertise in distance learning (iii), providing access to WebCT (abbreviation of Web Course Tools) software and services (iv) for teachers, institutions and companies interested in providing enhanced-quality learning.

Results

Including training in information retrieval in the curriculum of future doctors and veterinarians at the University of Liège

Years ago, user training sessions were created by librarians without any consultation with the Faculties of Human and Veterinary Medicine. Soon afterwards, these informal classes were changed to official and obligatory courses intended for students from the 1st and 2nd year Bachelor's courses. In the first year, students are taught the basics of information and communication technologies, mostly through a very general approach of computer networks. During the second year, they are trained in how to search scientific literature. Courses aim at familiarizing participants with the various forms of biomedical information. Training focuses on understanding the principles of database searching, on discovering and comparing different tools provided by digital libraries, and on optimizing question formulation through the use of controlled vocabulary and Boolean operators.

In the Faculty of Medicine, students have the opportunity of further practice in their Evidence-Based Medicine (EBM) classes (Master's 1), which also include critical reading and appraisal of articles reporting randomized controlled clinical trials (Master's 2).

Methods of training

All these courses aim at transferring skills rather than knowledge, enhancing the need for training, instead of lectures and didactic demonstrations. We were confronted by two major difficulties. First, there was the problem of the large numbers of participants compared to the few available teaching resources. Indeed, the 2nd year of the Bachelor's course in Veterinary Medicine usually registers more than 250 students, compared to 350 students in the Faculty of Medicine, where all the sections have to be taught: future doctors, dentists, pharmacists, physiotherapists and other students engaged in Biomedical and Sport Sciences. Moreover, all these attendees usually have poor motivation for a course whose interest is not obvious for them.

Different methods of training were developed and implemented with the backing of the faculty authorities and the support of experts from the SMART and LabSET departments. The different activities and time schedules are summarized in Table I. Attendance at these

courses and the acquisition of minimal competencies have to be certified by exams. Methods of evaluation will be discussed further in a separate section of the article.

- *Guided tours of the library*

Visiting the medical and veterinary libraries is a preliminary and essential step for the students. This visit provides an opportunity for them to visualize the spatial organization of the collections, to localize the different tools and services, and to discover physical differences between different types of documents such as encyclopedias, monographs and periodicals. Before leaving the library, they undertake brief exercises where they have to localize documents using local classifications and catalogs. All the visits are scheduled around the same time and most of the staff participate in welcoming hundreds of students over the course of 3 afternoons. The librarians who feel comfortable with oral communication guide library tours and interact with students, while others dedicate themselves to other registration or grading tasks. Indeed, student performance during the visit is taken into account for the final evaluation.

Curriculum	**Medicine**	**Veterinary Medicine**
1st year (Bachelor's course 1)	Basics in Informatics (15h)	Basics in Informatics (15h)
2nd year (Bachelor's course 2)	Information Skills (25-35h): - Ex cathedra lectures: 3 x 2h - Library guided tour: 2h - Interactive web-based hands-on - Group work	Information Skills (10h): - Interactive courses using electronic voting system: 5h - Library guided tour and one-to-one practical sessions: 5h
4th year (Master's 1)	Principles of EBM (3 x 2h)	-
5th year (Master's 2)	Critical reading (2 x 2h)	-

Table I: Information literacy as part of the curriculum of medical and veterinary students at the University of Liege. Time dedicated to teaching is reported as well as the different activities organized to support learning.

- *Interactive web-based hands-on approach*

In the Faculty of Medicine, plenary lectures were rapidly replaced by interactive web-based hands-on sessions that allow progressive learning based on discovery and practice. This approach is also more respectful of individual rhythms. We followed a methodology developed by LabSET (3) to create a course accessible via WebCT (4), which asks participants to progress through the following steps:

1. Identifying aims and priorities;

2. Evaluating current teaching;
3. Listing all the problems and difficulties students might encounter;
4. Structuring content;
5. Searching for every possible means that could support learning;
6. Creating as many useful activities as needed;
7. Optimizing interactivity.

Besides scientific support, LabSET also provided logistical assistance to create web pages and to manage the WebCT software and platform.

Our online hands-on approach focuses on PubMed. Students are invited to enter into a scenario inspired by a real-life professional situation where scientists need to search Medline in order to support their own research. Interactivity with the teacher is made possible through alternating exercises and self-evaluations. Multiple-choice test questions have been written, requiring students to consider the usefulness of some functions offered by the PubMed search engine or to compare the relative efficiency of different search strategies. Correction is instantaneous and feedback is returned for all answers, whether they are right or wrong.

We conclude each session with general rules of procedure and advice aiming to encourage good searching practice.

- *Interactive lectures based on the use of electronic voting systems*

In the Faculty of Veterinary Medicine, the scientific librarian has chosen to use the electronic voting system provided by SMART in order to trigger interactivity during plenary lectures. Two courses (2 x 2.5h) are attended by the entire cohort of 2nd year students.

Each participant receives an electronic voting device allowing him or her to answer personally questions asked by the teacher (v). Votes are collected and counted. Results are immediately shown on the screen and commented upon. The teacher can check if different ideas are well understood as the course progresses, and also provides additional explanation when necessary. The method also allows the conducting of pre- and post-tests in order to make students aware of gaps in their own knowledge or their weaknesses. In the Faculty of Medicine, the device is also used to simulate exams and to train students to answer multiple-choice test questions.

Electronic voting systems offer the advantage of allowing students to provide anonymous answers and to escape the risk of facing their colleagues in giving answers that might ultimately be wrong.

- *Practical sessions using a problem-based learning (PBL) approach*

After a five hour theoretical course taught in the amphitheatre, the students in Veterinary Medicine are divided into groups of 10 in a library classroom, for two sessions of 2.5 hours each, to work on practical exercises on an individual basis under the supervision of a "facilitator", a vet working in the library.

The different steps of the scientific information research process are detailed in these sessions, namely the choice of research tool(s) and the formulation of the task. Thus, each student is given the opportunity to assess his or her ability to solve a practical research retrieval problem from beginning (needs analysis) to end (retrieval of relevant information).

Satisfaction survey and evaluation of teaching effectiveness

Teaching IT literacy in the Faculty of Medicine started with traditional lectures and demonstrations followed by practical tasks to be achieved by students working in a group. Scores and analyses of multiple-choice examinations provided a rough evaluation of teaching effectiveness. However, a feeling of dissatisfaction was perceptible on the part of both students and librarians, which needed to be analyzed. Interviews were conducted in 2003 at the time we decided to start the e-learning experience, and again in 2005, after we had tested and upgraded our first classes on WebCT.

Questionnaires were carefully written in order to structure the conversations and to guarantee reproducible interview protocols. We met with five students in 2003 and nine others in 2005, all volunteers of both sexes, and representing the different scientific orientations in the Faculty of Medicine. Interviews were tape-recorded and lasted for a mean time of 40 minutes.

Questions were intended to:

1. Identify interviewees;
2. Measure general satisfaction;
3. Discover the criteria spontaneously chosen by interviewees to evaluate both teaching and learning;
4. Understand their perceptions regarding course aims and usefulness;
5. Measure what they really learned;
6. List the difficulties they encountered at different stages of the training;
7. Evaluate separately the different activities: library guided tours, WebCT-supported hands-on activities, online self-evaluation and group work;
8. Collect suggestions about what should be improved.

In 2005, an anonymous survey was conducted on a larger population of 160 students from all sections. Participation was mandatory. Print questionnaires were distributed during Biology classes; their size had been adapted so that completing them would take less than 15 minutes. Questions covered the same topics, and were asked in the same sequence as they had during the interviews. SMART collected data by using an optical mark reading system.

This anonymous survey completed the interviews very well by enlarging the size of the screened population and bringing additional data suitable for statistical analysis. For their part, the interviews offered the chance to ask additional questions in order to clarify student opinion, when necessary.

Both approaches came to the same conclusions. The introduction of web-based hands-on activities to replace formal lectures raised the general satisfaction index level from 5/10 to 7/10. The course content, difficulty levels and time schedule were perceived as appropriate and well balanced. However, students had a truncated vision of the objectives being pursued and had no clear overview of the course content. Very few of them were able spontaneously to cite several items from the following list of stated competencies for the training sessions: 1) to understand the rules of literature searching; 2) to be able to search major bibliographic databases and catalogs in an appropriate way; 3) to understand that different levels of information are available and that, depending on circumstances, not all of them are always suitable; 4) to remain critical when handling biomedical information, whatever the resources; 5) to engage oneself in life-long learning and continuing education.

Since the analysis of the results of our survey in 2005, we have each year tracked skills and concepts that remain fuzzy in students' minds and we have tried to adapt our teaching accordingly by providing additional explanations and activities. The structure of the online course has also been improved by linking more obviously specific activities with specific skills or objectives.

Students themselves have made their own suggestions, asking for the theoretical background to be further reduced to the essentials and for more exercises to be provided for all levels of difficulty, including the highest ones.

In conclusion, e-learning methods have allowed us to provide problem-based learning to very large groups. The survey confirmed that students do not encounter difficulties in accessing and using the WebCT environment. For those who do not own a personal computer, connections to the Internet are available, as a minimum on campus or at home over the weekend. Students appreciate the flexibility offered by e-learning in organizing their studies, but ask for a few lectures to be kept available where they can meet, listen to and talk with the teacher. Virtual is fun, but within limits.

Evaluation of student performance

Since IT literacy classes appear officially in curriculum, we are requested to evaluate students according to the Bologna rules and recommendations.

In the Faculty of Veterinary Medicine, every student has to take a practical exam with a personal computer at his/her disposal, answering 5 questions similar to those already solved during the PBL sessions.

In the Faculty of Medicine, the final evaluation is based on a 1hr exam composed entirely of multiple-choice questions. Scores are then adjusted according to individual participation on different occasions such as online testing and working in a group. Group work is a very important and time-consuming activity, and this comes at the end of the semester. Students have to search extensively literature on assigned medical or scientific matters. They have to find, select, evaluate and summarize documents from different sources: monographs, encyclopedias, reviews and research articles. Groups consist of between six and ten students, who must organize themselves and share out responsibilities in order to collaborate efficiently. Their final product is a print report written according to specific recommendations. Reports are powerful indicators of student effectiveness in information literacy, by clearly showing skills that are learned and those that remain to be improved. Teaching can then be adapted accordingly.

However, online testing and working in a group do not carry much weight in the final evaluation, since examiners cannot know for certain which individuals really carried out these activities. For similar reasons, we also decided not to consider usage statistics provided by WebCT, since we observed that many students like to work offline with print material. As a consequence, WebCT usage reports do not reflect how much time was actually invested in learning. Nevertheless, these activities are important in sustaining student motivation. From the interviews and survey, we understand that there is a demand for several occasional tests. Students have also reported that they feel challenged by the demanding instructions given to them for the searching-in-a-group exercise.

Discussion

Over the last 10 years, information sciences have been introduced into the curriculum of scientific and medical faculties, and scientific librarians have been designated to organize teaching. This decision can be considered as a formal recognition of the constant efforts made in libraries to educate end-users. It is very rewarding for librarians who are invited to participate in academic teaching. It should also prompt students to improve their skills and knowledge in information and communication technologies.

Structural reorganization of libraries at the University of Liege occurred recently and resulted in the gathering of collections and human resources. Within the library staff team there are now five scientists educated in Life Sciences, Psychology and Veterinary Medicine (at Master's and Ph.D. levels), who have decided to share personal teaching experiences in order to offer a unified information literacy program. On the one hand, we have come to a consensus regarding what should constitute the core of our teaching. On the other hand, we have put together different educational tools and approaches that we have tested and found effective in stimulating learner participation. Our main objective is to encourage students to adopt an attitude geared towards the outside world and to stimulate in them the intellectual pleasure of exploring ideas.

We all agree that our courses must be cleared of any concepts that are more relevant to librarianship than to practical literature searching. Instead, we focus our classes on the theory of database structure and database searching. We also try as much as possible to consider scientific content and to train students to locate the most relevant articles. Then, according to the size and education level of the audience, we select the most appropriate practical approaches. In fact, besides the official courses offered to the Bachelor's students, we continue to respond to all the demands from diverse groups of students and professionals. Sometimes, we have only 2 or 3 hours to deliver complex messages and to transfer sophisticated skills. Thus we have to rely on effective training methods. As previously described, we have the choice between different kinds of exercises: web-based one-to-one sessions and problem-based learning (see also, reference vi). Offering such novel approaches to teaching also enables us to distinguish our courses from the traditional scientific training, with a view to arousing students' interest and stimulating learner participation.

We could never have come to this point without collaborating with the SMART and LabSET university centers, which are dedicated to research into learning, teaching and evaluation. These scientists provided us with specific tools such as the electronic voting system and the WebCT platform. They facilitated surveys and multiple-choice evaluations through the use of an optical mark reading system. They taught us the essentials of pedagogy and e-learning. They accompanied the creation of online courses with the offer of a validated and systematic methodology in order to delimit course content and to select appropriate training methods.

Participating in such a project was rather challenging, and before training students, we also had to educate ourselves in new ways such as:

- Becoming interested in education sciences;
- Creating a course plan in order to structure content;
- Identifying with students in order to understand their difficulties;
- Self-evaluating in order to improve our techniques;
- Improving personal knowledge on different scientific matters needed for training;
- Organizing lectures and workshops;
- Improving oral communication;
- Using tools that support communication (PowerPoint, Dreamweaver, WebCT, E-mailing and Forum software);
- Reporting to the faculties about teaching effectiveness, possible improvements and new directions.

A major difficulty for librarians is to get second year students interested. These students are already provided in various ways with all the necessary textbooks, syllabus and support they need to get the most out of their curriculum, so that they do not need to use library resources. By organizing guided tours, we invite them to enter the library, to meet scientists and librarians, and to discover the tools and services that they usually ignore. We help them

to overcome their natural apprehension and to feel comfortable in a new place. Most of them would not experience this opportunity if the visit were not mandatory. Ideally, other teachers should also refer students to the library on every possible occasion, but the programs are so busy that it is hard to synchronize activities across different disciplines. Sometimes, opportunities occur later in the curriculum. For example, we now have the opportunity to participate in Evidence-Based Medicine (EBM) classes and to meet the same medical students during the fourth and fifth years. We can review the topics previously taught by going further into advanced searching and in-depth evaluation of clinical assays. In the Faculty of Veterinary Medicine, EndNote courses will be mandatory from 2008. We will meet students again during the last year to show them the advantages of managing personal bibliographic databases. All these occasions are important in order to establish mutual respect and confidence and it is always rewarding when former students come back to us as young professionals seeking advice and collaboration.

During the coming years, we will focus on evaluation methods in order to increase teaching effectiveness. Again, we will turn to university colleagues specializing in education. We plan on following the methodology developed by SMART to improve examination quality. It is in fact possible to propose MCQs, which are better able to take into account the relative importance of different aspects of the subject matter and the different levels of student performance: are they able to define, understand or apply a rule or concept (vii)? We would then be better able to see the level of achieved competencies and to identify any gaps or weaknesses in order to improve on them in a subsequent version of the course. In so doing, we will improve the library's image and we will justify our academic status by adopting a scientific approach of reflection towards our own teaching.
And, hopefully, we will contribute towards the development of professionals interested in the growth of knowledge and in new technologies.

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References

i. Brettle A. Information skills training: a systematic review of the literature. Health Info Libr J 2003; 20:3-9.

ii. SMART [homepage on the Internet]. Université de Liège: Système Méthodologique d'Aide à la Réalisation de Tests; c2000-2006 [cited Jul 31 2007]. Available from: http://www.smart.ulg.ac.be/smartweb/index.php.

iii. LabSet [homepage on the Internet]. Université de Liège: Laboratoire de Soutien à l'Enseignement Télématique; c2004-2006 [cited Jul 31 2007]. Available from: http://www.labset.net/.

iv. WebCT [homepage on the Internet]. USA: Blackboard & WebCT; c1997-2007 [cited Jul 31 2007]. Available from: http://www.webct.com.

v. Detroz P, Noel F, Gilles JL. Mesure de l'impact de l'utilisation des boîtiers de vote en amphithéâtre. 19me colloque de l'Association internationale de pédagogie universitaire: Les méthodes actives dans l'enseignement supérieur. Regards pluriels et critiques sur les pratiques. Louvain-la-Neuve; Belgium; 2002.

vi. Connor E. A guide to developing end user education programs in medical libraries. New York: The Haworth Press; 2005.

vii. Gilles JL, Piette SA, Detroz P, Pirson M. Le projet de plate-forme électronique de construction et de gestion qualité de tests standardisés e-C&QCST.
In: Arzola S, Vizcarra R, Cornejo A, Undurraga G, editors. World Education for Educational Research (WAER): XIV Congreso Mundial de Ciencias de la Education: Educatores para una Nueva Cultura; 2004; Santiago, Chile. Pontifica Universidad Catolica de Chile, Facultad de Education.