MedLibTrain

Become a better teacher of health information skills

Editors:
Barbara Niedźwiedzka
and Irene Hunskår

Kraków 2010

UNIWERSYTET JAGIELLOŃSKI
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Authors

Polish Team:
Barbara Niedźwiedzka
(Information Studies Department, Institute of Public Health, Jagiellonian University Medical College, Kraków)
Jolanta Cieśla, Ewa Czarnik, Ireneusz Korfel, Małgorzata Marcjan, Małgorzata Sieradzka-Fleituch, Lucjan Stalmach, Marcin Stasiak, Urszula Zdeb
(Medical Library, Jagiellonian University Medical College, Kraków)

Norwegian Team:
Irene Hunskår (Haraldsplass Deaconess University College, Library and Betanien Deaconal University College, Library, Bergen)
Randi Bolstad, Regina Küfner Lein (Bergen University Library, Medical Library)
Hege Sletsjøe (Norwegian Directorate of Health, Library, Oslo)
Anne Stenhammer, Karin Bakkemo (Buskerud University College Library, Drammen)
Frøydis Løken (Buskerud University College Library, Kongsberg)

Main Reviewers

Wanda Pindlowa (Institute of Information and Library Science, Jagiellonian University, Kraków)
Therese Skagen (Library of Medicine and Health Sciences at University of Oslo, Oslo)

English Correction: *Maja Nowak-Bończa*

Desktop publishing, proofreading and cover design: *Wydawnictwo EJB*

Project Partners Institutions

Jagiellonian University Medical College, 30-688 Kraków, ul. Św. Anny 12, Poland, http://www.cm-uj.krakow.pl/
Norwegian Library Association, Section for Medicine and Health, http://www.smh.no/

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Project Manager: Anna Uryga (Medical Library, Jagiellonian University Medical College, Kraków)

The MedLibTrain project team takes full responsibility for the content of this publication.

Contents

From the editors

The rapid development of scientific information in the medical and health fields nowadays causes that the task of raising users' information competence is becoming increasingly important.

On one hand, users are faced with a huge amount of information, often and aptly compared to a flood or a jungle. On the other hand, they are offered new tools meant to help them in information retrieval and use, but which are often fairly complicated and can only be used properly with certain knowledge and skills. In this context, without an appropriate level of information competency, users may have growing difficulty in finding, managing and using scientific resources. They increasingly need to learn how to effectively navigate "in the jungle", how to search and select information of high quality and relevance. They need advice on which information channels and sources, competing for users' attention, are reliable and most relevant. They need to know how to use information tools to store and manage information, etc., etc. In short, to become information competent, users need good education.

Therefore, in our opinion, the role of academic librarians in the twenty-first century will increasingly be the role of a teacher. This handbook was written with the aim of contributing to the improvement of the quality of user education. We are convinced that those health librarians who still wish to have an impact on whether and how information in the health care sector is used, must put more emphasis on various forms of user education. They also have to improve their own teaching qualifications. We believe that there is a growing demand for librarians' teaching capability along with other roles they have like: supporting evidence based health care, assisting health professionals and researchers, and in their outreach work with patients and consumers. The librarians-teachers are the ones to enable doctors, nurses, public health professionals, patients and students of different levels, to independently, effectively and safely benefit from modern information resources in their work.

It is not without reason that we use the term "teacher" rather than "instructor" and the word "competence" rather than "skills". The teacher is more than just an instructor. This is a person who not only provides knowledge and develops skills, but also educates and influences the attitude of students. Competence, in turn, is more than just skills. It is also the knowledge and attitude towards a particular matter. The information competent person, as the definitions say, is a person who does not only find information precisely corresponding to the need, but is also able to assess its quality, incorporate this new information in the knowledge held and use it to accomplish the task. Such a person also understands the economic, legal and social conditions affecting the production, circulation and use of scientific information.

To raise such a broadly defined information competency of users, librarians themselves not only need to improve their educational qualifications, but also should closely monitor the evolution of knowledge in health and medicine. This handbook, which is the result of the work of health librarians — information professionals from Norway and Poland — is meant to assist in this task. It has been written by librarians for librarians, by practitioners for practitioners, and reviewed by highly specialized information professionals in both countries. We would like to thank our reviewers for their contribution.

The authors of the individual chapters share their knowledge, give advice and refer to the rich subject literature and examples of good practice. The selection of topics is the result of a survey of educational needs of health librarians in Norway and Poland, carried out in 2009. These needs were not always the same, but several of them were listed as very important in both countries. In this book we try to respond to these highly ranked needs.

Each chapter is different, since it reflects the individual professional interests and educational background of the author. It is important to note that the authors do not attempt to cover everything, they are more like guides pointing at interesting resources, subject literature, giving some examples and hints which can be useful in teaching. Librarians preparing to teach will have to make additional effort to deepen, broaden and adjust this knowledge to their specific needs. We imagine that the modules and chapters of this handbook can be used like Lego blocks to construct and form a base for various kinds of information literacy courses and individual classes.

We hope that this handbook can serve not only teaching librarians, to whom it is primarily directed, but also the information end-users. The fact that it was written in close collaboration by health librarians from two, in many aspects quite different, countries will perhaps also be a small step toward leveling the teaching competence of health librarians in Europe.

This handbook is the result of the international project MedLibTrain

Kraków and Bergen, October 2010
Barbara Niedźwiedzka and Irene Hunskår

1. ABC of teaching

The goal of this module is to present some issues from the field of methodology of teaching and pedagogy, in order to help in designing and carrying out information literacy courses. We have focused on the practical side of teaching, and have collected information on basic activities that must be done so that the courses carried out by librarians may be successful. We have traced the steps of the teaching process: starting from educational needs analysis, through organization of the course in all its phases and at last to its evaluation. We have also made an attempt to identyfy what the term “good teacher” means and highlighted teaching methods and aids to ensure effective teaching. Realizing that we are not able to discuss fully all the methods of teaching and all of the needs assessment methods, we have chosen those that we think may be most effective. For those who have been staying up late at night preparing lessons we are providinig some teaching aids, such as: a course outline form, an example of a needs assessment questionnaire and course evaluation form. You will find them in subsequent chapters of this module. For those who wish to develop their theoretical knowledge in teaching, an extensive selection of literature and links to interesting web sites have been listed. We hope you find this resource especially valuable and informative as you continue to grow as a teacher. And we hope the exercises and problem solving activities included will inspire the reader to self — learning, which will benefit the trainees of our information literacy courses.

CHAPTER 1.1.

Educational needs analysis

Urszula Zdeb

Once...

The new Head of the Dermatology Department wanted his researchers, especially the younger ones, to undergo information skills training. He claimed that although there were no specific requirements, he wanted to make his staff more knowledgeable about what the library could offer them and how they could make use of the range of library resources in their research work. The librarians were faced with the problem of determining the level of knowledge of the Dermatology staff, their competence gaps and needs. Without this knowledge, it would be difficult for them to adjust the training to the specific needs of this group of users, who in addition, probably had different levels of research and information skills.

Introduction

The assessment of educational needs has a decisive influence on the process of teaching. Still, it is a tool which is underrated by teaching librarians. The training programs, which are currently being organized, are often based on the librarians' subjective feelings about what users should learn, and not knowledge about what they really want or need to know. Meanwhile, competent and skilful identifying of the users' needs and the appropriate adaptation of the training offered by the library to these needs is the key to its presence in the area of university teaching. Thoughtful analysis of users' needs also affects the effectiveness of library courses.

This chapter includes information and tips on how to conduct a proper assessment of the needs of users before developing a training course for them. Methods for such an evaluation and errors that can be made will also be discussed. A sample set of questions for an individual interview and a model survey questionnaire has been included in this chapter to help in conducting a needs assessment.

1.1.1. The aim of assessing educational needs

Research and analysis of training needs are carried out in order to construct an adequate and effective training plan. Actually, the research is intended to detect deficiencies and gaps in competences of future trainees and to identify their needs. Thanks to this feedback, you can:

- Become familiar with the expectations, motivations, attitudes, knowledge and skills of the trainees
- Make the objectives and expectations of trainees more precise
- Set goals which will serve as guidelines in the preparation of classes
- Choose the methods which will be used
- Determine the content of the training, which should be consistent with the expectations of course participants
- Decide when and what kind of training will be conducted
- Use training time effectively
- Motivate and encourage future users to be more conscientious about the needs they report
- Create a base for testing the effectiveness of subsequent training.

The study of needs may also identify sub-groups of trainees, which would be uniform in terms of level of knowledge or claimed deficiencies. Such a situation may occur with the group of employees described in the above example. The researchers in the Department of Dermatology may be so varied in terms of their knowledge and skills that it might prove useful to organize two or more different training events for them.

A well conducted needs analysis will set the right attitude in our future work. According to Mariola Łaguna, without a fair analysis "the effort put in teaching and costs related to it [...] can go to waste and bring no effects." A well conducted course is "...a tool with the help of which changes can be made in the store of knowledge, skills and attitudes" (Laguna, 2004).

Obtaining the information concerning the knowledge status of the future schooling participants will then be used to compare the starting point of the state of knowledge during and after the schooling. This research ought to be processed continuously and possibly including all the schooling stages along with the integrated evaluation of these stages. (Chapter 1.3). A good needs analysis is the key to successful teaching.

1.1.2. Carrying out a needs assessment

An educational needs assessment may be conducted:

- For the purpose of developing training for particular groups of future trainees (e.g. for students of particular curriculum) or

- For the development of specific training (e.g. targeting copyright laws, or searching a particular database). Such training can then be attended by various library users, and also information users who will not necessarily make use of library collections (e.g. patients).

One element of the preparation to needs analysis is to gain better knowledge of one's own or external institution and of a particular category of potential participants of the courses (e.g. researchers of defined specializations, diabetes patients, etc.). Learning what tasks they carry out, what their expectations are and what problems they are faced with will allow fitting the training to their needs.

The study of needs can be carried out by a company specializing in this, but due to high costs this is not usually practiced by the library. This task is often entrusted to the library staff. If the library has a teaching department which is responsible for didactics, it usually carries out such research.

Librarians conducting a needs analysis should first check if there are, and what are the current standards for information literacy training of health/medical library users. Such knowledge will be a good starting point for developing scenarios of interviews or constructing questionnaires (more about standards in Chapter 5.3)

The first step in the needs analysis might be to collect information on:

- The organizational structure of an entity whose employees or students are to be trained
- The nature of their jobs
- Their scientific interests
- The content of curriculum, (if dealing with students)
- Tools and databases of information used
- Previous training
- Conferences, which are of interest
- Research and professional activity. In the case of training individuals who are not affiliated with a specific institution, it is important to know the common tasks and interests of a given category of people. This can be done through literature studies and by having meetings and focus discussions with their representatives (e.g. academics doing research surveys or nutritionists).
- In what situations do they need information and what kind of information
- How they look for information (information behavior)
- What limitations do they have (rules, lack of the time, lack of knowledge etc.)

The obtained information will determine the content and form of teaching. If the teaching fails to match the real needs and interests of users, information literacy courses will remain on paper or as virtual offers. They will not find recipients. It must be remembered though that in relation to scientific information, librarians are better informed about trends in this field and should not only follow requests, but also include those skills and knowledge that may be needed for users in the conceivable future, but which they do not know about.

The second step in a needs assessment is having a meeting with the supervisors of those who are to be trained. This might be the manager who sought after the training (as in the example above) or persons responsible for subject teaching, if the target group are students. The individuals who are intended to undergo training may attend such a meeting. The initial conversation will divulge the expectations of supervisors and trainees, it will help the teaching librarian determine whether their expectations regarding the content of the training coincide with each other.

What should we ask about?

- What is the expected topic(s) of the training?
- What length of the training is expected? Is it to be one or more sessions?
- Where will the course be held? In the library, in the workplace or perhaps in another designated classroom?
- Will this be a session only for employees of a certain unit or for students (what kind of studies, which year of studies)
- How many shall attend?
- Will the entire session be dedicated to library skills or will it also encompass other issues?
- What form of training will be the most appropriate (lecture, practical exercises, etc.)?

If the participants of the course are to be students, we should also know what skills they already possess and in which areas they need instruction. An interview with the faculty member responsible for the group will help us assess these details. Before speaking with or emailing him or her, it is helpful to create a checklist of questions. This checklist should include:

- Do you have a course syllabus online or one that you can send me?
- What assignment will your students be working on?
- What are the guidelines for that assignment?
- Is the topic predetermined?
- If they are able to choose a topic for their assignment, will they have chosen it by the time of the information skills session?
- Are your students required to use certain information sources in the assignment (handbooks, journal articles, Web based resources)?
- What are the skills that you hope your students will acquire?
- Have your students had any prior library training?
- What year are they? (freshmen, undergraduate students, etc.)
- Are there specific concepts, resources or databases you would like me to teach?
- Do your students have any special needs (sight or hearing impaired students, etc.)?

Note It is a good idea to email or call the faculty member at least a week before the class. This gives him or her time to reply and also gives us time to plan the course properly. If we see a need for an additional, more complete interview or a written survey, we can carry it out among future participants.

1.1.3. Research tools used in the educational needs assessment

Listed below are available and widely used research tools. The choice of tools will depend on the needs and possibilities of the librarian doing the research. The decision about what research tools to use varies depending on whether it is intended for a large academic library or for a small hospital library, where the librarian might only be given a few minutes to do this research.

Interview

This is the method by which you can most effectively determine an individual's needs regarding specific knowledge and identify its shortcomings. There are several types of interviews. Depending on how the interviews are prepared and conducted, they are divided into:

- Quantitative (we have prepared a set of closed questions which we ask and we count the responses). The answers are yes/no or there are options given to choose from.
- Qualitative (more in depth), are more like a conversation on a certain subject, e.g. copyrights). We have prepared a set of questions/themes to start with and let the person being interviewed talk freely without interrupting too much.

Depending on the number of participants, the interviews can be:

- On an individual basis (carried out with one person)
- Collective (Focus group, controlled discussion with a few people).

Due to the manner of conducting the interview, it can be done:

- Directly (face-to-face)
- Over the phone.

Regardless of which type of interview we will use to achieve our goal, we must remember that the interview is a difficult method and requires specific skills from the teacher and very good preparation.

Interview: content and way of conducting

- Think about what type of interview will be sufficient in your case (e.g. if you are just beginning the needs assessment — a group interview can be a good prelude for constructing a questionnaire that can later be used in individual interviews
- What form best matches your capabilities (maybe you feel more comfortable conducting the interview according to a list of strictly prepared questions)
- Give the respondent the list of questions in advance
- Before the interview, explain exactly who you are, what you do, why you want to conduct the interview, how long it may take
- If you or the respondent does not have time to meet, conduct the interview over the phone
- The interviewer must be very well oriented in the subject of the interview

- The interviewer should possess the ability to listen carefully (try to be more interested than interesting)
- The interviewer should not give the impression that he/she is promoting the service, urging others to make use of the service
- Avoid guiding questions
- Ask clear and understandable questions, use helping (additional) questions for more details

Technical aspects

- If you want to record the interview ask for permission in advance and before the interview, check your equipment
- If you do not have the right skills (writing out the tape script is time consuming) take notes instead
- If you are recording the interview, check the equipment in the presence of the respondent
- The interview should last between 30 to 60 minutes (interviews over the phone may be shorter)
- Statements made by an interviewer should constitute no more than 5–10% (Nicholas, 2000; Babbie, 2010) of the whole interview
- Before the end of the interview look at the list of questions to make sure that nothing has been overlooked
- Giving the recorded interview for authorization can enrich it with facts which the respondent did not remember during the interview (e.g. due to stress)
- Remember to thank the person you interviewed.

Survey

The analysis of training needs in this case means giving out/sending out the questionnaire to potential course participants, gathering the results and presenting on this basis a proposal for training. The questionnaire may consist of closed questions, in which case the respondent may choose from several propositions, or open questions that allow for greater freedom of expression. We may use a combination of both. Questionnaire surveys are easier to conduct than interviews, as they do not require the direct involvement of the teacher, and answers to questions can be more concrete and specific. Disadvantages include: possibility of imprecise wording of the questions or discrepancy in understanding of the survey questions between the authors and the respondents, which can lead finally to inappropriate decisions in developing the content of training. A frequent problem is the fact that respondents are unable to diagnose their own knowledge and skills. They may also perceive disclosing their training needs as admitting that they lack competence, which respondents may be reluctant to do.

An example of a questionnaire seeking information skills, used in the Institute of Public Health in Krakow UJCM:

SELF-ANALYSIS OF COMPETENCE AND INFORMATION SKILLS

	Skills/Understanding	I strongly disagree	I disagree	I neither agree nor disagree	Agree	I strongly agree
1	I understand the idea of the rationalization of activities in health care based on scientific data					
2	I can distinguish scientific information from other types of information					
3	I know how to identify barriers which make dissemination and use of scientific information difficult					
4	I know the web portals and information directories in health care					
5	I know the basic sources of legal information					
6	I know the basic sources of economic information					
7	I can get to the information resources provided by the basic institutions in the field of public health					
8	I can find publications on a specific topic in the national medical bibliography					
9	I can find publications on a specific topic in Medline					
10	I can find publications on a specific topic in the Science Citation Index					
11	I can find data on health, based on OECD or other databases					
12	I understand the rules for drawing up a systematic review of scientific publications					
13	I know how to distinguish between a scientific article and an article in a magazine					
14	I know how to summarize an elaborate report/piece of writing					
15	I can identify characteristics of scientific publications					
16	I know the system solutions for the dissemination of scientific information					

17	I can identify characteristics of organizations' culture supporting the evidence based practice within it					
18	I can assess whether the source of information (e.g. journal, institution website) is a reliable source					
19	I understand the rules governing the creation of bibliographic databases and the resulting principles and problems of searching in these databases					
20	I can find information on a specific topic on the website of the WHO					
21	I know the rules for writing scientific publications					
22	I understand the need for specialized training of information workforce in health care					

Observations (in the workplace, in the classroom)

Librarians researching educational needs can do so by observing the potential training participants in their place of employment or study. Information can be gathered by participating in meetings, attending some classes (e.g. to make sure that mandatory library courses during the first year of studies do not repeat topics covered, for example, in the Introduction to Medicine course). Sometimes it is not enough to examine the curriculum, and is better to observe several classes and then create additional complementary teaching in the library, in cooperation with the didactic department and subject professors.

It is also very important to observe users at work in the library, to make an analysis of their information behavior and search paths which they use or questions they pose.

Observation, although the most difficult to implement, will give us information about the actual behavior of the target group, so whenever possible, we should try it.

Notes

Notes can supplement the observations. Although they are quite time consuming and require lots of work to be objective, they are a very valuable source of information and may serve as the basis for further analysis of educational needs. For a proper analysis of such notes it is best to use a form which has to be prepared in advance. This makes it easier to extract and organize the recurring questions or problems.

Communication with the university's teaching department

The teaching department of the university may express concrete needs and wishes, based on their research. Continuous contact with teaching staff is established more and more frequently by the medical schools' libraries. Examples of good practice and a description of these contacts can be found in articles and at conferences of medical libraries. Read more on how cooperation with the academic teachers can be implemented in Chapter 5.

Analysis of library statistics

An analysis of library statistics provides information mainly on the use of library holdings. We can also analyze data from the register of logins to electronic library resources, information about the use of databases. This way, we can trace the path of information search and try to analyze it in terms of what information needs users have. This information can supplement the assessment of educational needs of library users.

Earlier experiences

If a librarian already has experience in teaching — knowledge gained during previous courses may be a valuable source of information for the organization of training for new groups of workers or students. Observations and records of such training (self-reflection) may facilitate the formulation of questions about educational needs.

Getting to know the organization which had ordered the training (e.g. university, department or other institution)

It is good to know the institution whose employees are to be trained, especially if it is an external institution (unaffiliated with the library). Important information can be obtained from a careful analysis of its aims and objectives, areas of activity of its employees, organizational structure, and job characteristics of different positions.

Comment In practice, situations may occur when an information user indicates educational needs to the librarian. This should not, however, exempt us from the use of one of the methods described above, in order to confirm that the needs have been identified correctly. Indeed, users are often unaware of their shortcomings, also they might not know the names of various sources of information and therefore cannot indicate the areas of training that may be useful for them.

In the event where supervisors determine the needs of their subordinates, it is well worth to apply some form of control and thus to confirm/verify the needs of people targeted for training. Superiors sometimes see the development of their workers from a wider perspective and more objectively assess both the weaknesses and the needs of the employee, but sometimes such an assessment can be carried out in a rush, among many other duties, and may not quite accurately reflect the individual needs of each person.

1.1.4. Analysis of the results

A detailed analysis of the obtained information regarding educational needs will allow us to determine in detail the subject of training and tailor it to a particular group or category of users. The ultimate result of the needs analysis should be a short report on the activities undertaken. This report should include (Laguna, 2004):

- Objective of the analysis which was carried out
- Methods which were used
- Participants of the study (who was asked?)

- Outcome of the study
- Results and conclusions (it is the most important part of the report)
- Recommendations regarding possible trainings, supported by the results and conclusions of the needs assessment.

Presenting the results of the report to those who participated in the study and their superiors may be part of the promotion of the forthcoming training. A good report is a testimony to the professionalism of the librarian who conducted the survey.

Note An interesting alternative to the measures to examine the needs described above can be the so called "Diagnostic Training" (Laguna, 2004, p.74). Preparation of a test training and conducting it in a group of participants may evoke interest of future recipients of the training. It may also reveal gaps in particular areas of their knowledge and prove which training methods are most effective for this group of trainees. Such demonstration training can be used in any subsequent case of preparing classes for other groups of information users.

Knowledge resulting from marketing activities carried out by the library can be used in the educational needs analysis. More information on this topic can be found in Chapter 5.

1.1.5. Limitations and errors

Librarians who conduct educational needs assessment make errors and encounter barriers. Among the most frequent are:

- Lack of communication skills of persons carrying out the research
- Limiting oneself only to the data collected automatically by the library computer systems. This data will never replace the information gathered during an interview, or through surveys and discussions, and used as the sole source of information are incomplete and misleading
- Using specialist slang in questionnaire or during interviews
- Lack of control questions in the questionnaire

An obstacle in the study of needs is primarily high cost and that it is time-consuming especially when you use professional research tools and professional equipment to record interviews. These and the other obstacles listed above have been presented in the works of David Nicholas (Nicholas, 2000; Nicholas, Herman 2009) discussing the information needs of library users. Similar errors have appeared in literature discussing the organization of training and research training needs of large corporations (Laguna, 2004). This indicates that this is a widespread problem.

Note If for some reason we could not perform the analysis, or have done it incorrectly, let us remember that we can always use for this purpose the training which is actually being carried out. The results of the evaluation carried out at different stages of our training can be an indication for modifying the objectives; in their duration and/or to change the purpose and content of future training (See also Chapter 1.2).

Please note that the observations carried out during training with the purpose of future modification should be carried out methodically, recorded (or noted), and consulted with the participants.

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Suggestions for exercises

Exercise 1. Conduct a small group discussion on the subject of:

On what basis have librarians conducting training in your library decided that searching database X is of particular importance for a given group of information users?

Who identified the needs of this group and how?

Do the participants of this training really need it?

Exercise 2. Ask participants to get together in pairs and try to conduct an interview.

Suggestions for assignments to assess student's learning

1. Describe how you would identify the gaps of knowledge in the field of scientific information in a chosen category of users.

2. Name the most frequently used tools for the analysis of educational needs.

Teaching tips

Try to conduct a small study of educational needs of your fellow librarians, using different tools. It's the best way to observe the advantages and disadvantages of each method.

Additional readings and links to teaching materials

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CHAPTER 1.2.

Designing and conducting library courses

Urszula Zdeb and Małgorzata Marcjan

Once...

University authorities have, within the framework of expanding the range of curricula, opened a new field of study — Nutrition studies. The library has received a request to prepare information skills trainings and to become engaged in the teaching of future students. The teaching staff of the library developed appropriate teaching programs and suggested activities to be carried out through workshops conducted on site. Hands-on classes were to be complemented by theoretical materials posted on the distance learning platform. In addition, the library staff proposed a series of courses for the faculty. The goal was to also raise their information competence, especially to raise awareness of the possible uses of resources and technology, and facilitate co-operation between teachers and librarians. The librarians proposed that the classes for the faculty could take place at their workplace, in the Health Nutrition Department, if that would make it easier for them to participate. How can a block of library courses be prepared for such a wide group of users?

Introduction

In preparing a good educational program it is not enough to know the subject of the training well. Librarians must also have at least basic knowledge of teaching methods and principles of adult learning, and be able to apply this knowledge in practice. Determining carefully the training goals, adjusting appropriately the course content and applying the right methods and aids will guarantee a high quality of teaching.

There are many theoretical models depicting the cycle of teaching and its individual components. Those interested in theoretical considerations on this subject, should refer to the extensive literature in the field of pedagogy and methods of adult education. We want to draw attention to some of the stable elements of teaching and organization, common to every type of training, including information literacy training. Out of many

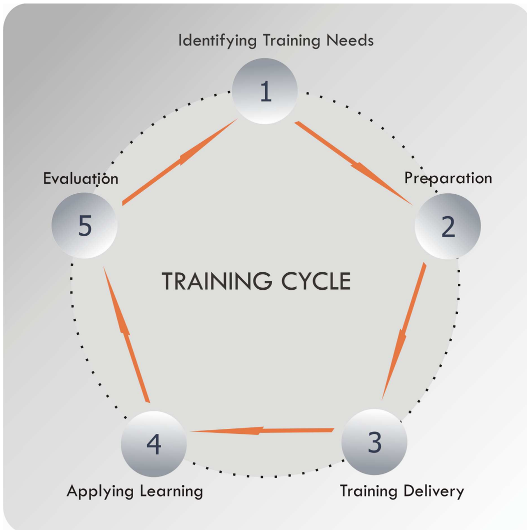

Figure 1: Training cycle.

theoretical models we had picked three, all used for the planning and organization of various types of training.

The first figure (Fig. 1) is our proposition of a training cycle and subsequent steps in the process of its preparation and implementation. These steps are: 1/identifying training needs, 2/preparation, 3/training delivery, 4/applying learning, and 5/evaluation. This graphical presentation emphasizes the cyclic nature of the process. Each evaluation makes it necessary to better understand the needs of trainees and causes changes in the content of a course, etc.

The didactic relationship model (Fig.2), widely used in the Scandinavian countries, originally developed by Bjørndal and Lieberg (1978), but further built upon by Hiim & Hippe (1998) shows the relationship between the various aspects and elements of the learning process.

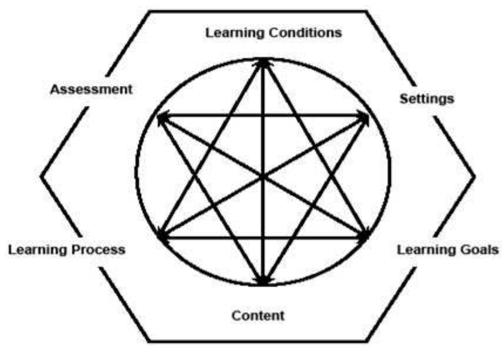

Figure 2: Didactic relationship model (Hiim and Hippe, 1998).

In this model, connections between: the learning conditions, the settings, the learning goals, the content, the learning process and the assessment activities are presented. As you can see between some of these elements and aspects of teaching there is clear relationship. Careful analysis of these elements and relationships, and "translating" them into practical solutions, will enable the librarian, who is preparing training, not to miss

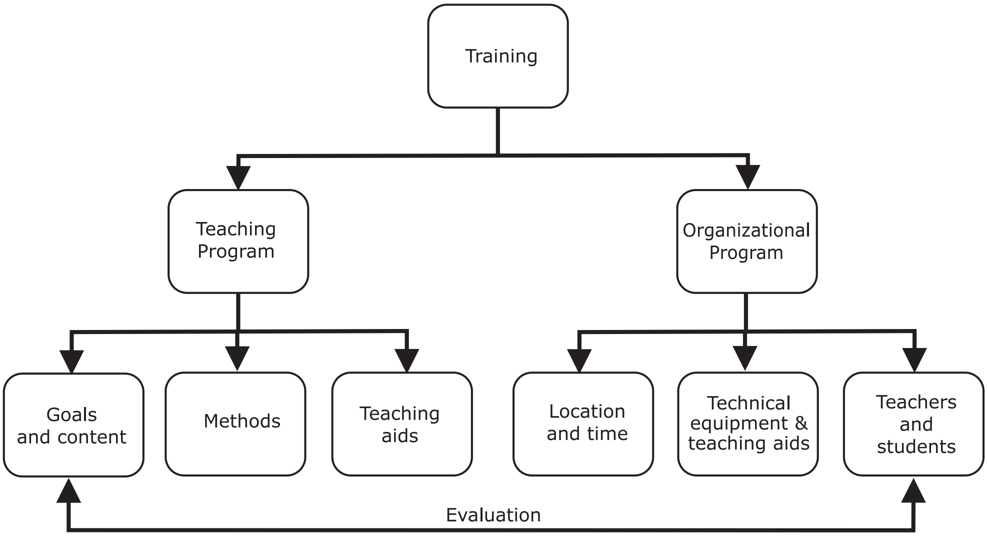

Figure 3: The Educational and Organizational Scheme of Training (based on Wasyluk, 1998, Łaguna, 2004).

any important element or aspect of the process. For a thorough explanation of the didactic relationship model, see: T. Skagen, M. C. Torras, S. M. L. Kavli, S. Mikki, S. Hafstad, I. Hunskår. Pedagogical Consideration in developing an online tutorial in informational literacy. Communication in Information Literacy (2008).

In contrast to the dynamic Hiim and Hippe model, The Educational and Organizational Scheme of Training (Fig. 3) is more static, but it explains in detail what issues must be taken into account while preparing to teach. The scheme was developed by the authors of this chapter on the basis of the work of Wasyluk (1998) and Łaguna (2004).

A careful analysis of all the presented models can help understand different aspects of teaching and individual organizational elements of the training. It seems to be beneficial for a librarian preparing for the role of a teacher, to carefully analyze all the models presented above, in order to deepen their perception of the pedagogical tasks. Furthermore, perhaps also other models contained in the pedagogical literature may be useful.

After that brief theoretical introduction, let's move on to discuss various issues relating to both curriculum and organization of library courses, as presented in Fig. 3.

1.2.1. Preparing the educational program

In preparation for teaching it may be useful for a librarian to complete a simple outline of the course (Tab 1.). Some items of the outline will be discussed in more detail in the following sections.

Table 1: Course outline

Place	
Date	
For whom	
Instructor/Teacher	
Module/Lesson	
Lesson Title	
Advancement Level/Group Level	
Duration	
Educational Goal	
Objectives	
Teaching Principles	
Teaching Methods/Techniques	
Teaching aids/Resources	
Evaluation	
Literature	

Activities of Teacher and of course participants			
Time and duration	Teacher's activities	Activities of the course participants	Notes

1.2.1.1. Defining educational goals

„If a man does not know what harbor he seeks, no wind is the right wind"

Seneka

The goal of education — is to achieve the deliberate and desired effects which we want to obtain as a result of education (Okon, 1970).

What is the main goal of our course? This is a question which we should ask ourselves before we start to design the training.

The main goal of teaching can usually be obtained on the basis of:

- Results of educational needs assessment
- Standards (available guidelines, describing the set and level of expected skills)
- Specific questions asked by the information users

In the case, mentioned in the introduction describing a hypothetical situation, the main objectives of the training are:

1. Library introduction for first year students

2. Raising teachers' awareness of the possible use of the library resources and information science technology in their teaching curricula, and

3. Strengthen the medical information searching skills of the nutrition department's faculty

These objectives can be achieved by designing a series of trainings, developed on the one hand on detailed needs assessment and expectations of future trainees, on the other hand, on the librarians' knowledge of what they should know and should be able do, to efficiently make use of the library resources. Any training can be broken down into sessions, each achieving specific partial (intermediate) goals.

Specific objectives are described by using operational verbs and should be formulated from the point of view of the recipients of the training. Operational verbs describe actions that can be observed, measured and assessed. Using them, a teacher can communicate, in a transparent way, what the participants should be able to do after the training. Therefore, specific objectives are often referred to as "learning outcomes."

The basis for the formulation of specific targets is their taxonomy. The world's best-known taxonomy of educational objectives was created by a team under the leadership of Benjamin S. Bloom. It is a system of classification of teaching tasks, which covers the three spheres of human activity: cognitive, psychomotor and emotional. Each of these areas relates to actions occurring during the learning process at different levels. These activities can be determined and described precisely by operating verbs (Bloom, et al.1956).

Sphere of cognition (knowledge and intellectual skills)

In this sphere, Bloom established the existence 6 categories: knowledge, understanding, application, analysis, synthesis and evaluation. Each of these categories is dependent on the preceding one. Therefore: the goal placed in the category "application" requires not only command of this aspect, but also the understanding of acquired information prior to its use; and the goal formulated as "assessment" — needs remembering, understanding, analysis and synthesis.

Here are some selected examples of the operational verbs defining the skills acquired in this field: define, recognize, know, select, check, give, draw, use, compare, assess, show, explain, design, solve, and perform.

Usage example

Goal: Students will be able to compare and distinguish scientific magazines from the popular ones.
Goal: Students will be able to compile a bibliography.
Goal: Students will be able to use the PICO scheme to formulate search questions.

Psychomotor sphere (physical skills)

The psychomotor sphere is aimed at developing a variety of skills through doing tasks requiring physical skills and the use of coordinated muscle movements. This sphere is also applicable to non-verbal communication: facial expressions or body language. These activities are important for teaching i.e. nursing, where many of the skills acquired by nurses concern precisely this sphere. In the case of library courses, this is a far less important skill.

The verbs describing the objectives of this sphere in the area of medical skills are: incise, operate, auscultate, press, inject, tie, immobilize.

Emotional sphere (feelings, attitudes)

The description of the objectives in the emotional sphere is exceptionally difficult, that's why it is usually omitted. In this phase we can distinguish categories such as:

- Reception (attention): addressee is ready to hear the message, consciously interested
- Reaction: addressee is adjusted to a course schedule, is willing to perform tasks and shows satisfaction if it is done properly, active participation or passive reception
- Valuation: acceptance and preferring values, which are the result of acquired knowledge
- Organizing and characterizing: acceptance of presented content and incorporating it into one's own system of values.

The verbs describing the objectives of this area: advise, present, assists, consult, object, participate, cooperate, converse, reject, approve. It relates to students' emotional behavior in relation to the topic of the courses, a teacher, a group.

Knowledge of the taxonomy of goals is useful and can be important in the didactic process. Adequately described specific objectives should be synonymous with the assignments we give to the participants of the course. Thus, they cannot be neither too meticulous nor too general. To properly construct the specific objectives, we can use the technique known as SMART (Neczaj, Turek, 2005), which shows us the characteristics of a well-constructed goal. It should be:

Simple — clearly stated, simple and comprehensive
Measurable — to determine using figures or indicators (rates) of the extent to which it is reached
Achievable — reachable, available in certain conditions
Relevant — appropriate, important for participants, so that they want to achieve it
Timed — determined by the time, possible to be completed by a particular date

Example

The subject of the training is "Searching for information: search strategies and databases." Main goal: After completing the training, participants will be able to translate their search query into an effective search strategy

Objective 1: Participants will be able to use a thesaurus to determine the appropriate key words

Objective 2: Participants will know how to use correctly the operators:; and, or, not

Objective 3: Participants will update and improve their searches

Specific objective 4: Participants will be able to select the most suitable, for their needs, source or sources of information

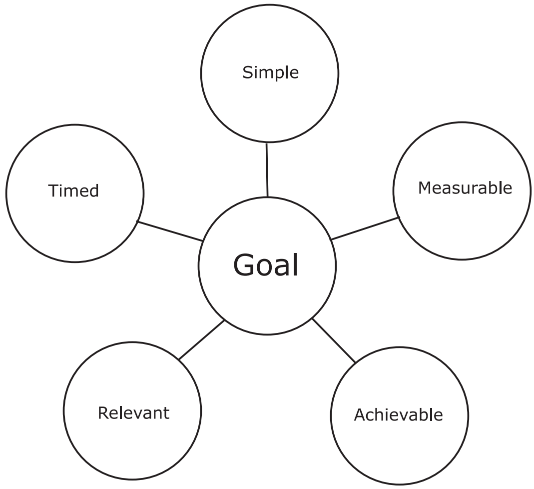

Figure 4: SMART (Neczaj, Turek, 2005)

1.2.1.2. Selection of educational content

Content of education — is a set of planned activities of a trainee, designated by the overall goal and specific objectives. The selection of the learning content can be supported by using common principles of teaching (Kruszewski, 2004, Laguna, 2008)

Connecting new knowledge with what is already known

Building and strengthening the participants' self-esteem by starting the class with the issues which are already familiar to them. Familiar issues are presented as introduction and then enriched with new knowledge, compared with what is known, the differences are being pointed out.

The transition from the simple to the complex

Indicate simple issues and skills at the beginning (e.g. during the presentation of databases) and next, develop the topic by presenting the detailed knowledge.

Structuring and organizing the material

Logical arrangement of the content, in a way that shows some of the content resulting from the other. Indicating at the beginning of the course how the content is organized helps trainees to absorb new knowledge and make connections between its elements.

Presenting of the content as part of a larger whole

The information we want to acquire is always a part of a greater whole. Referring to the whole and identifying the existing relations gives the participants a better understanding of the given content and allows them to see the context.

Awaking interest of a difficult subject

A good idea for how to run the class is half of the success. Arousing the curiosity of participants guarantees a better attitude towards the topic (especially when the class is obligatory). The class can be started with a good practical example, or an interesting problem to solve. Interesting, original wording of the topic arouses interest.

Provide additional learning opportunities

The trainees who show particular interest should be provided with additional material and ways to further their development. People who are slower in the topic acquisition should be provided with the possibility of acquiring the knowledge in a manner that is appropriate for their abilities.

1.2.1.3. Choosing appropriate teaching methods

Method comes from the Greek methodos — referring to a means or manner of proceeding, particularly a regular and systematic way of accomplishing the objectives. It gradually evolved into its current meaning: a set of systematic procedures and techniques for dealing with particular issues or problems.

For most of human history, educational methods were mostly informal - children imitated behavior of their elders, learning through observation and play. Following this path of thinking the children are the students and the elder is the teacher — the one who designs the course to meet the needs of the students.

Nowadays there is a wide diversity of teaching methods and the teacher, identifying and understanding the individual characteristic of students, has to choose the most effective, stimulating way of transferring the knowledge.

The following section focuses on teaching methods and techniques that can be used by the teaching librarian.

Selection of a teaching method

"I hear and I forget. I see and I remember. I do and I understand."

Confucius

Rational selection of the teaching method is an important step towards effective teaching. When choosing the teaching method, the teacher should take into consideration the following factors:

- Objectives of the course
- Subject — content and tasks which the teacher has to achieve within a specified period. Remember! The time is limited
- Number of students in a group
- Age of the participants
- Availability of teaching aids and resources. If you hope to obtain spectacular learning outcomes just from using the new technologies you may be disappointed

- Teacher's ability and preferences. The educator may select the teaching method which is consistent with personal preferences on the condition that the method will help students to achieve the learning objectives. Application of methods that makes the teacher feel uncomfortable and unconfident does not bring good results.
- Characteristics of students to be taught. There are three groups of learners:

1. Visual learners
   - prefer using pictures and images
   - prefer using words, both in speech and writing
   - focus on the tables, charts, illustrations
2. Auditory learners
   - prefer a form of discussions and interviews
   - prefer using sound and music
   - remember the verbal message
3. Kinesthetic learners
   - prefer action, learn by doing
   - prefer using body, hands and sense of touch

Approach to teaching

In choosing a method of teaching the teacher declares a particular approach to teaching, and how he/she perceives the role of the teacher and student in the teaching process.

The 'activating teaching methods' belong to a group of methods, in which the goal is to teach in an unconventional way. These methods should motivate students to work using creative thinking and problem solving. This group of methods is based on learning by doing, cooperation and most importantly, by experiencing. The essence of activating methods can be summarized by the sentence — "Tell me and I forget. Show and I will remember. Let me do it and I will understand."

Before choosing the activating method, the teaching librarian should take into consideration that not only the students will be active, but the teacher will have to be active as well. The teacher will have to switch to a different type of teaching, reconstruct requirements, and formulate objectives differently.

The major differences between student-centered learning and conventional teaching are listed in Table 2. (after Newble D., Cannon R., A handbook for medical teachers, 2001)

Variety of teaching methods

Using a variety of teaching methods is an important ingredient in creating a course that is of interest to students. A course with a large proportion of lectures, will need to have a high level of intrinsic interest to students to keep them engaged. Over the past few years, a wide range of different teaching and learning methods have been introduced and tested, often with the aim of developing skills which more didactic methods are poorly adapted to doing. There is substantial literature on these methods and on how best to use them. It is not possible here to provide great detail on every possible teaching and learning method, so instead we have focused on some of the methods and issues to be considered by teaching librarians.

Table 2: Comparison of conventional and student centered learning

	Conventional Teaching	Student Centered Learning
1	Students are often passive (no role in planning learning, sitting in lectures)	Students have responsible and active role (in planning their learning, interacting with teachers and other students, researching, assessing) Emphasis on integrating learning across the curriculum
2	More decisions are made by the teacher	Students required to make choices about what and how to learn
3	Emphasis on learning this subject only Emphasis on receiving information	Emphasis on enquiry type activities
4	Teacher as expert dispenser of knowledge and controller of activities	Teacher as a guide, mentor and facilitator of learning
5	Extrinsic motivation	Intrinsic motivation
6	Individual learning and competition between students Learning confined to fixed teaching venues (lecture room, libraries, labs)	Focus on cooperative learning Learning can occur anywhere
7	Relatively inflexible arrangements	Greater flexibility in learning and teaching
8	Assessment seen as the responsibility of the teacher with examinations as an important focus	Greater flexibility in assessment with self and peer assessment becoming more common
9	Short-term perspective: emphasis on completing assigned work and learning for the examination	Long-term perspective: emphasis on lifelong learning

Lecture

Lecture is still the core teaching method. It is best suited to provide an overview of the subject and to stimulate interest in it (Methods of Teaching and Learning — A Manual for Course Organizers).

Advantages

- Provides an overview of the material in direct manner
- Stimulates thinking
- Inspires thanks to the experience of the teacher
- Useful for a large group

Limitations

- Expert is not the synonym of a good teacher
- Communication only from the teacher to students
- Audience is passive

Requirements

- Comprehensible and clear objectives
- Examples, anecdotes to break preliminary barrier
- Handouts (helpful)

The teaching librarian who is not sure how to prepare a good lecture should visit the following site http://www.cardiff.ac.uk/insrv/educationandtraining/infolit

Lecture with discussion

Advantages

- Involves audience
- Motivates to inquire

Limitations

- Time
- Quality depends on the quality of questions asked during discussion

Requirements

- Questions should be prepared prior to discussion

Discussion

Advantages

- Stimulates creative thinking
- Effective, if conducted after introduction and presentation of the topic
- Allows everyone to participate and share ideas

Limitations

- Suitable for a group of not more that 20 participants
- Risk of digressing from the subject or change it
- Unequal opportunities — few participants can dominate while others may not participate
- Time consuming

Needs

- Careful planning by the facilitator of the discussion
- Draft questions and outline

Brainstorming

- Promotes broad and creative thinking about a problem
- Creates new ideas
- Solves problems
- Motivates and develops teams

How to conduct a brainstorming session?

- Explain the rules of brainstorming to the group emphasizing that:
    * criticism is ruled out during the idea generation stage
    * combination and improvement of ideas is essential

- Specify the objective
- Welcome and accept all ideas
- State the problem to the group
- Allow students to write down their ideas
- List, record, and display the ideas for everyone to see
- Begin the discussion and evaluation

Buzz Group

It is a form of brainstorming and may follow a lecture, panel, or some other teaching form which has been used to transmit certain basic information about a given subject

- Flexible technique and useful for large groups
- Generates ideas
- Covers different aspects of a topic or maximizes participation
- Solves problems

How to conduct a buzz group

- Name the clear task
- Divide the group into subgroups (usually of no less than three and no more than eight)
- Allow the participants discuss for a period of time
- Reassemble the group
- Appoint a spokesperson to report the results of the discussion to the larger group

Role playing

- Powerful and underused technique
- Teaches communication skills
- Develops interpersonal skills
- Provides opportunity to practice skills

How to conduct a role play?

- Introduce the intention of the exercise
- Describe the location and situation
- Choose students to act out roles
- Provide a script of the role
- Let "actors" practice for a play — specify the time
- Specify tasks of observatory for audience
- Discuss the experience with players and observers

Limitations

- No volunteers and participants to undertake action
- Participants may be too self-conscious
- Not appropriate for large groups

One-to-one teaching

One-to-one teaching is an extremely effective approach to instruction. It is tailored to the needs of the particular student what allows for a high quality interaction between the teacher and the student. The student benefits immensely from the personal attention inherent in a one-on-one teaching ratio. Because of the intimate environment, the teacher can accurately monitor how well the student is mastering the lessons, and can adapt the pace and targeting of skills accordingly.

There is a great possibility that the teaching librarian will be in a situation requiring the application of this method. Those who do not feel comfortable with this method should visit the following site: http://www.cardiff.ac.uk/insrv/educationandtraining/infolit

Hands on

Hands on activities are one of the most dynamic ways to deliver teaching. This method allows for creativity and learning at own pace. More on this method: http://www.cardiff.ac.uk/insrv/educationandtraining/infolit

It is worth considering carefully the choice of appropriate teaching methods and realize the enormous role of the teacher in the educational process, the teacher who can trigger certain activities of the student or block them.

We should keep in mind that people acquire knowledge in different ways and there is no teaching method that would be matched perfectly for everyone. When preparing a lesson/course it is good to use several methods, then it is more likely that every participant will find something suitable for him/her.

In selecting a method, it is not the best idea to allow ourselves to be led only by our preferences. Quoting A. Kaminski: “When a fisherman goes fishing, he takes with him the bait that tastes good to the fish, not to the fisherman.”

1.2.1.4. Selection of teaching resources and teaching aids

High demands in regard to the quality of education, and a fast-developing technology provides more and more new means of information transfer and new educational aids, which can enrich our teaching. To maintain a high level of attractiveness of teaching, the teacher should exploit and use teaching aids, materials and equipment in a thoughtful and skillful way, to make learning easier.

The often used division of educational means is:

- Verbal — textbooks, handbooks, exercise books, tests, feedback sheets, self evaluation forms
- Visual — charts, tables, boards, complex computer programs, WWW materials, slides
- Audio — recorder, radio
- Audio — visual, TV, CD-players, video, multimedia projectors

Use of other unconventional materials and aids is most welcome. It depends on the teaching librarian’s invention.

When designing a training course we have to plan what means will be used to convey the selected content or to conduct exercises. Both over-used means and their absence is not conducive to effective learning. Do not try to hide behind an excess of teaching aids in fear of contact with the group nor ignore opportunities offered by the application of even the simplest aids that can spice up an, otherwise monotonous, course. However, it is important not to abuse any of the measures (e.g. PowerPoint presentation) as it will soon cease to be attractive and will become boring.

When should we use teaching aids? We do this when we want to:

- Facilitate the mastery of new skills and knowledge
- Explain a complex phenomena/issues
- Catch students' attention, get them to focus on selected issues
- Keep the group's attention
- Strengthen student activity and participation
- Check students' understanding and mastering of the material discussed
- Deepen self-awareness (e.g. by testing)
- Reinforce the impression of professional preparation of the training (Laguna, 2004)

More about the types of teaching aids in Chapter 1.6.

1.2.2. Organization of the training

Apart from preparing the didactical aspects of training course, it is also important to make sure that the training is organized well. It encompasses:

Deciding on the location

Classes will usually be held in the library, in a designated room. But they can also be held at the workplace of those contracting the training (lab room, computer lab, lecture hall). It is important to check what these facilities look like, what equipment is available there and whether the methods which we want to use can be applicable in these conditions. We cannot effectively teach, for example, searching databases without a computer for every participant. We need to verify that the hardware that we need, will be installed. If possible, we should also ensure the utmost comfort of the trainees.

Time

We must carefully plan how much time should be allotted for the classes, exercises, presentations, etc. Planning for subsequent phases of the training course and practicing will help to avoid unpleasant surprises later. It is a good idea to reserve a few extra minutes for unforeseen events or additional questions. If the training course consists of several sessions, you need to schedule breaks in between. It may be useful to write down approximate time and duration of activities of Teachers and trainees. (Tab.3.)

Selection and verification of the technical and other aids needed

In addition to checking the equipment, which the classroom is equipped with, take care to check simple things like, whether the markers for the whiteboard write well. Preparing the tests, or other materials, prepare a greater number of copies, check whether they are readable, check page numbering, etc. These seemingly small mistakes can then significantly influence the assessment of our training by the participants and, more importantly, the quality of the teaching.

The choice of the person(s) to carry out the courses (if the plan is to have several sessions)

Well selected teachers or a well-chosen team of people will be the best guarantee that the training will go well. Good co-operation in such a group and knowledge of the subject throughout the training by the team members will help in case of, for example, illness so that substitution can easily be arranged. This is particularly important in cases such as the hypothetical situation described in the case, where the training is woven into the curriculum and coordinated with the whole.

Match the size of the group to the conditions and to the subject of the class

Some methods necessitate that the course should be for a small number of people (such as activating methods), others, such as the traditional lecture do not have such restrictions. The number of computer workstations in many cases determines the size of the group that we can train. More on the organization of courses in Chapter 5.3.

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Suggestions for exercises

Exercise 1. Try to identify specific objectives of classes concerning:

- Critical analysis and evaluation of information sources
- Creating and managing references
- Work with the sources for "evidence-based practice"

Exercise 2. Give the criteria for choosing teaching methods. What teaching methods are different from the content and teaching resources?

Suggestion for an assignment to assess learning

Point out the elements of the organization of a library courses. Characterize them shortly

Teaching tips

Specific objectives may be used to assess the effectiveness of the course session. More about this in chapter 1.3.

Tips for creating e-courses: http://www.fgcu.edu/onlinedesign/manage.html

Other inspiring materials: http://www.inspiringlearningforall.gov.uk/

Additional readings and links to educational materials

ACRL Instructional section: Writing Measurable objective http://www.ala.org/ala/mgrps/divs/acrl/-about/sections/is/webarchive/smartobjectives/writingmeasurable.cfm

Bloom's taxonomy — learning domains http://www.businessballs.com/bloomstaxonomyoflearning-domains.htm (access 05.2010).

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Many important details about the process of teaching and training organization are available in the on-line journal of the School of Economics in Warsaw, Poland: e-mentor. Also in English. http://www.e-mentor.edu.pl/index.php

CHAPTER 1.3.

Methods of evaluation

Urszula Zdeb

Once...

During the past several years the employees of the Teaching Department of the Library have been carrying out a course for the students of the 3rd year of medicine on the use of databases and the organization of academic work. The head of the Department noticed that when the same students, who had attended the course, visit the Library, they are still incapable of proper database usage and they continue to struggle with searching. Why? The manager decides to check if the evaluation of the course has been carried out properly by the training team. Perhaps the librarians do not teach well, maybe the level of knowledge and skills taught is not appropriate. The results of good evaluation could probably explain the reason.

Introduction

The work of a teacher is not only to teach, but also to evaluate the effectiveness of this teaching. The evaluation should not be limited to the final stage of checking acquired knowledge. The teacher himself is also subject of assessment. The evaluation of course participants' achievements as well as the evaluation of the teacher is a complex process that begins at the moment of establishing educational goals. A well-prepared evaluation consists of several steps that should be thoroughly planned before conducting the training. This chapter will briefly present information on the purpose of evaluation. Various models of performance evaluation which appear in literature will be examined. Those models that are more applicable in assessing library training will be discussed in greater detail. Particular attention is given to the methods and problems that we might encounter when carrying out evaluations.

1.3.1. General issues

A review of the definition of 'evaluation' in literature indicates that the most common term used to describe this activity is the word 'process'. In the following text evaluation will be treated as such. A common mistake is to use the terms ‘assessment’ and ‘evaluation’ interchangeably. An assessment is a component of evaluation and is the result of having used different measuring tools in the evaluation process. Janusz Wasyluk in “The Handbook of Medical Teaching” distinguishes between the two concepts (Wasyluk, 2001):

Assessment — is the judgment and opinion regarding the level of knowledge and skills, based on the results of teaching measurements carried out on the basis of pre-established criteria.

Evaluation — is a process of continuous informal assessment of the effectiveness of education, encompassing students and teachers as well as learning objectives, teaching methods and ways of assessing the results.

Evaluation provides feedback on the good aspects and faults of the training and allows it to be improved.

1.3.2. The objectives of the evaluation

The goals of the evaluation may vary depending on the information we want to achieve. There are two main goals of measurement: determination of quality and determination of effectiveness.

Determination of Quality — The students’ satisfaction with the conducted training is examined. We can evaluate every phase of the training cycle. The assessment can be conducted with use of questionnaires completed by the participants. For this to be successful, participants should be informed about its purpose before the training takes place. Also, appropriate conditions and sufficient time to answer questions must be ensured.

Determination of Effectiveness — The level of knowledge and skills that learners have gained through the training is being assessed. This assessment can be carried out at several points during the training cycle: before, during, and at the end. There is also medium and long-term assessment, carried out a few months after completing the training. In courses for library users this is not always possible.

Other reasons and benefits that can be obtained as a result of a well performed evaluation are:

- Setting standards (if there are no specified benchmarks in the field, performance evaluation can help to develop them)
- Motivation for learning (awareness of the progress control system can sometimes be a stimulating factor)
- Identifying problems
- Assessment of increase in skills over a specific period of time
- Analysis of the teaching process (objectives, methods, evaluation), to determine its weaknesses and strengths
- Assessment of the person conducting the training

Due to the two main objectives — quality and effectiveness — evaluation can be divided into summative and formative evaluation:

Summative evaluation

The summative evaluation is limited to the assessment of work already performed; it is geared towards the outcome, the result of this action. This evaluation focuses on examining the extent to which the objectives of the course have been achieved. In practice, this translates into conducting a test among the participants of the training, checking their knowledge after the training. Such action in itself is only part of the evaluation process.

Formative evaluation

The formative evaluation is process and correction-oriented, focused on the improvement of the action carried out. Its purpose is to show the strengths and weaknesses of training rather than to assess the trainees' specific knowledge. The field of evaluated data is being broadened; answers to questions are being sought: What is happening? How? The observation and analysis of the subject of evaluation is undertaken. Importance is attached to the description, interpretation and context of gathered information. However, the final data is also taken into consideration. This approach focuses on gathering various information and broad knowledge on the subject of evaluation. Such understanding of evaluation can be a starting point for changing the goals and content of library training. It can change its form, teaching methods and even change the person running the course.

This form of evaluation awakens a more positive attitude among participants of library courses as compared to the assessment of their knowledge. Trainees are more eager to participate in this type of evaluation and are more likely to give fuller answers. The teaching librarians who do the teaching and explore the participants' satisfaction and their needs at various stages of the training, gain more respect and are seen as professional and trustworthy.

Note Formative evaluation can be especially helpful if you are teaching a new or substantially revised course, adopting a new text or lab manual, or experimenting with a new mode of instruction.

An example of a satisfaction survey can be found at the end of this chapter.

1.3.3. Evaluation as a process

There are three stages of the evaluation process:

STAGE 1: Planning activities and developing a draft of the evaluation form

When planning evaluation activities we should consider questions concerning the purpose of the evaluation, its addressees and determine the subject of the evaluation — in other words, we should acknowledge what we want to research. We are also looking for the answers to the following questions:

- When do we need the results?
- Who will be involved in carrying out the evaluation?

- What will the tasks and functions of individuals be?
- What will be the costs of the project in terms of time and finance?

Therefore, the planning of the evaluation is important. An example of a satisfaction survey can be found at the end of this chapter.

The project of evaluation describes the chosen method of evaluation, as well as its mechanism. It must contain an accurate description of what we want to research, what aspects are of interest to us and what assessment criteria we assume. Only then can we define how we want to collect data which is pertinent and of interest to us. We have to include where we will gather data from and what data collection methods we will be using and what is our sample. In the attachment to our plan it should be shown which data collection tools (e.g. a questionnaire) that may be used.

STAGE 2: Gathering data

Before the proper research is conducted it is important to consult and test tools and procedures. To obtain credible data, it is vital to create an atmosphere of openness and trust and pay attention to the ethical side of the study. It is important to gain the participants' acceptance. We can do this by clearly explaining the purpose and describing the procedure and choosing areas and criteria of evaluation in co-operation with the trainees. To ensure a sense of safety and confidentiality, we should also inform course participants in advance about the use and dissemination of the results. During the data collection we should ensure full anonymity of respondents and afterwards delete all data, which can identify our respondents.

STAGE 3: Analysis of collected information and assessment of the results

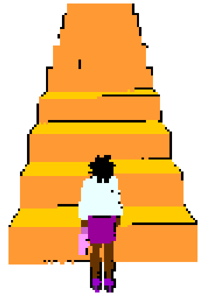
In analyzing and interpreting data, you should consider which data are most important. The evaluation results are collected and presented in the evaluation report. It should be written in a form which is concise and readable to the recipient. Conclusions should be drawn from the collected data, which include answers to the questions asked earlier, and evaluated according to the assumed criteria.

Dissemination of results is a form of feedback to the stakeholders and an opportunity to reflect on the outcome together with the course participants. They can be distributed in an abridged form, while the full version of the report can be posted for viewing. The teaching librarians can sum up the evaluation at a meeting with their supervisor, and the results can be placed on the library's website, etc.

The evaluation can be done by the administrator or by the teaching librarian himself/herself. The first will be more objective. But, since many health libraries have very few librarians, usually the teaching librarian does the evaluation herself. If evaluation is done appropriately, with use of possibly objective measures, it is a great tool for improvement of teaching and for self-improvement, even if to certain extent biased.

The Kirkpatrick Model

The evaluation process can be carried out on several levels, depending on the needs and financial possibilities of the library. An effective tool for the preparation and evaluation of training is Donald Kirkpatrick's four-step research model for examining efficiency (Kirkpatrick, 2001).



The Kirkpatrick model focuses on four different aspects or levels:

- Reaction of participants
- Learning
- Behavior after the training
- Performance on account of changes in behavior

These four elements are the successive steps of the evaluation. The evaluation process itself, at each of the levels, is similar (3 stage-planning, data collection and analysis, conclusions and recommendations). The evaluation always starts at level 1. Depending on the needs and financial possibilities of the library, it is possible to move up a step or stop at the first level. The information obtained in the first phase is the basis for the transition to the next level. The evaluation becomes more difficult to implement at each subsequent stage, but at the same time it also increases the value of the gathered information.

Level 1 — Reaction

For the training to be successful and for its future development, the participants' satisfaction is essential; what they thought and felt about the training. The measurement of the level of satisfaction takes place at this stage. Participants might evaluate the whole library training, that is both the teaching and its organization (See also Chapter 1.2).

In conducting evaluations at this level, we can address the following aspects:

- Did the trainees like and enjoy the training?
- Did they consider the training relevant?
- Was it a good use of their time?
  - Did they like the venue, the style, timing, domestics, etc?
  - What was the level of participation?
  - Ease and comfort of experience
  - Level of effort required to make the most of the learning
  - Perceived practicability and potential for applying the learning.

Level 2 — Learning

The evaluation at this level regards the change in the level of knowledge of participants. We check whether they acquire new or additional skills. To assess this level it is necessary to specify in advance the objectives of education and level of knowledge before the training (see also Chapter 1. 2), as they are a point of reference in this evaluation.

In conducting evaluations at this level, we address the following issues in the questions:

- Did the trainees learn what was intended to be taught?
- Did the trainer's experience influence the level of knowledge gained?
- What is the extent of change in comparison with the level of knowledge/skills before training?
- How much have the participants learned during a training session?

Level 3 — Behavior

This level of the evaluation pertains to the improvement in the behavior of the participants of the training. In other words, we check how they take advantage of the effects of training, how they apply acquired skills. To achieve the change, according to Donald Kirkpatrick (2001) it is necessary to meet the following four conditions:

- a person must want to change
- a person must know what to do and how to do it
- a person must work in a friendly atmosphere
- a person should be rewarded for every positive change

In conducting evaluations at this level, we will ask the following questions:

- Did the trainees put their learning into effect when back on the job or study?
- Were the relevant skills and knowledge used?
- Were there noticeable and measurable changes in the activity and performance of the trainees when back in their roles?
- Was the change in behavior and new level of knowledge sustained?
- Would the trainees be able to transfer what they had learned to another person?
- Are the trainees aware of their change in behavior, knowledge, skill level?

Measurement of behavior change is not as easy to quantify and interpret as evaluation of reaction and learning. To conduct evaluation at this level we need a good relationship with the staff in other academic departments or elsewhere in an organization to help us plan and carry out the evaluation.

The Head of the Teaching Department from the case has conducted the evaluation at this level using the simplest available measuring technique, which is observing the behavior of the participants. To find out why there were no expected changes in the behavior of the students, he needs to evaluate the two previous levels.

Level 4 — Results

Evaluation at this level looks at the final tangible outcomes of the training. These final outcomes can be: positive changes in the work place, better study skills, changes in medical treatment, improvements in activity of an institution, etc. These changes can be seen looking at indicators like: raised number and higher quality of scientific publications, raised standards of health care, various quality ratings, less library inquires, etc.

Note The easiest way to conduct evaluation is on level 1 — reaction. The assessment of a given librarian's undertakings in the realm of organization and training is very important for the library because it provides valuable information that can be used to improve subsequent training. But remember that a positive assessment of the training at this stage does not guarantee that the participants have acquired specific knowledge and skills. Level 2 evaluation of learning and knowledge can give us information about that aspect.

1.3.4. Measurement tools

A well designed evaluation should encompass several measurements. This will allow for a deeper analysis of the results. There is no list of research methods and techniques that is especially set aside, or “reserved” for evaluation. All quantitative and qualitative approaches and methods used in social research are exploited. The choice of measurement methods and construction of measurement instruments is a crucial step in the evaluation process because it determines how the data will be collected.

The most popular and interesting measurement tools are:

'Minute answers'

This tool consists of two questions to which students give written responses at the end of training. It takes a minute or two to answer these two questions:

1. What is the most significant thing you have learned today?
2. What question is uppermost in your mind at the end of today’s session?

Such answers are very useful in evaluating how successfully you conveyed the knowledge and whether students were bored or confused.

Tests

A test usually consists of multiple choice closed questions. The respondent has to mark the answers he/she agrees with. The test’s reliability is achieved by formulating a large number of well-constructed questions, what requires considerable skill. Using a greater number of questions is beneficial, as a larger set of questions provides better coverage of course material, and students’ test scores are more reliable. A large number of examinees can be tested with relatively small resources. The major disadvantage of multiple-choice questions is that they are time-consuming to construct. However, once constructed, multiple-choice questions can be used again, in either original or modified form. Since these tests primarily measure knowledge only, they are now often being replaced with more performance-based assessment. About computer/network based tools to conduct tests (like e.g. LSM) read in Chapter 1.6.

Short written evaluations

An assessment tool that requires students to construct short, written answers to presented questions. It is often used instead of multiple-choice questions to have students actually construct the answer rather than merely select it from a set of alternatives. As the answers must be constructed, there is little chance of guessing correctly. Because it requires students to construct answers, it provides more information about the students’ knowledge. The disadvantage of this form of evaluation is difficulty connected with grading. Quizzes are a special form of this type of evaluation (see also in Chapter 1.6).

Question Box

Put the box in the back of the room for student questions, comments or problems. Students can drop questions into the box anonymously at the beginning of the class or during the break. After the end of the cycle of classes you can answer the questions in front of the students. This technique gives students anonymity in asking questions. It can also help a teaching librarian identify areas of special difficulty if the same problems are raised by several students.

Sort questionnaires

This is a form which professional evaluators call "formative evaluation" as differentiated from a "summative" or end-of-course evaluation. It is designed solely to give you very specific, concrete information on where you can make improvements in course content, organization, or teaching method. Formative evaluation can be done during the course in regard to any specific aspect of teaching.

Knowledge questionnaires

Questions in knowledge questionnaires should not take a form radically different from those which you use in your course in quizzes, lecture or discussion. Students should have the opportunity to demonstrate their mastery of the material in the same ways you have emphasized in your presentation of it.

Videotaping

If a teaching librarian wants to know if the students are bored or confused or if he/she wants to get feedback on his/her teaching and wants to develop a more interesting style of presentation, recording of the training can be used as a tool. It is the most effective kind of feedback you can get. You just have to get used to it.

Self-Assessment Questionnaire (self-reflection)

Assessment completed by the learner about himself or herself to provide indirect, inexpensive measures of skill attainment and real-life performance. It serves as an evaluation of one's own deficiencies and achievements, professional behavior, performance and competence. Though important as a tool in motivation for improvement of competence, it has the weakness of being subject to rating biases.

Note It is worth asking yourself a few questions about your own lesson activities right after the training. This will allow us to be more aware of what kind of teachers we are. These may be questions such as:

- Did I encourage the trainees to participate in the classes? If not, what can I do differently?
- Did the participants understand the purpose of the lessons? If not, how could I make them clearer?
- Was I well-organized? If not, what can I do to improve that?
- Were the participants attentive? If not, how could the lessons be changed to be more interesting in the future?
- What did I do best? and what did not work out?

In the Table 1. below you can find examples of evaluation tools, related to Kirkpatrick's levels.

Table 1: Examples of evaluation tools

LEVEL	CONTEXT	MEASURING TOOLS
1. Reaction Examination of feelings and opinions of the participants after the training	Evaluation regarding teaching content and organization (among others: teaching methods, resources, organization of training, teacher's behavior and all kinds of teaching aids)	Satisfaction survey, interviews with participants, trainer self-reflection, observation, question box, Short written evaluation, questionnaire, videotaping
2. Learning (knowledge) Testing knowledge of trainees	Tests the level of knowledge, practical skills and changes in attitudes acquired during the training The evaluation should take place before and after training (pre- and post-test) and at a specified time interval (e.g. one month)	During the training — „minute answers", knowledge and skills tests, quizzes, and case studies at the end of training, observation, question box, interviews, reflection notes,
3. Behavior Examining whether there is a change in behavior, investigation into the level of implementation of information skills (such as tracking change; and whether trainees actually apply the acquired skills in their work)	The participants' behavior after training in the workplace or in studies. The assessment should take place after several months.	Observation of skills, questionnaire of knowledge
4. Results Examines whether and how the acquired skills affect changes, in example in research work, or in health outcomes, etc.	Assessment of practical results of using educational content in the activities of the organization (e.g. the impact of changes on the results of studying or on health) Assessment of training costs in relation to the resulting benefits. A longer period of time must elapse between the training and the research (e.g. one year)	Interviews, analysis of documents

A good evaluation should be (Łaguna 2004, Kosińska 2000):

Objective and reliable — Should determine the actual level of knowledge and skills of the trainees. The repetition of such an evaluation by another person should bring the same result.

Mobilizing — The results should lead to certain consequences, have a negative impact (e.g. lack of course credit) or positive (e.g. gain extra credits/points)

Useful — Its results should be used to improve the methods, content and organization of teaching. Evaluation has no meaning if no one makes use of it

Overt — Training participants/ trainees should be informed about it prior to the training and should know the results

Feasible — Evaluation assumptions must be realistic. The evaluation should only be performed if it is feasible for practical reasons, and its effects offset costs

Instructive and constructive — Should make students and teachers aware of their achievements and shortcomings, giving tips on how to supplement them, how to change. The evaluator must also indicate the direction for further action

Fair/Honest — Should be conducted fairly and in accordance with ethical standards (protection of personal data, information sources)

1.3.5. Using technology in evaluation

Computer technologies can be used to support the evaluation. There are several ways in which they can be used. These include:

- As a management tool to store, distribute and analyze data and materials. An evaluation system should be integrated with larger systems for curriculum management such as processing of student data and delivery of course materials (e.g. through Learning Management Systems).
- As a tool in the evaluation process such as for the marking and scoring of tests. Software can be purchased that enables you to prepare and present work for assessment, but you should check to see if your institution has a license for some of these software products (e.g. Class Performance System — CPS).
- As a resource for student learning and assessment. Basically this involves students using technology to prepare and present work for assessment. (See also Chapter 1.6)

Note Information technology and telecommunications can be very helpful, but you have to be careful with relying only, for example, on the results of computer surveys. The reliability of results depends to large extent on the construction of such a tool. It is safe to use a validated tool of good quality.

1.3.6. Evaluation of the results — report

Feedback for participants

A professionally designed and carried out evaluation requires a final report. It is important to also keep participants informed about their progress and results of analyzed surveys or questionnaires. This should of course be subject to ethical standards, especially to ensure anonymity and privacy. This has to be done also in case the information provided during the interview needs to be authorized.

The final report systematizes the information about the effects of teaching and its purpose is to inform participants and also supervisors of the evaluation results. And what is most important, it can be used by a librarian in improving his/her teaching. Such report should contain:

- Training program description. Which was the subject to evaluation: its objectives, expected outcomes, participants, duration, etc.
- Method of the evaluation. In this part of the report the following elements should be included: key questions, the methods and techniques used, information about sample of respondents
- Results of the analysis and their interpretation
- Indications for future action. Suggestions and proposals.

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Suggestions for exercises

Exercise 1. Course participants design, in groups, a method of evaluation of a courses in bibliographic database searching (e.g. Embase or PubMed). One person presents the results of this group work.
Exercise 2. Organize a discussion: is self-evaluation a reliable method of evaluating the effects of teaching? Divide the group into two parts having contradictory opinions and tell them to prepare arguments for and against. Under what conditions can such evaluation be useful?
Exercise 3. Organize a discussion on advantages and disadvantages of various methods of evaluation of teaching. Which methods are most suitable for library courses?

Suggestions for tests and assignments to assess learning

1. Construct a test measuring the satisfaction of participants with the conducted training

2. Give the qualities of a good evaluation

Teaching tips

- To make the satisfaction survey conducted after the completion of training interesting, use a method called “suitcases”. Give the participants of the training sheets of paper on which there are contours of two suitcases. One is entitled “what are you taking with you?” and the second reads: “what you leaving behind?”. Then ask the participants to fill in the empty suitcases with the content of the training, which proved to be useful and that the participant wants to take along, and the other one with items that are not useful and which will be left behind
- When doing an evaluation, always check what were your assumed teaching goals
- At the end of the session, ask students to write down three things that they learned. After the session, you will see if you met your goals
- Pre- and post-test. Create a test dealing with knowledge you will cover during the session. Copy it on both sides of a sheet of paper. At the beginning of the session, have students take the test. When they are through, tell them to set it aside. At the end of the session, ask students to turn the sheets over and take the same test again. Compare results. They will immediately be able to see what they learned
- It is recommended to use simple, “friendly“ evaluation tools that do not require a labor-intensive statistical analysis of results

Additional readings and links to teaching materials

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An example of a satisfaction survey based on one used during continuous education courses at EAHIL conferences:

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                        COURSE EVALUATION FORM

Thank you for taking the time to complete this evaluation. Your ratings
and comments will be helpful to our instructors and course developers.
Course Title:  ---------------------------------------------------------
Instructor's Name(s): --------------------------------------------------
Date : ---------------- Location: --------------------------------------
SCALE:
5 --- excellent
4 --- good
3 --- neither good nor poor
2 --- poor
1 --- very poor
0 --- no opinion

OVERVIEW
1. What is your overall rating of this course?              5  4  3  2  1  0
2. How well did course advertising materials                5  4  3  2  1  0
   describe the course content?
CONTENT
3. Did the course meet your learning objectives?            5  4  3  2  1  0
4. Was the content at a level appropriate to your needs?    5  4  3  2  1  0
5. Were the handouts supplied useful?                       5  4  3  2  1  0
6. Did  A/V materials enhance the course content?           5  4  3  2  1  0
7. Was the content applicable to your work setting?         5  4  3  2  1  0

DID THE INSTRUCTOR(S)
8. Offer a well organized presentation?                     5  4  3  2  1  0
9. Display good subject knowledge?                          5  4  3  2  1  0
10. Use appropriate style(s) of presentation?               5  4  3  2  1  0
11. Provide adequate opportunities for                      5  4  3  2  1  0
    questions and discussions?

Additional Comments:

SUGGESTIONS FOR OTHER COURSES:
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CHAPTER 1.4.

Good teacher profile

Marcin Stasiak

Once...

It was a cloudy, winter morning, almost 8 a.m. A young, inexperienced teaching librarian was about to give an introductory lecture about his library services for a group of rookie students of medicine. The students had already taken their places in the rows of seats. Some of them were a little sleepy, but on the whole the group was ready to listen. At the same time the lecturer was becoming a bundle of nerves. He glanced at the auditorium and saw nothing more than twenty pairs of hostile eyes. He had thought that he was well prepared, but as he was going to start, his only impression was that of the great black hole in his mind. He was equipped with a laptop, multimedia projector and power point presentation to be shown using these electronic devices. When he started to talk he looked as though he were glued to his chair and was staring directly at the computer screen. At the beginning he looked up once or twice at the auditorium, but when he saw all the bored faces, he thought it was not a good idea to maintain eye contact with the students. The power point presentation and written comments became his shelter and he merely repeated the presentation content, reading aloud a previously written text. In addition, his voice was shy, and his speech indicated that he was not self-confident. At the end of the fifty-minute lecture the students were not only bored, but also felt that the lecture was not very useful.

The lecturer asked himself some questions afterwards: “What did I do wrong? What mistakes did I make? After all, I was well prepared, the electronic devices and presentation worked well, and finally, I told them everything that I had planned to say.”

Introduction

In the case described above, the teacher’s main problem is not a wrongly constructed content of training, but serious mistakes in the art of creating a message for his students. It happens frequently, that teachers, even those with a lot of teaching experience, look lost in the forest during a lecture or when conducting training. We can compare them to good novelists/writers or even better to scriptwriters: They put a lot of effort into preparing the content of training — basically texts. However, at the same time they forget that the art of teaching does not mean delivering (written) knowledge, but rather a constant process of communication and complex interactions with the class. This means that factual excellence is just a first step on the road to success. The next one — crucial, but so often forgotten — is to prepare an appearance. Teachers must remember that while in class they are not only scriptwriters. They are also directors and the main actors of training or lecture. Moreover — they are in charge. It is a great responsibility, but also a great chance for educational success.

The main aim of this chapter is to show how to communicate effectively with trainees or students; how to develop an effective message. It could be treated as a kind of guide of "performing" well during public appearances — such as lectures, training or classes. My intention is to give a whole bunch of useful remarks and tips concerning public appearances and conducting various kinds of trainings and show how to avoid the most common mistakes made by teachers.

1.4.1. Types of teachers

Among teachers there are various approaches to students and to conducted classes. Choosing a given style of teaching is sometimes determined by course characteristics, but more often by a teacher's personal preferences. Of course it is up to you, which style you adopt. In the following paragraph I would like to suggest what options you have, in choosing your own style(s). In the typology of teaching styles I will be following a proposition made by M. Kostera (Kostera, Rosiak, A., 2005, p. 27–30). Kostera proposes five main types of teachers:

- Lecturer
- Mentor
- Trainer
- Supervisor
- Educator

Lecturer

This type is especially focused on transferring factual knowledge from the teacher to his or her students. The teacher is not interested in developing the students' reasoning (thinking) skills or he/she does not treat it as a primary task. In this model, students are first and foremost obliged to assimilate certain pieces of knowledge presented by the teacher. It is typical for a "lecturer" to assign reading and homework. He/she also tries to check the students' knowledge as often as possible. The lecturer prepares written tests or questions that the students have to do during classes. In this type of teaching, an exam closing the course frequently takes the form of a test measuring the "level" of knowledge.

Mentor

This type of teaching is completely different from the style discussed previously. The teacher does not pay much attention to the students' factual knowledge, but is extremely interested in developing thinking skills of his/her students. The mentor wants his students to be creative, full of ideas and open-minded. Students are not obliged to get certain pieces of information, but rather to be "inside" the problem and get factual knowledge through action, we can say: "by the way," or through practice. Students should be involved in the problems discussed during class and think about them all the time. Obviously, closing tests in this model are designed primarily to check students thinking/reasoning skills.

After classes conducted by a mentor, students will probably not be "walking encyclopedias". However, they doubtlessly will be prepared to solve problems on their own, without assistance.

Trainer

The trainer is neither interested in raising students' knowledge nor developing reasoning (thinking) skills. He/she is focused on developing other skills. As Kostera points out, in this model teachers usually want their students/trainees to develop interpersonal skills — that means work in groups. Firstly, students should learn how to cooperate in solving certain problems. The teacher-trainer is not the main actor in the class. His/her duty is to set and explain the rules, organize groups and think of tasks for them. Exercises should be suitable for the nature of work in groups and it should be possible to solve only with the cooperation of all members of the team. During group work the trainer is in the background, but all the time ready to help his/her students.

Supervisor

In this style, the teacher tries to combine factual knowledge with thinking skills. Thus the supervisor is not focused on passing on/ transferring pieces/portions of information to the student, but wants his/her student to make use of knowledge. Readings, or teacher speeches are the basis for the students' own work. In this model students are encouraged to develop their own ideas, to be creative. Students' criticism is highly appreciated, and even desired by this type of teacher. But the process of getting a student's own ideas, should be rooted in certain readings, should have a strong foundation in literature or previous discussions with teacher.

Educator

As Kostera claims (Kostera, Rosiak, 2005, p.30), this type of teaching is most common. In fact it is a combination of all four styles shown before. The educator mixes different methods to make his/her classes effective. Of course, he/she has to be sensitive about the content of the class and the group's character, accustoming his approach to these circumstances. On the one hand an educator has a lot of possibilities to make classes interesting. On the other hand, he/she must be very careful and well prepared to maintain order in the classroom and not let students get confused or leave class with the impression of chaos. Graphically Kostera's typology is presented in Fig 1.

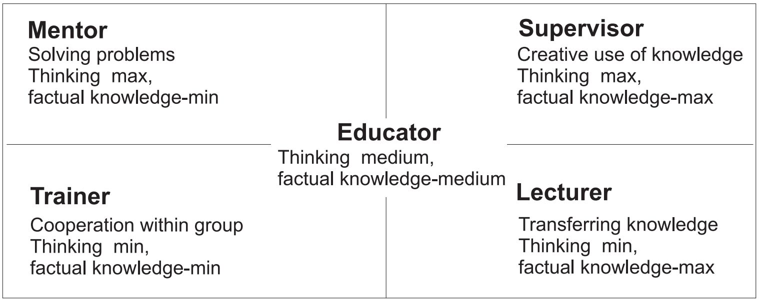

Figure 1: Types of teachers (Kostera, Rosiak, 2005, p.28)

I hope you find the teaching styles presented above useful in your daily work with library users, students or even academic staff. But remember — whatever model(s) you adopt, you need to be convincing to your students. That means being true and authentic, and most of all — self-confident. Your trainees must be sure that their teacher is a person they can rely on. You have to be convincing not only by what you are saying or presenting during training, but also by how you perform in class.

1.4.2. Environment/space

Most of the training and teaching (except e-learning) librarians conduct is located in a specific place. It could be a classroom, a lecture hall or a library computer room. The space is a place of interaction between the teacher and students. It is crucial to make some effort and to devote some time to arrange that space in a way that allows your training to be really effective. Someone will say that this is a waste of time, and that the teacher has more important things to do before training than considering a room arrangement. It could seem to be not really important, but in fact it is one of the matters that may play a great role in your educational success.

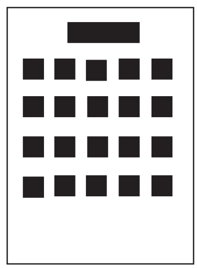

Figure 2: Lecture hall order

First of all, anybody who decides to teach should remember that physical surroundings are a part of his training/lesson as well as factual content. Improper arrangement of the space can devastate even the best-prepared lesson.

While preparing a room for the training (class, lecture), the teacher should take into account some important issues:

- Type of training
- Number of trainees
- Size of the room
- Existing physical barriers within the room and other elements of the space

In practice, a teacher projecting his/her future training ought to have its space constantly in mind. It is quite obvious that he/she is not able to conduct practical classes on medical databases in a lecture hall with one hundred faculty staff members. On the other hand, one could hardly imagine an effective lecture for one hundred students in a class designed for an auditorium not exceeding thirty people. Of course it is not always possible to get the dream room, perfectly fitted for the training. Teachers usually meet smaller or bigger obstacles in arranging space. On that point my aim is to give some useful advice concerning space arrangement.

Arrangement of the "audience" means organizing the seating order of your students in the classroom. Typical training lasts at least 45 minutes up to two hours. So it is very important to provide your trainees with comfortable workplaces or seats, if they just ought to listen and take notes. Carefully consider the "seating order". Presumably when you enter the room scheduled for you lessons, you will find one of the typical classroom orders (Fig.2, Fig.3).

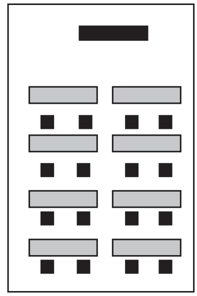

Figure 3: Classroom order

It may happen that orders like the ones presented above would be suitable for your training. However, sometimes it is really good to change the typical arrangement to make it more effective. The classroom arrangement usually depends on the methods you prefer in education and aims you want to reach during the training.

If you focus on the interaction between the group (that means trainees and teacher) maybe it is advisable to consider a semicircle or circle order of the seats (Fig.4). That type of seating arrangement is strongly recommended for smaller groups, where the teacher is interested in maintaining constant contact with their students as well as in developing exchange of ideas between students. Each member of the group can see other people and maintain easy eye-contact with them. The teacher is also part of the circle and can play an active role in group activities. The technical issue you have to consider when deciding on that type of space arrangement is: if you want to use only chairs or you prefer to include desks too.

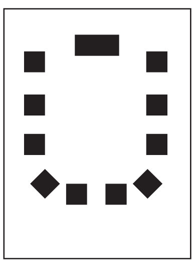

Figure 4: Semicircle ("horseshoe") class order

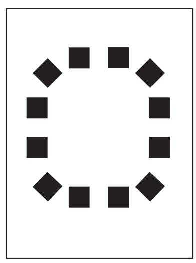

Figure 5: Circle scheme

Communication/Interaction

When arranging the classroom in this way you should also decide on what your role is in the training. If you just want to be the supervisor or to play the role of one of the disputants, you should choose a circle scheme. But, if during the lesson you would like to demonstrate something, show a presentation, make a drawing or write down important things on the blackboard, it is better to set a semicircle order ("horseshoe") (Fig.5). It will enable your students to see the board or screen. Simultaneously it makes you more "mobile". But on the other hand — in the case of the semi-circle, you are no longer a part of "the circle" — remember that in this case the teacher, usually standing, takes part as somebody from the outside and not as a partner.

Lecture/Presentation

In this type of teaching, the teacher is not especially interested in interaction within the group. The communication is mainly unidirectional. Of course a lecturer can interact with an audience; however, due to the number of students, multidirectional interaction is not as easy as in a small class. The scheme is commonly used and well known by every teacher and every student. It should be used when the group of trainees is big or the content of the training does not demand interaction. However, it seems to be easy to prepare a room for lectures/ presentations, the lecturer should still put some effort in space arrangement.

Visibility — the main issue for the lecturer. So, he/she and all presented materials should be clearly visible from all angles of the auditorium. That means treating the auditorium as a shapeless form, but speaking to each of the listeners. It might be hard because of the capacity of lecture halls, but is strongly recommended.

Thus, before your lecture or presentation, make sure that the presented materials (e.g. multimedia presentation, blackboard notes, graphs, etc.) can be seen from every place in the hall. You can make a test — try to take seats in various places in the room and check if words, paintings, screenshots or other elements are visible for you. If so — you have done a good job.

Another question is **audibility**. In large lecture halls it may turn out that your voice is too weak to be heard, even if in normal circumstances the voice is strong enough. Before the lecture visit a hall with a friend or group of them and make a rehearsal. Ask them if they can hear you from the last rows. If not — use a microphone during the presentation. Maybe it is not very comfortable- but at least your trainees can hear what you want to tell them.

Work in groups

It's a special type of work, when the teacher is definitely not in the center of the students' attention. He/she stays in the background ready to help in every minute. Course participants should be focused on the problems to solve. So they need to interact in small teams. The teacher is responsible for providing them with good and comfortable conditions for work. So trainees should:

- Have the opportunity to communicate easily within the group not disturbing members of other groups
- Have easy access to the teacher
- The best way to fulfill these requirements is to create a few small circles. They should not be very close to each other. If the room is not spacious, the teacher can ask his trainees not to speak very loudly as to allow the other groups work comfortably. To be accessible to every group, the teacher should stand or sit in one visible point of the classroom.

Computer class

In this case arrangement of the space is usually impossible immediately before the training. The teacher does not have influence on the shape of computer hall if it was already furnished and equipped. However, it is advisable to think about training needs during designing the library computer room. Placing the blackboard, screen and trainer's area in the right place can be priceless in the future.

Barriers

Whatever arrangement of the classroom a teacher prefers, he/she should be conscious of the barriers present in the space. The most important are desks. They are so common in academia that we are used to treating them as part of a neutral environment. But without doubt they are not transparent. Standing or sitting behind a desk or lectern makes the teacher feel hidden and separated from trainees. It just extends distance between the teacher and the group. Sometimes it can really work — especially during official lectures or in big lecture halls. But on the other hand, when the teacher is interested in close relationship with the small group, and want his/her students to be active, setting boundaries as desks or lectern is really not a good idea. The same applies to the students' desks. Sometimes it is better to provide them with simple chairs with small desktops than to be separated from the teacher by solid tables.

1.4.3. Art of speaking

In everyday work teachers have numerous aids and techniques ready to be used during training: computer software, space arrangement, technical aids, and body language. However, as someone who teaches intuitively feels, there is one crucial and essential tool in a teacher's work that is more important than any other factor — one's voice. To be honest, I can imagine a classroom without computers, blackboards, multimedia projectors or even desks. I can visualize a petrified teacher, completely motionless, unable to use body language. But in no way, can I imagine training conducted by a voiceless teacher.

In fact, despite the deluge of technical innovations, speaking is still the most important way of creating the message in the teaching process. For sure this is very flexible. On the one hand, speaking by itself can be used in delivering certain pieces of information. On the other hand, it often successfully plays the role of "glue" or binder for various forms of creating a message used by the teacher. Basically, any training placed in the physical space is impossible without speaking. The question is: how to speak to be an effective teacher?

"Buying" an audience/class

One of the keys to being a success in conducting training is to win the favour of the trainees. If you have them on your side, together you can reach a higher level. But if the group is against you or you start to challenge them, you are on the best way to lose as a teacher.

You should not underestimate the first sentences directed to the group. The first words are very important, because they are a part of the first impression (See also 1.4.5). Based on them your trainees will judge whether training is useful for them and if it is reasonable to become fully involved in it. Your task is to convince them that your training is exactly what they need.

To become familiar with the group, it is recommended to use some tried-and-tested tricks:

- Inspiring quotation
- Interesting problem to be solved
- Telling an anecdote or joke
- Telling an intriguing story
- Reference to the current events (well known to the trainees)
- At the beginning (but also later) try to present yourself as someone interesting. Try to make your classes valuable not only thanks to the factual content, but also because of the personality of the trainer.

It is essential to be persuasive at the very beginning of the training — explain goals of the training and methods to be used honestly and fully. Remember that everyone, including you, does not like uncertainty.

Being persuasive means not only the proper content of the speech, but also a tone of voice. Your voice should present you as a self-confident, reliable person, someone who your students can count on.

What is even more important, you should not confuse self-confidence with haughtiness. Whatever type of teaching you prefer, it is worth considering a dialogic approach to classes/ students. Every minute of your speech, remember about each of your listeners. Remember that you are talking to them not to yourself. It is especially applicable in a lecture situation, but could be important in every type of training. So whatever you say in class or in a lecture hall try to “talk it”. Basically — be open to your students. Try to avoid making speeches, but rather talk with every member of the class/auditorium. It really helps. This way your students will see you as a person who is interested in their needs, doubts and questions. If they see that you are interested in them, they will repay you — it is a great chance to make them truly involved in your classes. If you are well prepared for the training, that attitude will help you to gain real authority among trainees.

One of the keys to successful teaching seems to be creating a good classroom atmosphere. As I pointed out before, being interested in students’ needs is absolutely essential. Now I want to stress the importance of another element that can help a teacher in making friendly relationships within the classroom. That is basically a bit of humour provided by teacher.

Using humor should not be understood as a method of teaching. It is not a good idea to tell jokes constantly. Moreover, a teacher telling jokes in front of the trainees should rather make them smile rather than laugh. After all — it is not a cabaret performance, but serious training. Your students are mostly interested in the content of training, humor is a side issue. However, a good joke or anecdote adjusted to the type and content of training can be useful. A reasonable sense of humor presented by the teacher is a vivid sign of his/her self-confidence. It also indicates that the teacher is relaxed and feels really self-confident in the matter he/she trains.

The major matters seem to be: what kind of jokes should be told during training? What could be funny? What kind of humor really works? There is no simple answer to that question. It usually depends on the situation. However there are some rules that could be useful:

- Humour should be understandable. Jokes which are funny for one person, are not necessary funny for the others. That is why it is so important to know your students well. Then you are able to make jokes that would be understood by trainees and it helps you to become more familiar with students.
- The safest subject of jokes seems to be the teacher himself/herself. If you do not know your trainees very well, you are not sure what could be funny for them and you do not want to offend anybody by mistake, just tell something funny about yourself.
- Teachers telling something funny should not expect positive reaction (smile, laugh) of the trainees. If the joke does not work, the result of that attitude would be embarrassing silence. Make the humor is just a part of your speech, but do not stress it very much, and do not force your students to react to your jokes.
- There are quite a few people who are born funny. For most of us it is definitely hard to make jokes “on the stage”. So being funny requires good preparation. The best way to make your humour work is to constantly collect funny anecdotes and practice telling them.

How to speak?

Speaking or talking in public (e.g. in the class) is stressful and hard for almost everybody. Usually you have to sit or stand in front of a group of people you do not know very well. For sure, they are not you closest friends. Probably sometimes you would like to leave them, to just escape. But you know, you have to stay and conduct the training. In such situations it is important to focus on the way of speaking. But, with no doubt, voice control is essential for every teacher.

- Be clear. To be effective, the teacher has to deliver a clear message, easily understood by his/her students. How to make speaking clear?
  - Use communicable, easy language. Your students are usually not equipped with dictionaries to check sophisticated language. It is not a good idea to show off how rich your vocabulary is. When a difficult, uncommon word is necessary, do not forget to explain its meaning.
  - Build short sentences. Avoid multiple compound sentences. Remember that speaking language is different from written sentences. Probably your students would not be happy, if at the end of the sentence they would not remember its beginning.
  - Avoid using slang and abbreviations. Some teachers may think that using slang phrases makes them familiar with students, especially the young ones. But from my point of view it is risky business. Firstly, they probably would not expect you to use such language. Secondly, you can use outdated expressions, what makes your trainees confused (or they start to laugh at you). After all, training is usually a formal meeting on the academia. Your speeches should be clear, informative and useful. By no means are they chats in a pub.

  - If during the classes, lecture or presentation you prefer to use notes, the text should be visible. Use big letters and simple font. Arial is a good one.
- Speak loudly.
  - Your voice should be firm. Your students should be focused on what you saying, not on your voice. On the other hand you should adjust the voice strength to the size of the room or number of people in the group. Being audible does not mean shouting.
- Speak neatly
  - Proper pronunciation is even more important than strength of voice. If you speak carelessly, it would be not only hard for your students to understand you, but also they might feel ignored. So take care about the words you are speaking:
  - Do not “eat” last syllables.
  - Try to speak slowly. People intend to speak faster when teaching/giving a presentation than in daily life situations. It is better to make short breaks during speaking than speaking like a “machine-gun”.
  - Make your breath regular while speaking.

1.4.4. Body language

Teachers focus on developing the content of training, rarely do they pay attention to their body language. They do not realize that their “body management” has great impact on his or her message quality and the teacher appraisal by students. Without a doubt, it is a hard task to control one’s body in front of a group of students. However, once we force our torso, legs and hands to submissiveness and design their moves in the way they support our words, the effects can be amazing. Controlling body language is not easy; it requires a lot of practicing. Additionally, there is not one common model or template, ready to use in every case by each of librarian-teachers. However, there are some principles used by experienced teachers. These rules are very efficient. This section is an attempt to discuss these rules. I hope they will turn out useful in your daily work.

Stand up or sit down?

This dilemma is common among teachers while they start a class or lecture. It is present particularly in the case of conducting classes with small groups. Most often, teachers choose the “safer” solution and sit down behind a desk, finding shelter there. However, the sense of comfort and peace a teacher gets thanks to that “hiding” is just misleading. In fact such an attitude does not help the teacher in establishing contact with the group and doubtlessly does not strengthen his or her self-confidence. The sitting position makes the teacher’s perspective flat and narrow. Simply, while the teacher sits behind the desk, only the desk and first rows of students are visible to him/her. What is more, the whole classroom becomes static and the whole group, including the trainer, is motionless. The teacher can obviously stand up at any moment — but changing position means changing the role played by teacher. And that may be very difficult for a teacher. What is more, choosing the sitting position by a teacher has another disadvantage:

- It results in pressing down on the chest which makes the voice weaker. Moreover — the teacher becomes exhausted much earlier
- The teacher is not visible for the whole auditorium. From the other side, the audience cannot see the teacher easily. In result — the eye-contact is limited
- Closeness of the desk brings strong temptation to use notes placed on it. Then, there is just a small step from replacing interaction with students by interaction with teacher's closest friends — notes

As you see, choosing one of positions (sitting or standing) is crucial for the teacher. Standing in the class, despite its difficulty, is in fact much more beneficial for the teacher. It enables the teacher to maintain eye contact with students and creates an impression that the teacher is the person in charge of the class. In addition, it brings "freedom of moves" — the teacher is no longer "glued" to the chair — and makes speaking easy, helping in vocal emission.

Body posture — how to invite the audience?

In making the group familiar with the teacher, the teacher's posture is as important as his speech. Using his whole body he should show that meeting with these students makes him happy and their problems are interesting to him.

The way you enter the class and how you welcome your students is very important. Entering the room with a spring in your step makes a better impression on your students than "crawling" by the wall. Similarly, a facial expression plays a great role. A smiling and relaxed teacher, whose face seems to say: "I am happy to meet with you today" has a great chance to make students more familiar with him.

Once you overcome an initial mistrust, your duty is to maintain a good atmosphere. The most useful in maintaining a good relationship with the group seems to be eye contact. This remark may occur trite, but many people and teachers among them have a real problem in maintaining eye contact during speaking or talking. In fact it is difficult. Avoiding the gaze of listeners is a kind of escape, looking for shelter, as in the case of hiding behind the desk. If it is hard for you to constantly look at the people sitting in front of you, try to focus on the details of their faces or, for example, on the shape or color of somebody's glasses (if some of them wear them). It is important to devote some time for every "face", even if the auditorium is large. Doing this, you show your students, that they are interesting to you.

Hands, feet and legs

Even the best prepared speech could be damaged by the most "unruly" parts of the teacher's body — his or her limbs. Most commonly a teacher's own arms, hands, legs and feet betray his anxiety and lack of self-confidence. Uncontrolled moves, frequently unimportant from the teacher's point of view, could be crucial for trainees. These uncontrolled moves not only have a negative effect on the teacher's image, but also interfere with the reception of the training content and make listeners confused. Thus, it is essential to learn how to control limbs to make them obedient.

Hands play an important role in non-verbal communication. While used in the right way they can enhance a teacher's words. But, under any circumstances, it is forbidden to allow them to live their own life. Their moves should cooperate with verbal communication. In any case, gestures performed by teacher should have an aim, should be useful. There is nothing worse than repeating gestures without sense. In this case, trainees are witnesses of a somehow poor performance — they are not learning, but watching unintelligible waving — one time it maybe funny, but finally — annoying.

Controlling gestures is indispensable during any public appearance. However, one must remember not to go too far. First of all, movements of arms and hands should look natural. So if it is natural for you to use many gestures, and if it is a part of your normal behavior and is harmonized with your way of speaking, do not restrict gestures at any price. It is worth stressing that the most important thing for any teacher is to be authentic in the eyes of the trainees.

While conducting classes, the teacher should take into account not only gestures, but also his legs and feet. On the one hand, a teacher, while conducting classes must not be glued to the floor. On the other hand – his or her legs and feet cannot live their own life. Teachers should refrain from making any needless movements, such as: shifting weight from foot to foot, crossing legs, standing on one leg, swinging, "strolling" around class without any purpose. Like in the case of hands and arms, leg movements should have an aim.

To sum up, I believe that controlling body language is a very important part of a teacher's appearance. Properly used, body language can really enforce the message and can help the teacher to present him/herself as a competent, reliable person.

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Suggestion for an exercise

Teacher shows students movie depicting the training conducted by teaching librarian. The film concentrates on the teacher's role and his actions. The students' task is to choose and indicate which of the teacher's behaviors are desirable and which should not take place. They should also be able to explain why the behavior is wrong and tell you what to fix and how they would themselves have behaved in a similar situation.

Teaching tips

Organization of classes:

- If you are running courses in a particular place for the first time it is necessary to come a bit earlier. Check the setting of chairs and tables, or change the arrangement of the Hall. Make sure to test electronic equipment that you will use in the classroom. Do not let technical problems have hampered the effort you made preparing classes
- Pay attention to time — classes should start on time, but also end at a predetermined time. Extending classes or being late is not a teacher's good mark
- Prior to the classroom be sure to turn off your mobile phone. If this inconspicuous object, rings in the lecture hall, it can undermine the efforts of even the best prepared teacher
- Before every class, try to ventilate the room

Vocal emission

- The voice is the basic teaching tool. In order to properly fulfill its role you need to take care of it
- During the class always keep a bottle of water in front of you. Use it regularly. Water helps you to avoid unpleasant dryness of the mouth and will have a good effect on your throat. It also has an additional advantage — in the case of longer speeches or lectures, it will give you a chance for a short rest and give you time for collect your thoughts.
- Save your voice and throat. Remember that they have limited strength. If you run more than one class per day, during the breaks between them, try to spend the time in silence. Breathe some fresh air.

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CHAPTER 1.5.

Developing teaching materials

Lucjan Stalmach

Once...

The library purchased a new database available to users via the Internet. Both the database content and interface were very different from those currently used in the Library. Therefore it was expected that users would have difficulty with the database. The librarian who was responsible for the course in database searching decided to prepare teaching materials, which would present the basic functionalities and the manner of using it. With the help of the teaching methods and software specialists he designed the materials in such way so they could be used both in a class and for self e-learning. An interactive tutorial with progress assessment exercises were placed in the Library's open access repository of educational aids.

Introduction

This chapter describes the main issues related to the resources and teaching materials which librarians can make use of while running information literacy courses, or they can be made available on the Internet to implement e-learning.

Unlike chapter 1.6, which focuses on tools facilitating communication in the teaching process, this chapter deals with the tools to support the process of creating materials in a form of text documents, multimedia presentations, audio and video files. It provides examples of good practices, tips and guidelines for those who have no experience with building digital content.

1.5.1. How can good teaching material be prepared?

Dissemination of tools for digital content creation has fundamentally changed how materials used in the teaching process are prepared. Enriching text content with graphics, images and often with animations, sound and video has become common. It is not just to raise the visual appeal of the material, but also to raise the level of understanding and assimilation of this content by course participants.

Success in preparation of good learning materials begins with a well thought-out scheme and structure. It is also important to realize the psychological predispositions that affect the reception of the presented content. The summary of good practices and tips is presented below and in the next subchapter.

How to make tutorials effective (Source: http://www.kineo.com/elearning-tips/tip-20-six-steps-to-effective-tutorials.html)	
Get attention	Get learners emotionally and intellectually ready to learn and engage in the module
Set direction	Give the learners a clear indication of content and purpose
Present content	Convey key concepts, theories, processes and practice in a memorable way
Exemplify and practice	The heart of learning, this section is all about 'putting it into practice'. The practice is what will help transfer the learning into the job role
Summarize	This section ensures that the key learning messages are reinforced. It can also provide a linkage into the next section
Call for action, provide support	This step is all about helping ensure the learning moves to application in the workplace. It also ensures learners know what to do if they need more help, which is particularly important in self-study learning

Preparation

Before you start preparing a presentation it is worth asking a few questions:

- What is the purpose of the presentation?
- Who will be attending?
- What does the audience already know about the subject?
- What is the audience's attitude towards me (e.g. hostile, friendly)?

For more about preparation of courses, see Chapter 1.1 Educational needs analysis.

Structure of presentation

Introduction

A presentation should start with an introduction and an icebreaker such as a story, interesting statement or fact, joke, quotation, or a short activity to get the group warmed up.

The introduction to your presentation should contain an objective, that is, the purpose or goal of the presentation. This not only tells your audience what you will talk about, but it also gives information about the purpose of the presentation.

The main part of the presentation

Do not write out word for word what you want to say. All you need is an outline.

There are several options for structuring the presentation:

- Timeline: arranged in sequential order.
- Climax: the main points are delivered in order of increasing importance.

- Problem/Solution: a problem is presented, a solution is suggested, and benefits are then given.
- Classification: the important items are the major points.
- Simple to complex: ideas are listed from the simplest to the most complex. This can also be done in reverse order.

Conclusion of the presentation
This is where you ask for questions, provide a summary, and thank your audience for their participation.

Form

- Use graphics and video to increase the level of understanding.
- A 45 minute talk should have no more than about seven main points. This may not seem like very many, but it will leave the audience with a clear picture of what you have said.
- Good presentations include stories. The best presenters illustrate their points with the use of stories, most often personal ones.
- Your slides should contain only a minimum of information; your slide notes, which only you see, will contain far more data; and your handout will have still far more data and detail.

Do not read the text word for word off the slide. Audiences can read, so why do presenters insist on reading long lines of text from slides? As a result the lecture is boring and gives the impression that the lecturer is not knowledgeable.

Presentation means

To conduct a presentation you can obviously use the computer, with multimedia projector. However, you can also use visual aids:

- Flip charts
- Epidiascopes/ Overhead Transparencies
- Poster
- Slide projectors / Audio-Slide Show
- Video recordings / Videotape

Comparison between the means of presentation can be found at:
http://www.osha.gov/doc/outreachtraining/htmlfiles/traintec.html

1.5.2. Common types of teaching materials

1.5.2.1. Types of electronic documents used in teaching

Nowadays computers are the most common tools used for the preparation of teaching materials. Below are the most commonly used forms of electronic teaching materials.

Text documents

It is obvious to use text editors for the production of any sort of text material. However, in respect to diversity of such programs it is recommended to exchange documents in PDF-file format, not in native editor format. PDF is widely accepted and supported by almost all computer systems.

Multimedia Presentations

Increasing the efficiency of teaching is often achieved through the use of multiple channels of communication — not only text, but also graphics, animation, audio and video. Thus, many materials are produced as multimedia presentations. MS PowerPoint is still the most broadly used software to run presentations. However, the Internet services providing the possibility to create and publish presentations online are becoming more and more popular.

Podcast, webcast, screencast, webinar

The progress of broadband Internet has enabled the transmission of audio and video streams in real time. Video and audio conferences have become a much more common way of transferring presentations and other sessions. The recorded sessions of such conferences can be available later to playback to a wide audience.

Different forms of broadcasting digital content can be used. The most common ones are described below:

Podcast — is a series of digital media files (either audio or video) that are released episodically and often downloaded through web syndication. Commonly used audio file formats are Ogg Vorbis and MP3.

Screencast — is a digital recording of computer screen output, also known as a video screen capture, often containing audio narration

Webcast — a media file distributed over the Internet using streaming media technology to distribute a single content source to many listeners/viewers simultaneously. A webcast may either be distributed live or on demand. Essentially, webcasting is "broadcasting" over the Internet.

Webinar — A webinar is a neologism (WEB-based semINAR) to describe a specific type of web conference. It is typically one-way communication, from the presenter to the audience. A webinar can include polling and question & answer sessions to make it more interactive. In some cases, the presenter may speak over a standard telephone line, while pointing out information which is being presented onscreen, and the audience can respond over their own telephones. VOIP technology can also be used to perform audio communication.

A brief summary of presented types with possible examples of usage in libraries is shown in the table below.

Tips for podcasts (Sources: http://www.kineo.com/elearning-tips/top-18-five-pointers-for-podcasts.html http://www.workhappy.net/2009/02/20-ideas-for-an-excellent-podcast.html)	
Know your audience	Identify characteristics of your typical listener. This will help you in planning the podcast.
Have objectives defined, be organized	Be clear on what the objective is and stay focused. Rambling podcasts without a clear goal is not effective. Take time to prepare, in detail, your presentation or lecture. Write down an outline with talking points and notes.
Show emotions, be true	Bring in your enthusiasm, passion and enjoyment for what you're doing.
Use the right form	Monologue: one person speaking to microphone. Script it out carefully, and keep it short. Interview: the most common format. Effective for helping the interviewee convey messages in a friendly, conversational format. Prepare the questions ahead of time. Send them to your guest so they can be prepared and coherent. Magazine show: Can include monologue, guests, even phone-ins. Can be very effective if produced to a high standard, but time-consuming to prepare, record and edit. Documentary: Themed show focused on a specific topic, including clips with interviews conducted with variety of stakeholders, and with a linking narrative. Very demanding to pull off. Needs detailed preparation. Audio tutorial: A more formalized piece of audio learning with overt learning objectives and structure. This can be a good addition to other learning interventions — but rarely to be relied upon to be the primary source of learning as dense technical information is not well-suited to the audio format.
Make podcasts short	It is not easy to listen attentively to someone for a long time, so, plan carefully how long you want your podcasts to be. The whole podcast should not be longer than 30 minutes and it is recommended to break up the podcast into 5–7 minute parts.

Tips for video (Sources: http://www.kineo.com/elearning-tips/shoot-this-5-tips-for-video.html http://service.real.com/help/library/guides/RealProducer10/htmfiles/video.htm)	
Show, don't tell	Showing things is more convincing than telling about them.
Think of quality	Immediacy and authenticity are more important than finely crafted work – at least for some video clips. The same is not true for audio, research shows we expect more quality in regard to audio messages. For better quality, use a mounted camera rather than hand-held one. This greatly reduces the movement you may inadvertently introduce into the scene when recording. Don't have a rapidly moving object fill the entire frame. Use 24-bit or 32-bit color. Lower color resolution results in poor clips.
Bandwith limitation: out-source to other services	If your IT infrastructure cannot guarantee sufficient bandwidth you can consider putting your video on YouTube (or other Internet services offering video streaming) and just linking to it.

Further technical advice can be found at
http://service.real.com/help/library/guides/RealProducer10/htmfiles/video.htm

Tips for webinar (Source: http://www.kineo.com/elearning-tips/tip-25-top-ten-webinar-tips.html)	
Promote it	Study your key audience and develop a targeted promotion strategy. Activate networks — include an "invite-a-colleague" link in all exchanges with potential attendees.
Respect audience's time	Start and end on time
Plan for the worst, test	Technology isn't foolproof. Prepare for all calamities. Schedule at least one run through that covers: • Web conferencing technology • Webinar presentation and timing • How to handle a loss of audio or web access Be sure speakers have a hard copy of their presentation in front of them.
Prepare everything be-forehand	Gather all necessary files in one folder beforehand and arrange them in the right order

Create excitement	Bring your enthusiasm, passion and enjoyment for what you're doing. Show a sense of humor
Make notes of what people say	This helps you to refer back to mentioned issues at the end of the class
Keep people involved with polls and other interactions	Doing polls keeps people involved on an ongoing basis, but don't do too many because the audience will think you are filling time. Encourage them to make comments even if they are not talking.
Try to have two facilitators	One of you should act as the "master of ceremony" and the other concentrates on chat conversations and handling the technical side of things
Record webinar	Some people will miss your webinar. Record it for them.
Build in follow up activities	Post the slides and recordings and encourage further dialogue in the form of comments and follow up exercises prior to the next webinar.

Some of the tools for audio and video processing are presented later in this chapter. More detailed information on the tools and equipment needed for videoconferencing is presented in chapter 1.6.

1.5.2.2. Internet publishing techniques

Electronic documents can be accessed on the Internet in many ways. You can distribute them directly to readers using e-mail. You can also publish them on servers allowing other users to download them. If the documents are stored as HTML files, PDF, or Flash, most browsers can display them directly. Some of the files must be downloaded and then read with the appropriate software.

Audio or video files are often very large in size (one hour of recording time can exceed a few hundred MB). These files are usually made available through a streaming protocol. The already downloaded part of the file is shown on the user's computer while the next part is downloaded in a background.

The usage of protocols dedicated for streaming requires the application of special software on the servers that publish streamed documents. However, if the audio or video content will be saved in Windows Media format, then streaming can be performed on a file level with any web server.

1.5.2.3. Adapting the form of teaching material to the content of the course

Various forms of communication provide an opportunity to adjust the form of teaching material to specific needs of participants of information literacy courses.

Often the aim of health librarians is to teach how to use certain computer programs (e.g. how to search bibliographic databases on the OVID or EBSCO platform). Screencasts or webcasts seem to be the most appropriate for such purpose. Making recordings illustrating a search in the Medline database will be much faster than describing the whole procedure. If audio comments will be recorded along with a screen recording, then the degree of understanding achieved probably will be much higher than if text documents or even multimedia presentations were used. The possibility of repeating playback is also very important.

Forms of digital content

Type	Distinctive features	Example of use in library courses
Text document multimedia presentation	text, graphics	As a support for on site training in a library; as a "take home material"; tutorials to print
Podcast	recorded audio	Limited application
Webcast	recorded audio and video	Presentations of library services; "virtual tour" through library; interviews with librarians or users;
Screencast	recorded audio and recorded PC screen	Library catalogs and databases searching tutorials; electronic journals and books usage tutorials; ILL services tutorials
Webinar	live audio and video with question/answer session	Targeted courses for small groups eg. course on library resources for dentistry; advanced course on database searching

By contrast, if course content requires extensive transfer of theoretical knowledge, the materials in the form of multimedia presentations or text documents can be more appropriate.

Many materials can be produced on the occasion of conferences, training or interviews organized by the library. Sometimes such events involve high-class experts, what can provide a great opportunity to produce interesting teaching materials. Therefore, it is worth to think in advance about such occasions, to prepare the necessary tools and to obtain speakers permission to record the session.

1.5.3. Overview of the tools for creating content

1.5.3.1. Text editors

Assuming the capability of course participants to use text editors, it is still worth reminding them that the formats created by these tools are different and often not interchanged. As already mentioned, the most convenient (and most common) format for the exchange of documents is Adobe PDF format. Saving document in PDF format allows the author to protect it from tampering and even printing. If the editor does not have a built-in functionality to publish in PDF format, you can use one of the many services available on the Internet pursuing the conversion of various formats to PDF format.

1.5.3.2. Tools for creating multimedia presentations

When preparing the presentation one should have in mind the possibility of showing it on another computer. Certainly, it is recommended to use the most popular tools such as *MS PowerPoint*. Usually, one can find free viewers allowing to run the presentation without the full version of software.

However, the tools for making presentations and publishing it directly on the Internet have become more and more popular. The advantage of this solution is the possibility to run the presentation without a dedicated viewer and on practically every hardware platform.

Examples of such services are *Prezi* (prezi.com) or *Sliderocket* (www.sliderocket.com) — both offering full paid and limited free access. Prezi offers the possibility of building non linear presentations while Sliderocket allows to produce impressive PowerPoint-like ones.

Prezi

Prezi service offers the capability to create presentations based on the so-called presentation path and to create non-linear presentations. Prezi allows zooming in and out and the creation of visual maps containing text, images, video or web links.

After the user has signed up to the free service, he can make presentations on the Internet, and then save them to his computer for playing it locally. With the pay service, the presentation can be stored on the Internet for playing it directly from web.

A broader list of web applications to create and publish presentations is available at http://mashable.com/2007/08/12/online-presentations/

1.5.3.3. The tools to create webcast, screencast, podcast

Playing presentations of computer screens (screencast) is usually much more informative than even the most elaborate descriptions. Thus, there is a huge popularity of the tools to create this type of demonstration (webcast, screencast).

These programs are able to capture (record) the screen of the computer, its changes, moves of the cursor, and sometimes also an audio narration (i.e. comments of the presenter).

There is a lot of free software to record screencasts:

Jing — allows to easily create Flash screencasts and publish it on the internet (http://www.jingproject.com/);

Microsoft Media Encoder — free tool which allows recording and saving screencasts in a Windows Media streaming format (http://www.microsoft.com/windows/windowsmedia/forpros/encoder/default.mspx);

CamStudio — also free alternative for MS Media Encoder; allows to record screencast into AVI video files and can also convert it into Streaming Flash videos (SWFs) (http://sourceforge.net/projects/camstudio/files/).

The last two products allow the recording of both video and audio.

For some services the recorded sessions can be published on the Internet as a screencast/webcast.

Both of the mentioned activities: recording and publishing on the Internet can also be accomplished by using a free Internet service called *ScreenToaster* (http://www.screen-toaster.com/). Once registered, you can run a Java applet to record a screen session (with sound) and immediately publish it as a webcast on the Internet. Since the records of sessions are sent directly to the server of ScreenToaster, you need a fast Internet connection.

To record the audio channel only, *Audacity* — a software for recording and sound editing — can be used for free (http://audacity.sourceforge.net/)

1.5.3.4. Tools for creating tests and quizzes

User needs analysis and evaluation of results, described in Chapter 1.1 Education needs analysis, have been mentioned as important training stages. Tools for creating tests, collecting and analyzing the results can support these tasks. Based on communication through the Internet, these tools can easily carry out such tasks among training participants without physically attending. The functionalities offering fundamental statistical analyses in a simple manner are also a great feature of these tools.

The Internet offers many tools for creating tests, collecting and analyzing the results. The most popular service provider of this type of service is Survey Monkey (http://www.surveymonkey.com), which in a free of charge version allows building complex tests at max. 10 questions for a group of up to 100 people. It allows collecting responses through a website or through e-mail and browse the results. The functionality of the paid version is much wider.

Suggestions for an exercise

Exercise 1: Prepare a simple screen cast using Jing software

Install Jing software on a computer. In order to use Jing, you'll need to set up an accountant screencast.com service.

After installation and initialization completes, do some simple operations on a computer which will be recorded by Jing. Save the recorded session to local file (in SWF format).

Open the saved recording.

Solution to exercise 1:

1. Download the software from http://www.jingproject.com/ and install it. During the installation you will be asked to provide data necessary to create a new account at screencast.com service: e-mail address, user name and password. Having an account you will be able to publish the recordings on the Internet and share them with other users (it is also possible to save recordings on a local disk)

2. Run Jing. The yellow circle icon will appear on the taskbar. Right-click the icon — context menu will appear. Select Capture.

3. Define the area of the screen to be recorded by appropriately dragging the yellow line designating the area

4. Start recording — press the video recording (video capture) icon on the Jing toolbar.
5. Perform some actions on the screen inside the recording area
6. Finish recording — press the Stop icon on the Jing toolbar
7. Open/preview recording
8. Save on your local disk (floppy disk icon) or publish in the screencast.com service).
9. Exit the program.

Additional readings and links to teaching materials

- Training Outline Template in MS Word — http://www.nwlink.com/˜donclark/hrd/-templates/lessonplan.rtf
- Tips and good practices on material creation — http://www.kineo.com/elearning-tips/
- Presenting Effective Presentations with Visual Aids — http://www.osha.gov/doc/out-reachtraining/htmlfiles/traintec.html
- Big Dog's Leadership Page — Presentation Skills, Tips and Techniques For Great Presentations. How to use the voice and body. Nerves. Questioning — http://www.-nwlink.com/d̃onclark/leader/leadpres.html#voice
- Presentation Zen. How to Design & Deliver Presentations Like a Pro, Garr Reynolds http://www.garrreynolds.com/Presentation/pdf/presentation_tips.pdf
- Guide to video podcasting — http://library.wlu.ca/digitalstudio/guides/video_pod-casting
- Tweaking the Competencies with ICT support — http://www.speaq.qc.ca/work-shops/2009/technology09/media.htm
- 10 Great Webinar Tips — http://ezinearticles.com/?10-Great-Webinar-Tips&id=-122121
- Julie B. Marcy, Webinar Creation — A How To Guide http://cw-environment.usace.-army.mil/webinars/Webinar Creation.pdf

CHAPTER 1.6.

IT and technical equipment used in teaching

Lucjan Stalmach

Once...

The newly opened medical school, housing a large library, provides two seminar rooms to conduct training. The library's didactic team was given the task of designing the rooms with modern equipment to facilitate the workshops that would be held there. The team members ordered computer workstations, projectors and whiteboards. Not much more came to mind. Already at the first session, it turned out that the librarian spent most of the time moving around the classroom, from student to student, in order to see how the students were doing. He also had trouble getting the students to stay focused on the course content, instead of 'surfing' the Internet.

Topic introduction

This chapter describes some of the technologies that can support and shape the processes of teaching now and in the near future.

Teaching, being a form of exchange of information between human beings, is subject to the same changes as the communication processes. For many years, information technology has been steering the development of areas in which the exchange of information is an important element. This applies to business, science, social life and teaching. More often, the teaching processes are detached from a particular place and time, becoming more personalized and interactive.

The chapter describes information technology and specific tools that can assist teachers in implementing lessons both in the forms of traditional teaching in classrooms, remote learning and e-learning.

Web conferencing and remote collaboration tools for teaching are presented. Furthermore, learning management systems which cover the entire process of teaching from recruitment to evaluation of learning outcomes are described. The chapter also describes classroom management systems that intensively exploit the advantages of IT technology in the process of classical teaching in classrooms. At this point, the commonly used audio-visual resources will be briefly discussed and alternative solutions based on IT technologies are proposed.

Finally, the tools that are not directly related to the learning process, but can provide librarians support for library users (also remote ones) are mentioned.

The reader is encouraged to read Chapter 1.5 Developing teaching materials. This chapter presents the tools for the preparation of electronic teaching materials. Often, however, these tools themselves could provide support not only at the stage of their development, but also can be used to facilitate teaching.

General issues

Development of IT technology has a great influence on how the process of teaching is performed. Internet and the availability of multimedia equipment support the development of new forms of teaching: e-learning, remote learning, social learning. Teachers preparing the learning process should be aware of the opportunities offered by IT. This can help to increase training efficiency and extend availability of courses.

Classroom equipment and classroom management systems

Classroom equipment

More and more classrooms are equipped with electronic devices that replace the classical tools. Boards are replaced by tablet PCs connected to video projectors. Video Players (VCR) are being replaced by DVD players.

The following summarizes the typical equipment used in classroom:

Audio	Microphones, amplifiers, speakers
Video	DVD players, document visualizers, overhead projectors, video scalers, digital camcorders, webcams, monitors, TVs, VGA splitters
Digital content	Computers, tablet PC, PDA
Other	Voting/response systems

In addition to modern electronic means supporting the teaching process, instructors should not forget traditional tools such as paper, yellow sticks, magnetic boards even chalk boards to help present the teaching content and to activate students.

Software classroom management systems

Classroom management systems are designed for the management of individual computer stations at the time of conducting classes. Often, such systems are implemented using appropriate electronic devices for switching between the teacher's and student's computer desktops. The teacher can broadcast his desktop to students' computers or he can observe students' desktops on his monitor.

However, there are also available software systems performing computerized classrooms management. The main features of these systems are:

- The teacher's computer screen transmission to all or selected student PCs (for demonstration)
- Monitoring of the students' computer screens from the teacher's computer
- Blocking the students' computers and blanking out the screens (to get the full attention of the students)
- Enabling the teacher to take control of a student's computer

Classroom management systems allow the teacher to increase the level of individual control of each trainee. They also allow more effective use of class time because they eliminate the need for continuous movement around the room. Many courses carried out by the library are based on the individual work of participants with the computer. A typical example might be courses on bibliographic databases searching. Conducting such activities, the teacher needs to observe how students deal with the problem. Classroom management systems allow for such an observation, quick switching between objects of observation, and allow the teacher to help without leaving the desk.

Therefore, if the library has a training room equipped with computers, installing such a system may be taken into consideration.

The most known commercial systems for managing classrooms are:
Vision (www.netop.com), *LanSchool* (www.lanschool.com), *Netsupport School* (www.netsupportsoftware.com), *SMART Sync* (www.smattech.com). *iTALC* is the open source system of this kind.

As discussed above, classroom management system functionalities can be a desirable solution to the difficulties outlined in the case described at the beginning of this chapter. They allow a teacher to remotely monitor a student's work instead of physically moving to him. They also allow blocking unwanted student activities on a computer and thus force their attention.

Example

iTALC

iTALC software (http://italc.sourceforge.net) is the most popular open source system and delivers all typical functions offered by classroom management systems.
iTALC can work in the following modes:

- Demonstration mode — the teacher's PC screen is displayed on all of the students' computers;
- Overview mode — the teacher can preview students desktop (snapshots of viewed desktop can be recorded);
- Lock workstations — the students' desktops are locked to get their undivided attention. The keyboard and mouse are locked, the screen is black in color;
- Remote-control computers mode — teacher can control student's computer from own PC

Detailed documentation for iTALC is available at http://italc.sf.net/wiki.

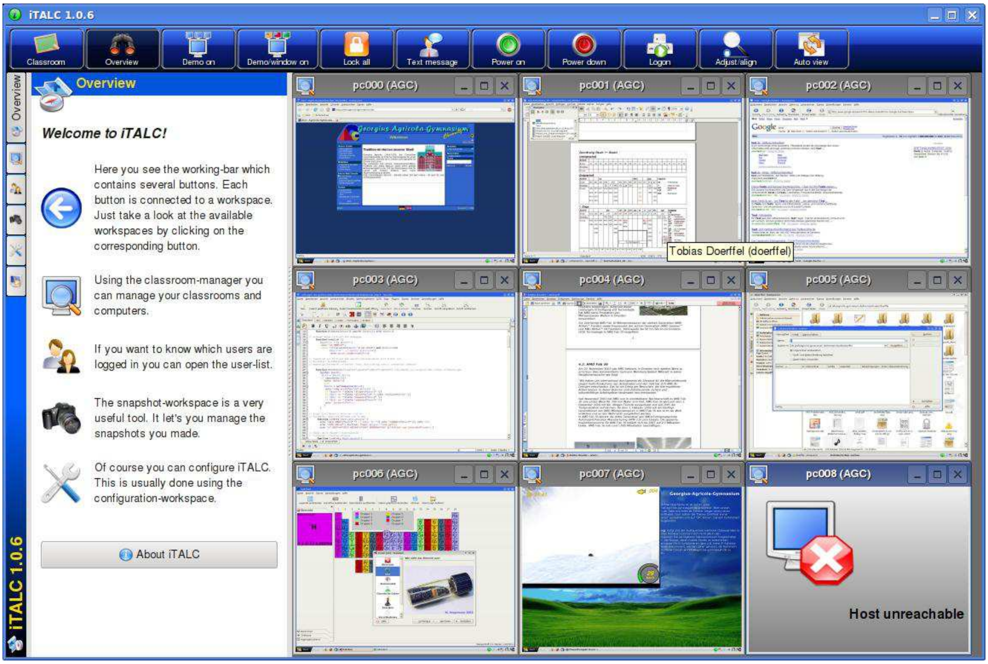


Figure 1: iTALC in overview mode (source: italc.sourceforge.net)

1.6.1. Learning management systems

Learning Management System (LMS) is a software application for the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content. (Ellis, 2009)

Systems of this type are fairly complex, so their implementation only for library trainings might be hard to justify. However, more and more of these systems will work in institutions, with which libraries are affiliated. Therefore, they should also be taken into consideration for library use. Typical features of LMS are:

- Course Management, e.g. catalogs of courses, registration process, fee management, pre-requisites
- Course calendars
- Progress tracking, assessment, testing, online grading
- Authoring teaching materials, quizzes, tests
- Ability to import standard IMS or SCORM[1] third party packages

[1] The Sharable Content Object Reference Model (SCORM) integrates a set of related technical standards, specifications, and guidelines designed to meet SCORM's high-level requirements — accessible, interoperable, durable, and reusable content and systems. SCORM content can be delivered to your learners via any SCORM-compliant Learning Management System (LMS) using the same version of SCORM (according ADL www.adlnet.gov).

- Communication with students through email, forums
- Instant messaging with students and collaboration through chat, whiteboard, teleconferencing

LMS systems provide a platform for the implementation of distance learning. Web browsers are typical client software to work with them. However, you can also use LMS systems to support the traditional teaching process. You can, for example, apply them to prepare and conduct tests and quizzes.

There are many commercial and free LMS products. *Blackboard* (www.blackboard.com) formerly known as *WebCT* seems to be the most popular paid solutions. Among the open source products the absolute leader is *Moodle* (www.moodle.org).

The Internet service *Udutu* (www.udutu.com) can be an interesting alternative for such systems as Moodle. This service offers tools to create course content online and to publish them on the Internet. With the free account, a user can create a course, preview it and export it as a SCORM package.

Another Internet based LMS is it's learning (http://www.itslearning.net/). With the price $15 per student (for hosting and technical support) system can be, in some cases, comparable with open source systems. it's learning supports the full range of instructional approaches and learning styles, delivers media-rich interactive learning environment and easy-to-use and highly customizable features for both new adopters and sophisticated users.

Example

Moodle (opensource)

The address of the Moodle home page is http://moodle.org/. There, installation packages, documentation and tutorials can be found. A good introductory video tutorial Putting Moodle to work, describing basic functions of Moodle can be reached at the following Internet address: http://preview.tinyurl.com/35x6qlr.

You can also download a HTML version of that presentation at the address below: http://www.kineo.com/news-insights/putting-moodle-to-work.html

You can also see the demo versions of Moodle available at:

- http://demo.moodle.net/
- http://www.kineolearning.com/demo/

Moodle documentation for students, teachers and administrators can be downloaded from the address: http://docs.moodle.org/overview/ .

1.6.2. Web Conferencing

Interactivity as an essential feature of the modern teaching model that can be implemented using *web conferencing systems* — systems which allow users to make conferences on the Internet. These systems allow users to collaborate remotely in real time (synchronously) sharing digital content (video/audio broadcasting, remote presentations), applications (such as whiteboard, computer desktop), using chat rooms or online surveys. With this functionality these systems are used to create virtual classrooms, which can be used for interactive training. An important feature of such systems is the ability to record audio/screen/video sessions with the possibility of publishing them for playback at a later time.

For a library these types of systems may in future be the main tool for distance learning. Often, library users are scattered in different places and cannot participate in on-site training. Web conferencing software allows the education process to be independent from the site. The possibility of recording sessions and its playback allows the training to be repeated at any time.

It is becoming more and more frequent that library trainings are conducted using specific web applications e.g. database search systems. The great advantage is to be able to share applications and computer desktops between the teacher and students. Not only can a student track what the teacher is doing by looking at the computer screen, but also a teacher may supervise the student's work, controlling in this way the student's activity.

Web conferencing involves other concepts such as a *webcast* — a one-way (from presenter to listener) audio/video transfer to large groups of recipients, and *webinar* — (Web seminar) mostly one-way transmission with an element of interactivity e.g. possibility to ask questions. More information on webcast and webinar can be found in chapter 1.5.2. Most Web conferencing systems are available as a service. To carry out a conference a user should set up an account (can be paid or not) on the server which implements the service. Some solutions allow the user to build his own server for hosting the web conferencing (e.g. *DimDim*).

Among the most popular web conferencing systems are the commercial products *WebEx* (www.webex.com) and open source system DimDim (www.dimdim.com).

In addition, there are many online commercial systems, which also offer free web conferencing services, but usually for a limited number of participants.

Examples of free web conferencing services:

- DimDim Free (http://www.dimdim.com/products/dimdim_editions_free.html) — 20 free users
- Vidvic (http://www.vidivic.com) — 9 free users
- eLecture Free version — 10 free concurrent user connections to the server
- Yuuguu (http://www.yuuguu.com) — 5 free users

Example

DimDim

DimDim web conferencing software or DimDim service (www.dimdim.com) delivers functionality allowing to share:

- Microphone & Webcam
- Computer screen
- Docs, website, whiteboard
- Public & Private Chat

For teaching process DimDim allows:

- Produce Webinars & Audio Conferencing
- Free recordings & embeddings

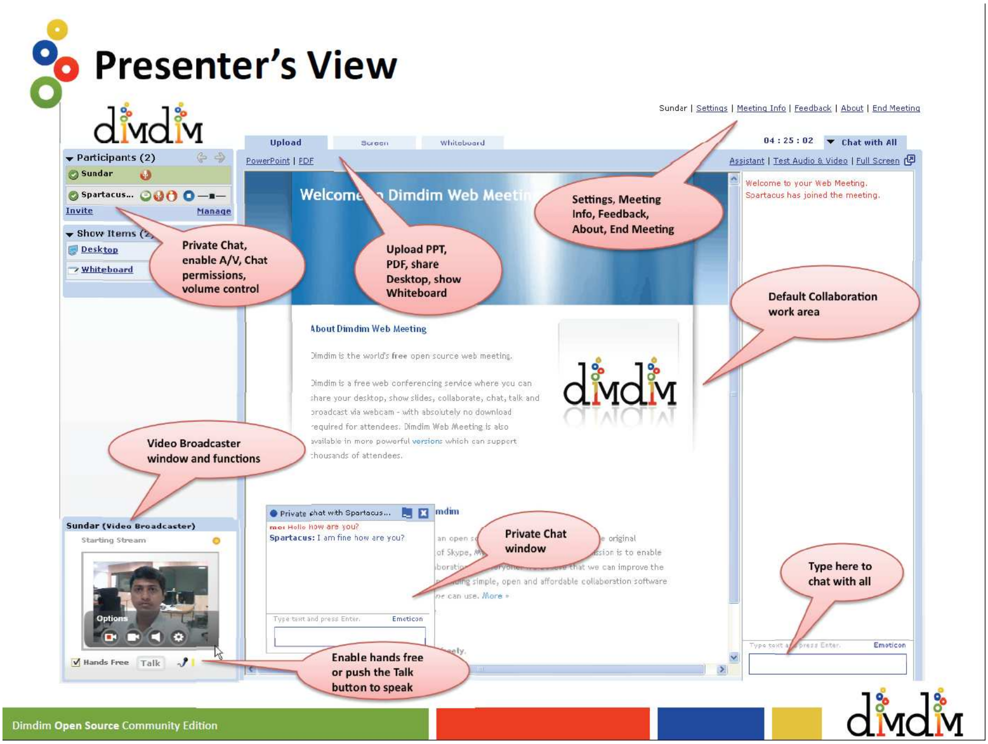


Figure 2: DimDim screen layout

Detailed documentation for DimDim system is available at http://www.dimdim.com/-opensource/dimdim_documentation.html.
User guide is available at this link: http://www.dimdim.com/documents/Dimdim_User_-Guide.pdf.[2]

Skype

If you do not need advanced functionality and Web conferencing is limited to the transmission through the audio channel (with elements of video) and chat, then the well-known Skype can be used. Skype is a software application that allows users to make voice (video) calls over the Internet. Calls to other users within the Skype service are free.

Usually Skype is used to make calls one-to-one. Conference calls can be easily set accordingly with the guide available at http://www.ehow.com/how_2015266_conference-calls-using-skype.html.

[2]Source: Dimdim_Opensource_Meeting_Server_v3.5_UserGuide.pdf — http://www.dimdim.com/documents/-Dimdim_Opensource_Meeting_Server_v3.5_UserGuide.pdf

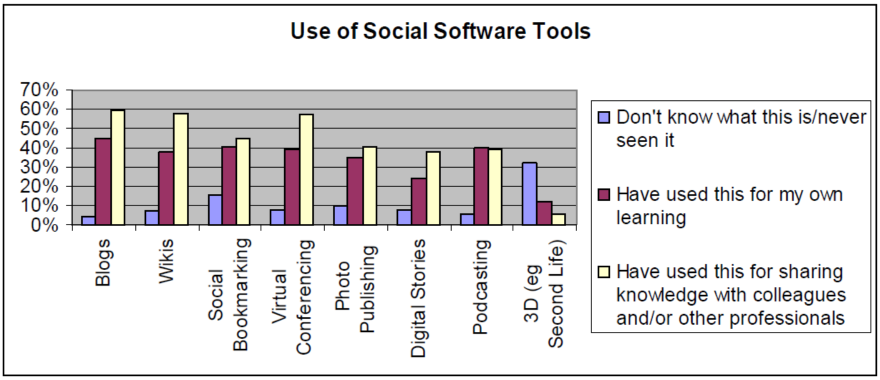


Figure 3: Use of social software for staff learning and knowledge sharing (source: Val Evans)

1.6.3. Web 2.0 as a learning place

The increasing usage of Web 2.0 technologies and especially the enormous popularity of social networking sites have made them considered as tools supporting learning. Learning with such tools is performed by cross-group exchange of knowledge and experience. The role of the teacher is not as important as in traditional teaching.

Among the most popular social networking tools that can support e-learning are blogs, wikis, social bookmarking, and virtual worlds.

Val Evans in his study in 2007 (Val Evans) indicates that many users already use extensively social networks as a tool for knowledge exchange.

The usefulness of these tools is confirmed by the fact that many libraries have already published blogs on their websites and in this way they deliver knowledge about library resources, activities, information literacy skills etc..

1.6.4. Supporting remote users with IT tools

Each library receives many calls from users who are experiencing problems with library resources usage. They expect urgent and usually remote support in overcoming them. Unfortunately they are not always able to accurately describe their problem.

There are lots of free tools to connect to a remote computer and watch it's desktop and even take remote control over it. These include e.g. *VNC*, *Windows Remote Desktop*.

Unfortunately, these programs cannot easily operate if computers are in networks using private addressing (under the nat). For this reason, many Internet services mediating in communication between computers can be found. *LogMeIn*, *Microsoft SharedView* (http://connect.microsoft.com/site94), *Mikogo* (http://www.mikogo.com) are some of them.

If a user expecting remote support from the librarian, connecting to such a service (and usually starting the appropriate program) the librarian will be able to connect his/her computer and demonstrate the solution to a problem directly on the users' PC.

Examples

Mikogo

Mikogo is an easy-to-use cross-platform (MS Windows and Mac) desktop sharing tool, ideal for web conferencing, online meetings or remote support (audio is not possible for sharing).

During the remote session, which involves two or more computers it is possible to switch the roles of computers (from presenting its desktop to supervising a remote one) and to transfer files between computers.

Establishing the Mikogo session does not require any knowledge of computer network settings. A portable version of the program exists, which does not require installation.

The Mikogo user guide is available under http://www.mikogo.com/downloads/docs/-mikogo-user-guide.pdf

References

Ellis, R. K. (2009) Field Guide to Learning Management Systems. ASTD Learning Circuits, http://www.astd.org/NR/rdonlyres/12ECDB99-3B91-403E-9B157E597444645D/23395/LMS_-fieldguide_20091.pdf

List of web conferencing software — http://c4lpt.co.uk/Directory/Tools/conferencing.html

Val Evans (2007) Networks, connections and community: Learning with social software: http://www.flexiblelearning.net.au/files/Learning_with_Social_Software_Report.pdf

Suggestions for exercises

Exercise 1: Web meeting based on the platform DimDim

Using DimDim service, initiate web meeting named „Medlibtrain" and invite 2 additional participants.

Test computer desktop sharing functionality.

With the „whiteboard functionality" prepare any simple drawing together with other participants.

Solution for excercise 1:

Set Up and Run a Webinar With DimDim — http://www.ehow.com/how_5323489_set-up-run-webinar-dimdim.html

Share desktop — http://onlinehelp.dimdim.com/videos/tutorials_share_desktop.html

Share Whiteboard — http://onlinehelp.dimdim.com/videos/tutorials_share_white-board.html

Exercise 2: Supporting the remote user with the Mikogo tool This excercise is to be handled in a 2-person team: one participant play the role of the library's client (A) having a problem with the searching Medline database, the second person is the librarian (B), who is supposed to remotely help in solving the problem.

After presenting the problem by the person A, person B should:

- initiate Mikogo session
- invite person A to join that session
- take control over user A's computer
- demonstrate proper search techniques
- close down Mikogo session

In a real life situation, given people will communicate by telephones.

Solution for excercise 2:

Librarian (user B) initiates a Mikogo session

- create an account on the Mikogo platform (http://www.mikogo.com)
- run the Mikogo program downloaded from it's page (you can use a portable version) — http://www.mikogo.com/downloads/mikogo-portable.exe
- click on the Mikogo icon on the active programs toolbar (letter „M")

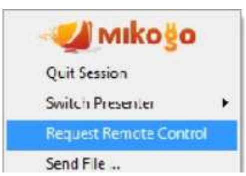
- choose the Settings option, and enter Username, Password, Your Name
- click on the Mikogo icon, choose the Start session option. The popup window will give the information considering an initiated session. This information can be sent through e-mail to other members (user B should note this information for the purpose of this excercise)

Library client (user A) expecting help joins the session initiated by librarian

- connect Mikogo page http://join.mikogo.com
- enter (or read form the e-mail) the session's ID and user's nickname (e.g. name) and press the button Join session
- Mikogo software download will start. Run the downloaded program.
- Librarian's desktop will appear on the screen. Librarian can now demonstrate the solution of a problem on his computer.
- He can also take control over the user A computer and demonstrate the solution there (see procedure below).

The librarian (user B) takes control over the user A computer

- click on the Mikogo icon and choose the option Request Remote Control (done by user B)



- Approve of remote control (done by A) by clicking the button Yes, give remote control in the window „Remote Control Request"
- The librarian gains control over the user A desktop, where the solution can be presented.
- User A or B chooses the option End session to end the remote control session.

Additional readings and links to teaching materials

Ellis, R. K. (2009) Field Guide to Learning Management Systems. ASTD Learning Circuits, http://www.astd.org/NR/rdonlyres/12ECDB99-3B91-403E-9B15-7E597444645D/23395/-LMS_fieldguide_20091.pdf

Moodle Assessment Report — http://oscmoodlereport.wordpress.com/2009/08/19/hello-world/

The future of e-learning is social learning http://janeknight.typepad.com/pick/2009/04/the-future-of-elearning-is-social-learning.html

Zaid Ali Alsagoff — 69 Learning Adventures in 6 Galaxies — http://zaidlearn.blogspot.com

2. Information sources and searching

In this module we would like to guide teaching librarians through the most important and essential issues about medical and health-related resources. We are going to raise their awareness about various biomedical databases and free resources, and help them understand the need for critical appraisal of the content and validity of the information. Through this process we want them to acquire knowledge and skills how to research commercial databases, free web based resources and stay abreast with new developments in this field of knowledge. We will show how to use appropriate searching techniques, indexing and abstracting services, and terminology to become an effective information searcher.

CHAPTER 2.1.

Medical and health concepts, terminology, controlled vocabulary and their practical application

Jolanta Cieśla

Once...

After completing the information skills training for PhD students, which took place in the medical library, the participants were asked to evaluate the course. The "searching" part received negative feedback from the students. One of the opinions reads, "I do not understand why I am supposed to be learning all of this. I search using keywords and it is enough for me, otherwise it is too complicated". The lecturer observed that even though there had been a lecture regarding this subject, students still treated the databases as though they were Internet search engines. The course coordinators decided to modify the content and teaching methods used in the training. Hopefully the changes will motivate the students better and show them the benefits of more in depth knowledge of databases and searching principles.

Introduction

In every field of knowledge language is a basis of thought and action exchange and has to comply with the standards of precise phenomena description. Usage of unambiguous terminology is a necessary element of scientific communication. Along with the development of medical science and artificial intelligence, we can observe the appearance of, broader and broader in scope, dictionaries, classifications, thesauri, search-retrieval systems and ontologies. Especially in the area of medicine, the usage of precise vocabulary is of vital importance for communication, resources development and easy access. Searching in broad databases, containing millions of publications, requires usage of advanced tools and specific skills from the users. These skills, together with knowledge of terminology and of controlled vocabulary, will allow them to formulate precise questions necessary to obtain the relevant result.

This chapter contains a brief review of vocabulary development in biomedical sciences, a summary of the most commonly used classifications and descriptions of specific features and functions of controlled vocabularies. This knowledge is essential for a teaching librarian, especially in teaching searching skills. In the case described above, the course should include at least a presentation of the role of controlled vocabulary in the information retrieval process, its structure and application, as well as hands-on training of selected databases. Controlled vocabularies will rarely be the topic of a separate training. But with more advanced trainees (e.g. scientists), such training may be enriched with a historical introduction, a review of medical classification, as well as information about contemporary trends in terminology developments.

The choice of vocabularies, databases, and the choice of training methods (see Module 1) depends on the course participants and on the amount of time which we may devote to terminology issues.

2.1.1. General issues

Term versus concept

A term is a thought equivalent of an object — an idea, phenomenon or a thing. When a concept is defined and named, a term is developed. A scientific term is a word or phrase that has a precise meaning, which was agreed upon, which unambiguously reflects a concept from a given field of knowledge. A single concept can be expressed by several synonymous or closely related terms. Formulating scientific terms should comply with several universal principles, e.g. explicitness and conciseness, universalism (in the meaning of wide usage), language correctness and systematical arrangement (Cimino, 1998). Concepts frequently — often locally — are described by one preferred term, while other terms function exceptionally as synonyms. Therefore, a concept could be identified by a group of terms of which every term can be replaced with a different one from the same group, and this will not change the meaning of information. It has to be noted, that a preferred term does not have to occur in this role forever, sometimes it is replaced by a shorter, more precise term or more contemporary spelling comes into use.

Example: „A complex disorder characterized by infertility, hirsutism, obesity and various menstrual disturbances such as oligomenorrhea; amenorrhea; anovulation" (MeSH scope note). This concept is represented by terms:

Polycystic Ovary Syndrome (MeSH heading from 1985 till now)
Sclerocystic Ovarian Degeneration
Sclerocystic Ovaries
Sclerocystic Ovary Syndrome
Stein-Leventhal Syndrome
In 1963-84 MeSH heading was Stein-Leventhal Syndrome.

Short description of the development of medical terminology

Western medical language begun to be formed in Greece. The oldest written sources originate from the works of Hippocrates from the turn of the 5th and 4th century B.C. This legacy which we have inherited from the Greeks, is still used in the medical nomenclature in most modern languages:

- Catheter (probe, catheter, Gr. *katheter* or *kathienai*)
- Cholesterol (Gr. *chole*, *cholos* — bile, anger — choleric, melancholy)
- Diagnosis (Gr. d*iagnostikos* — recognizable, *diagnosis* —distinction)
- Dialysis (Gr. *dialyien* — break, dissolve)

After gaining domination by the Romans, who were not as medically advanced as the Greeks, the Greek terms still operated as there were no Latin equivalents. Many doctors among the Romans were still Greeks. One of them was Galen, who spoke in Latin and wrote in Greek. His contemporary was Julius Pollux, whose dictionary of anatomical terms, published again in the end of 16th century, had a major influence on scientists in those days. As time went by, Greek terminology was Romanized, and to the Greek word roots Latin suffixes were added. In the work of the Roman scholar Celsius "De medicina" many anatomical terms appear which were translated literally from Greek by the author. The influence of Arabic and Hebrew on medical terminology is much less noticeable. In the Middle Ages Latin becomes lingua franca not only in medicine, but in widespread international communication. Medical works written in Latin only were being published in Europe even in 19th century. Medical terminology, originating in Greek, then being translated into Latin and finally into various national languages, differs depending on the given language, however a great number of terms have retained their original stems. When nowadays books titled *Hypoglycemia* or *Neurofibromatoses* are published, the titles are understandable in the major part of the world. Medical terminology is constantly developing, however it still uses Greek, even when it comes to naming the modern techniques (e.g. use of suffixes: –scopy gr. *skopein* — observe or –graphy, gr. *graphein* — draw, write). The major difference is that in today's world, terminology is disseminated via the English language which has become the new lingua franca of our times.

Do you know, that...

there are online courses of medical terminology designed for medical students to learn English medical terms, e.g.:
http://www.free-ed.net/sweethaven/MedTech/MedTerm/default.asp
http://www.dmu.edu/medterms/

Review of medical classifications

Attempts to systematize the medical terminology started in the 17th century. John Graunt is considered a pioneer in the classification of diseases. He was researching the mortality rates among London's children and for statistical purposes he developed a simple classification of death causes, differentiating just a few categories (Chute, 2000). In the 18th century new attempts were made to systematically arrange diseases in the works of Linnaeus: *Genera morborum*, Sauvages's: *Nosologia methodica* and in William Cullen's: *Synopsis nosologiae methodicae*. The classification of diseases was recognized as important and interesting only in the 19th century, thanks to William Farr — a statistician. In 1839 he stressed that:

> *The nomenclature is of as much importance in this department of inquiry (medical science) as weights and measures in the physical sciences, and should be settled without delay.*
>
> (quote: History of the development of the ICD)

The approach proposed by Farr (the division of diseases into five groups: epidemic, general, local and developmental diseases and diseases that are the direct result of violence) became a starting point for the International "List of Causes of Death". This classification was proposed by Jacques Bertillon and presented in 1893. Soon afterwards the International Statistical Institute made the resolution, in which they recommended the use of this particular classification in the statistical institutions in North America and in Europe.

The International "Classification of Diseases and Causes of Death-Sixth Revision" introduced in 1948, after many amendments and consultations, can be considered a breakthrough in forming an international classification of real and multipurpose use. The list is revised every 10 years, according to the development of medicine. Currently ICD-10th Revision is valid. For a long time the ICD was the only international classification.

New era

Along with the development of computerization since 1950', efforts have been made to adjust medical nomenclature for automatic gathering and processing of data. The medical classifications have also started to be used in many important areas, like:

- Health care financing and administration, where medical services payers require application of a specific coding system by service providers to pay for their services
- Data gathering and exchange of epidemiology and health statistics
- Medical records
- Systems supporting clinical decisions (Rosenbloom, 2006)
- Libraries, which use classifications in managing their collections

Some of the classification systems have an international reach, others are of local use. Just a few are listed below.

- **ICD-10** with a family of associated classifications allows the encoding of mainly diagnoses of diseases. It is used for statistical analysis of population health, data comparisons, morbidity monitoring, and also for finance analysis in health care.
- **ICD-9-Clinical Modifications** was developed in cooperation of the medical environments, government agendas and the health services payers. It allows to code medical procedures. The coding matter is the medical activity (not a disease) done to the patient during diagnostic or therapeutic process.
- **ICPC** (**International Classification for Primary Care**) formed by the family doctors association. Although ICPC is less specific than ICD, it allows to encode the reason of a patients' visit in the primary care clinic.

- **SNOMED** (**Systematized Nomenclature of Human and Veterinary Medicine**) developed by The College of American Pathologists. In this system every disease is described in many dimensions, e.g. localization of pathological state, morphological unit, etiological factors, procedure usage, sociological factors. Thanks to this, all the components of a disease and related treatment with accomplished procedures can be encoded, e.g. in the patient's electronic medical record.

Some classifications are the standardized tools to account the treatment costs, e.g.

- **DRG** (**Diagnosis Related Groups**). This classification is based on ICD-9-Clinical Modifications and allows attribution of a particular patient to a specific homogeneous diagnosis group in terms of a patients state, diagnosis and treatment procedures. On basis of these allows estimation of the cost of treatment for a given patient.

Examples of classifications in specific fields:

- **TNM** — Tumor, Nodus, Metastasis — used in oncology
- **UMDNS** — Universal Medical Devices Nomenclature System — the classification of medical equipment
- **LOINC** — Logical Observation Identifiers Names and Codes - laboratory medicine
- **ICNP** — International Classification for Nursing Practice
- **DSM-IV** — Diagnostic and Statistical Manual of Mental Disorders -fourth edition is not a typical classification, but rather a diagnosis criteria source in psychiatry.
- In public health, there is no leading terminology, although many thesauri in a particular subfield, or encompassing the whole field of public health do exist (Niedźwiedzka, 2008).

Ontologies

Different encoding systems serve different goals and recipient groups. The creation of a system, which would link a variety of functions, is the medical ontologies' goal. What is ontology? In computer science it has a slightly different meaning than in philosophy, however it also describes the structure of reality. Ontology denotes the model of a given part of the reality, in other words it is a formalized description of the particular world's domain. This description is executed with the help of collections of terms, their attributes and the relations between them. The terms and relations must be clearly defined and able to be identified by the computer systems. Ontology describes the compound relationships between the terms, and the knowledge of these relations is taken from various dispersed knowledge sources. They encompass knowledge about a part of reality in a way, which allows drawing conclusions and multiple usage of given knowledge. The method of representation of knowledge in ontology is the topic maps or the semantic web. The semantic web is constructed of graphs which reflect different links between the concepts (e.g. broader and narrower terms, synonyms, features, connotations) (Robu, 2006). See also Chapter 2.3.5.

Example

An institution's ontology will include database of employee's, relations between them and their competence, but also the institution's documents, patents, procedures, established terminology. An example of a practical ontology approach in medicine is mammography ontology (Podsiadły-Marczykowska, 2005). The goal of this ontology was to limit variability (subjectivity) of interpretation of results of mammography. For this narrow sector of radiology a model was created, which required acquisition of specialist knowledge, systematization and defining of terms vital in this area. A special interface for editing of the mammographic reports was also developed.

A broad ontology is OBO Foundry (Open Biomedical Ontologies) and, connected with it, Gene Ontology. Another ontology is the UMLS (Unified Medical Language System) — a long-term project of National Library of Medicine (Bethesda, USA). The goal of UMLS is to collect and develop semantic resources of biomedical sciences in connection with the sources of information. It consists of a Metathesaurus which encompasses terms from over a hundred classifications and nomenclatures, and a lexicon of biomedical terms. Further, it consists of the dictionary of biomedical terms — Specialist, semantic web, map of information sources informing about localization and access to the databases, and support to the user in the search process. We can find two main hierarchies in UMLS: one for Entity (Physical Object and Conceptual Entity) and the second for Event.

Similar goals were established by the European project GALEN (Generalized Architecture for Languages, Encyclopedias and Nomenclatures in Medicine). The project GALEN responds to following challenges:

- Reconcile diversity of needs for terminology with the requirement to share information
- Avoid exponentially rising costs for harmonization of variants
- Facilitate clinical applications
- Bridge the gap between the details required for patient care and the abstractions required for statistical, management and research purposes.
- Provide multilingual systems which preserve the underlying meaning and representation (GALEN, www.openclinical.org/prj_galen.html)

GALEN is considered as a third generation terminology since it breaks with the approach to hand out the list of already prepared codes such as ICD. Instead it delivers a model, which is based on logical criteria of connecting simple terms and transforming them into more complex ones. Their classification is automatic.

Ontologies and semantic webs are different means for knowledge representation and searching for information in vast resources. Especially in an area as complex as medicine, they are useful. They are constantly being improved and most probably they will be commonly used (Bodenreider, 2008).

Do you know that... In the Metathesaurus UMLS several translations of MeSH are already included: French, German, Italian, Japanese, Portuguese, Russian and Spanish. In some other countries there are translations of MeSH, widely used in databases and catalogues, but not yet included in UMLS, e.g. the Polish version of MeSH. There are countries, e.g. Norway developing a national version of MeSH at the moment. NLM developed also a tool BabelMeSH (http://babelmesh.nlm.nih.gov/), enabling Medline/PubMed searching, using medical terms in 11 languages (Arabic, Chinese, English, French, German, Italian, Japanese, Korean, Portuguese, Russian, Spanish).

2.1.2. Controlled vocabulary — definitions, functions, standards

Controlled vocabulary (CV) is a collection of terms chosen and approved for use (authorized). Types of controlled vocabulary are: thesauri, subject headings, taxonomies. As mentioned previously, an integral part of every ontology is an unequivocal and structured terminology.

„Controlled vocabularies serve five main purposes:

- Translation: Provide means for converting the natural language words of authors, indexers, and users into a vocabulary that can be used for indexing and retrieval.
- Consistency: Promote uniformity in term format and in the assignment of terms
- Indication of relationships: indicate semantic relationships among terms
- Label and browse: Provide consistent and clear hierarchies in a navigation system to help users locate desired content objects
- Retrieval: Serve as a searching aid in locating content objects." (AINSI/NISO, 2005)

Controlled vocabulary is applied in a variety of knowledge management systems, also those around which every library's life concentrates. Among them are: classification schemes used for arranging book collections, thesauri of subject headings in databases, and authority files used in cataloging. It can be said that a selection of controlled vocabulary determines the organization of work in the library.

CV can be of varying complexity, from a simple list of terms to classifications and broad polyhierarchical thesauruses, which show different relations between the terms. Controlled vocabularies are dynamic tools and their nature is to change along with the development of knowledge.

Do you know that... Application of the controlled vocabulary in the databases has not always been so obvious. It has been repeatedly discussed that the maintenance costs of keywords are lower and their search efficiency comparable to a controlled vocabulary. Finally, it has been proved that the keyword search (omitting words from which the subject headings are built) results in a loss of even one-third of the publications. (Gross, Taylor, 2005)

What conditions must the controlled vocabulary fulfill? For example, an American standard NISO (National Information Standards Organization) gives specific guidelines for construction, formats and organization of monolingual controlled vocabularies. In forming the controlled vocabulary, four basic rules must be applied:

- eliminating ambiguity
- controlling synonyms
- establishing relationships among terms where appropriate
- testing and validation of terms (AINSI/NISO, 2005)

The controlled vocabularies are more and more complex, allowing the possibility of term mapping and integration with other systems (e.g. clinical classification or administrative) and interoperability (Sosińska-Kalata, 2007).

Effective use of controlled vocabularies especially in searching databases and catalogs depends on a few factors: the size and the methods of organizing of a given CV, quality of the vocabulary (unambiguity and consistency), abilities and responsibility of the indexer, ability to formulate precise questions on the user's side as well as search functions offered by a particular database.

A librarian who teaches how to search in databases, has to take all these factors into consideration., She has to adjust teaching to, the minuteness of a particular controlled vocabulary or how it can be used in a given database. A librarian has to turn the attention of the training participants to this and state that the search results will depend on what kind of searching is performed. The training participants can choose between sensitive and specific search.

What is sensitivity and specificity of a search?

Sensitivity, recall = the number of retrieved relevant publications in relation to the number of all relevant publications in the whole database.

In other words, this value determines a possibility of retrieval of all relevant publications in the database. In the search of high sensitivity indicator, the probability of that less relevant publications will be retrieved increases.

Specificity, precision = the number of retrieved relevant publications in relation to the number of all retrieved publications.

In other words, the effect of high precision (specificity) searching is a collection of publications, from which most are relevant. It does not indicate that all relevant publications were retrieved.

The research shows, that these two values are usually opposite to each other; when one of them increases, the second decreases. The ability to balance the two values is an advanced skill: precision and sensitivity while searching databases.

Do you know... The term "information relevance"? It means "relative value of information, measured in relation to a task for performing which the information is needed or needless. If Information is needed to perform the task it is relevant (value 1), if information is needless it is not relevant (value 0) and causes information noise. This value mainly depends on knowledge of reality of the information user." (Bojar, 2002)

2.1.3. Subject headings

2.1.3.1. Types of subject headings

In the subject characteristics of documents in the biomedical science the controlled vocabulary is sometimes used with a thesaurus structure. Such structures have MeSH and Emtree, the most commonly used thesauri in medicine. They include terminology in the polyhierarchical arrangement. This terminology, along with synonyms and the scope notes, is used to describe the publications. The terms that occur in the thesauri can be divided into:

Main headings, descriptors, preferred terms — terms used for indexing and searching. The main headings describe the subjects of the publication. Included here is also:

- terms describing researched population: sex, species, age group;
- geographical terms, if the subject of publication is limited to a specific geographical territory;
- check tags — small groups of descriptors used only in the detailed indexing done in databases, they are not used in the library catalogues, e.g. Humans, Female.

Entry Terms, non-preferred terms, ascriptors — terms which are not used in the indexing, but can be useful in information retrieval. Entry terms are synonyms or near synonyms of main headings. They refer the user to the main headings.

Topic qualifiers, subheadings — subheading answer the question: what aspect of the subject is described by the author in the publication. It is not a self-dependent lexical unit in the thesaurus — but a modifier. They occur always with descriptors, which they narrow it a particular aspect.

Publication types — they indicate the formal character of the publication, answer the question: what type of publication or what type of research study is this document, e.g. practice guideline, review, case study, academic dissertation.

2.1.3.2. Relationship between concepts

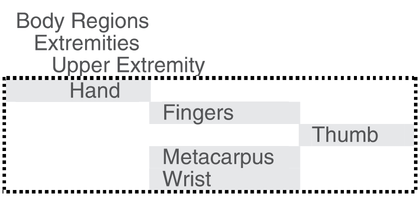
In the thesauri we can specify two main types of relationships: hierarchical relationships and associative relationships. Hierarchical relationship means relation of superiority or subordination. Descriptors are ranked in multilevel trees which reflect the relations among them. A user can find more general or more specific terms to be used in searching when looking into the trees.

Thanks to the Explode (or Explosion) function a user may retrieve citations that contain not only the selected term, but also these which are described with all of its narrower, more specific terms.

The same descriptor can occur in several trees in the thesaurus and in such cases we deal with a thesaurus of polyhierarchical structure. For example the term Arthritis, Rheumatoid (MeSH) is found in 4 trees: Joint Diseases, Rheumatic Diseases, Connective Tissue Diseases, Autoimmune Diseases.

Example: A part of the hierarchical tree Body regions (MeSH). Typing the heading Hand and choosing the Explode option (Medline) will initiate the search for all the publications with the heading Hand and all its narrower headings: Fingers, Thumb, Metacarpus, Wrist. If the Explode function was not chosen, the system would only search the publications about the Hand and will skip publications dealing only with a wrist, metacarpus or fingers.

1. The search range after selecting the Explode function for a heading "Hand"



2. The search range after selection of the function: Do Not Explode:

Body Regions
Extremities
Upper Extremity
Hand
Fingers
Thumb
Metacarpus
Wrist

The associative relations types: See also, See under, See related, Consider also, Entry combination (or combination of descriptor with a subheading), have a less accurate character than hierarchical relations. These relations play a supportive role and help the user finding terms connected semantically or grammatically (e.g. kidney: „consider also terms at renal"). And sometimes the relation types stop us from making a mistake in distinguishing the meaning of a term (Nelson, 2001).

2.1.4. The rules of indexing

To make users understand how indexing is being done and what an indexer really does when assigning certain subject headings to a publicaton, is very important for the effectiveness of a search. A teaching librarian should pass this knowledge to the course participants.

2.1.4.1. Text analysis and the choice of headings

The indexer gets acquainted with the publication content and describes it by including in the bibliographic record several subject headings taken from a controlled vocabulary of a given database or a catalog. The responsibility of the indexer is to capture all the issues discussed in the publication (discussed and not merely the mentioned ones) in the document. Each heading can be specified with the use of a subheading, if the publication covers only a certain aspect of the topic, e.g. Hand—surgery, Pneumonia—pathology, Aspirin—pharmacokinetics.

The indexer describes the topic from different points of view, for example, if the publication discusses the pharmacological treatment of a disease, than he will assign entries such as: DISEASE—drug therapy, but also DRUG—therapeutic use. If the work concerns the drug effects on an organ: ORGAN—drug effects and DRUG—pharmacology.

Next, the indexer decides whether the geographical range of research is of importance (like e.g. in epidemiological work) or the time range (e.g. in historical works).

During the deep indexing process, like for the databases, it is obligatory to characterize the study group (sex, age, species) and also to list substances used in research. Finally, the indexer describes, using headings, what form the document has and/or what kind of research it describes (e.g. Review, Textbook, Clinical Trials).

In broad databases (like Medline or Embase) the indexer additionally specifies the headings, which correspond to the major topics, dividing the given headings into primary and secondary ones depending on the emphasis put on the issue in the article.

Specificity and the number of headings

The indexer assigns the headings which are most specific and adequate to the content of the publication. If the work describes only "defects of heart septal" — only this heading is being assigned and the heading Congenital Heart Defects is not added. Very general publications or these considering many aspects of the topic, specifically in the library catalogues, may be described with the use of one general heading, e.g. Stomach diseases, Pediatrics, History of Nursing.

If a work covers many specific topics, the indexer gives the needed amount of headings. However, when three or more specific headings are needed which occur in one tree structure, an overriding heading is assigned. Likewise, if the publication contains a description of few aspects of one topic, they can be generalized, e.g. if the work contains: growth, metabolism, secretion and immunology of a specific organ, only one subheading usually is used: physiology.

Indexing of complex concepts

Issues which are often discussed in biomedical literature usually have their representation in the form of a heading in a specific thesaurus. However sometimes, the indexer has to present a complex concept in a different way. The simplest situation for the indexer and the user is when the complex concept is represented by the "pre-coordinated descriptor" — a term which combines two or more concepts, e.g. Arm injuries, Accident Prevention.

When missing a proper, complete term, the indexer builds an entry consisting of a descriptor and a subheading, e.g. Liver—injuries, Fires–prevention & control. If this is not possible, e.g. due to the lack of adequate subheading, the concept must be represented by two or more descriptors. The user must combine them in the search process, that is, post-coordinate, and find the logical product (by AND operator). Example, finding publications on Jejunal enteritis requires the combination of two headings: Jejunum AND Enteritis.

Building a search strategy

Building a search strategy, which is an answer to the user's needs is a skill, which combines information literacy of the user, his substantive knowledge and knowledge of functions offered by the particular database interfaces. A user in a search process should seek to achieve an acceptable recall rate and the highest precision rate (see 2.1.2). A librarian who teaches how to search should show users, with a few examples, that raising the rate of recall (e.g. by entering one broad term) decreases the precision of the search.

Why it is worthwhile to spend the time to learn subject headings searching. Key words search versus subject headings search

Text word, keyword, free text or natural language searching — this option allows users to search any word occurring in the headings, summary or among the keywords added by the author or the librarian, it can also include searching in the whole text of the publication record.

Subject headings searching — is conducted using terms taken from the controlled vocabulary (thesaurus), which were added to the publication record during indexing to describe its content.

Most of the databases offer a search by both the text words and the subject headings. Searching with the use of subject headings in most cases is more efficient. The principle of indexing with the highest specificity contributes to the increased precision rate. The search precision with the use of text words is usually higher than sensitivity (Lowe, Barnett 1994). However, there are situations where the search by words is necessary. Optimal effects are gained by using both methods. The information in the table below present differences between these two methods of searching the databases.

Aspect	Text words	Subject headings
Difficulty	Text word search is simple and does not require special training However, it is important to say that the search using the keywords is easy, when the user searches only for a „sample" of articles. It becomes more complex when one needs to do the exhaustive search when all the important publications considering a specific topic have to be found.	The use of subject headings requires familiarity with the rules of indexing, moreover the knowledge that different databases use different controlled vocabularies
Synonym control	Text word search uses the words and language that the author of the publication has used and requires inclusion of all possible synonyms, e.g. Brain Stem Infarction, Brainstem Stroke, Benedict Syndrome, Top of the Basilar Syndrome, etc.	Subject headings group the publications independently of what terms have been used by the authors, which limits the problem caused by the terminology richness
Grammar variants and different spelling	Text word search requires the prediction of possible grammatical variants, e.g. E-B Virus, E B Virus	The use of subject headings eliminates the necessity of prediction of different grammatical variants of the terms. Entries are independent from the language in which the publication was made.

Syntax Compounds terms	Relationship between concepts can be express only in limited way (parenthesis, NEAR operator)	Subheadings allow describing precisely particular aspect of a subject: e.g. Cataract — chemically induced; Cataract — rehabilitation. There are also pre-coordinated terms. Compare: Protein Binding and Binding Proteins
Specificity	Text word search is possible on the level of detail which is presented by the publication	Searching by headings is difficult, when an essential heading is missing, e.g. in the MeSH there is no heading: Aspergillus terreus. Searching by the MeSH heading requires going through all the publications to which the broad entry Aspergillus was assigned
Primary and secondary headings	In the text word search the user can specify the primary emphasis only to some range e.g. choosing the option "title word" available in some databases	In the indexing process some heading are labeled with higher rank if they refer to major topics (major focus, major topic, asterisk)
Hierarchical relationship	If the search has to encompass a particular term as well as terms subordinate to it, it is necessary to type in all the terms	Hierarchical ranking of the headings and expanded Explode function allows a simultaneous search of the publication of the given subject and all the works considering subordinate entries to a general entry
Accessibility	Text word search is possible the moment the publication is published	In the records of the newest publications, headings do not occur until their indexing (sometimes few months later) Implementing a new term as an entry in a controlled vocabulary can take a year or longer.
Subjectivity	Choice of words depends on the author of the publication (language style, habits, journal requirements, nationality, etc.)	Choice of headings depends on the experience and knowledge of the indexer, and in the automatic indexing systems depend upon assumed rules

Costs	Text word search does not require special training, indexing manuals, highly specialized indexers or maintaining additional database.	Maintaining the controlled vocabulary database, employing and the training of the indexers highly increases the costs.

The creation of an optimal search strategy should start with formulating a question that is, running a topic analysis. This is the most complex stages. Preparing the query, filling it in the advanced searching form does not introduce many dilemmas, and submitting it to the system is not complex. The system will always respond, but is it an answer to actual user's needs? The role of a teaching librarian is not only to help select the most appropriate resources, but also to teach how to formulate a complex inquiry.

In one-to-one teaching this is to be done on the basis of an interview and through asking questions about actual needs of a user. In group teaching, good examples of the problems to be analyzed have to be prepared by the librarian in advance.

The second stage is: to specify the topic(s) and their aspects, that is referring concept(s) to the keywords or subject headings (eventual narrowing down with the use of subheading). The selection of vocabulary should include related terms in case of headings or synonyms in reference to keywords. Some databases offer mapping of natural language to controlled vocabulary (e.g. Map Term on Medline Ovid).

The third stage is a complete creation of a question with the use of Boolean logical operators and the use of limits and other functions offered by the interface (as mentioned before: Explode, Major topic). In the case of keyword searching, it is important to perform truncating of terms or use of double quotes (see 2.2).

Do you know. . .

In a query subject analysis a scheme called PICO, popular with Evidence Based Health Care can be used: clinical inquiry is being broken down into its constituent parts. See Section 3.3.2.

The result of a given search can be modified in many ways. A significant influence on the search result might be the selection of the publication type. For the clinician, it can be essential to narrow down the results of the search to the studies done on a given type of population or to a certain type of publication e.g. practice guidelines or case study. For a pharmacologist it may be useful to narrow the search to a clinical trial of some phase, whereas the person, who begins reading the subject literature, will be interested in finding reviews to start with.

A few practical tips on how to optimize the search results, if the results are not satisfying:

A teaching librarian should show course participants (again on well pre-prepared examples) how search results, if not satisfactory, can be improved.

What can you do when the number of retrieved publications is too small

- Use a wider search: using Explode function, Explosion
- Do not narrow the search to subheadings; use Subheadings none/All subheadings
- Do not limit to the major topic of the publication

- In the controlled vocabulary search (MeSH, Emtree) check the range of use of the heading (definition, scope note) in order to find other related terms; search synonyms to use in the word search
- In the word search check, if all the possible synonyms and spelling variants were checked, American — British spelling differences, abbreviation use and the masking of the ending (an asterisk or $), do not narrow the search to the words form the title
- Do not apply unnecessary limits (e.g. date or publication type)
- In the search of the chemical substances use the compound numbers from the classification: CAS Registry or EC number
- Check what headings were assigned in the record, which best suits the query and search the database according to them
- Do not exceed the Boolean operator AND, consider expanding the search with the use of OR

What can you do when the number of retrieved publications is too big

- Limit the search to the main headings: Major topic, Major focus
- Consider the exclusion of the expanded search: Explode, Explosion
- Narrow the searched entries only to relevant specific subheadings
- Use the limits: e.g. newest publications, reviews, only in English, full texts only, etc.
- In the word search, narrow down to the words in the title of publication
- Create a more complex search strategy: add other important headings or words
- Do not exceed Boolean operator OR, consider narrowing the search with the use of AND

It is also good to turn the attention of the course participants to some mistakes often made by users, which are easy to omit:

- Wrong spelling of the terms in the search question — trivial but frequent
  Advice: show user how the search results differ depending on how you spell the word
- Different interpretation of a particular term
  Advise: read the scope notes and check, to which class or tree term belongs in the thesaurus E.g. Cardiology it is a medical specialty, it is not a synonym of cardiovascular diseases
- Discouragement after first failed search
  Advice: try to improve the strategy, try a different approach
- Wrong choice of the database.
  Advice: before searching read about the existing databases, their scopes, other web based resources, etc. Some other chapters of this handbook can be helpful.

2.1.4.2. Comparison of MeSH and Emtree — the most popular subject headings

The structure and the use of both thesauri are similar. The largest differences concern disciplines on which the emphasis is put in the subject area. MeSH considers all biomedical science domains, Emtree puts strong emphasis on pharmacology and drug names. The number of descriptors representing drugs in Emtree exceeds the number of all descriptors in MeSH. Moreover, Emtree offers a large range of synonyms. Drug names can be searched by many trade names, alternative generic names, and laboratory codes. MeSH, in turn, provides a very rich scope of notes and annotations, which facilitate the use of unambiguous terminology. The divergence in the field scope of the two thesauri is followed by different use of subheadings. Emtree widely expands the area of subheadings only in relation to the names of drugs and diseases. Remaining descriptors can not be narrowed to a specific aspect. Most of MeSH terms can be modified by many various subheadings. While in Emtree only terms for drugs and diseases are accompanied by a range of possible subheadings. Other headings cannot be modified.

New names of drugs are being introduced faster in Emtree in than in MeSH assures Emtree's publisher. After only five occurrences in the literature new terms will be introduced in Emtree, while MeSH needs the term approval (Eger, 2008). Both thesauri are updated once a year, however MeSH makes exceptions, e.g. with the growing number of publications about SARS in 2003, this heading was added immediately. All MeSH terms are included in Emtree.

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Suggested exercises

Exercise 1. Work in a small group Every participant is given a printout with an abstract of an article. Request course participants to read it individually, and write down all terms connected with the topic. Next, write on the board/screen all the terms given by the participants, group the synonyms and grammatical variants. During the discussion choose these which describe the main topic of the publications as opposed to the secondary issues. Using MeSH Browser http://www.nlm.nih.gov/mesh/MBrowser.html "translate" together the terms into MeSH headings (simple or complex) and determine the type of publication. Compare your headings to the Medline entries. During this exercise, the role of controlled vocabulary and indexing process is being shown.

Exercise 2. Work in a small group Using the previous exercise we compare free terms proposed by the participants and subject headings finally assigned to a publication record. We ask the participants questions:

Were all proposed terms reflected in the subject headings?

Could we find this article in Medline using terms proposed by the participants? (try to do so)

What would we lose if we used keywords only in retrieval?

What can we benefit, if we use subject headings (e.g. more precise searching)?

This example shows the difference between searching using keywords and subject headings.

Exercise 3. Discussion (Only if your students are librarians). Conduct a discussion: is it reasonable to prepare different trainings in controlled vocabulary and database searching for various groups of trainees, e.g. nursing students, cardiologists, epidemiologists, dentists, etc. If there is disagreement, divide group into two teams: For and against and tell each group to present the arguments in writing (e.g. on a flipchart). Summarize the discussion.

Exercise 4. Work in pairs (Only if your students are librarians). What elements should be found in a medical terminology course for medical students, PhD students, doctors? Please propose a class outline (120min) for a chosen group of listeners.

Suggested assignments to assess student's learning

Select and assign subject headings to an article on the basis of given abstract.

Please find and present in writing (or online) a case in which text word searching is justified and better than a subject heading search. Choose a database to take this case from.

Choose an appropriate database and prepare a search strategy for the review about.... for the years... (give a problem/subject requiring the use of few limits and functions).

Teaching tips and recommended methods

Teaching the issues considering the terminology, remember that it is a complex topic, do not use specialist terms before explaining their meaning.

The biggest challenge is to persuade the listener to get involved in learning how to operate the controlled vocabulary. Find a lot of arguments supporting this method, use the publications/evidence documenting the usefulness of this skill, show convincing examples.

Name the most common mistakes which are made by the users during the database research — it mobilizes the students to avoid them.

Trainings in controlled vocabulary and database searching should be differentiated depending on the group of trainees. Choose the examples from the area close to the trainees' clinical specialization, public health, nursing, etc. The research shows that the use of databases is more effective if the user knows the field of knowledge. Along with specific knowledge transmission we increase the listener's satisfaction and positive reception of the training.

Additional readings and links to teaching materials

Berg, M.H. (1990) *Medisinsk nomenklatur* [Medical nomenclature]. Universitetsforlaget.

In this book, the most common medical terms and their connections are explained in Norwegian. It describes the origin of terms as well as derivation and compounding. Parts of the book are illustrated. It has a good index and can very well be used for self study.

Emtree, http://www.info.embase.com/UserFiles/Files/emtree_white_paper.pdf

Concise information on Emtree Thesaurus prepared by Elsevier in 2009.

Øyri, A., and Øyri, B. (2007) *Norsk medisinsk ordbok* [Norwegian medical dictionary]. Samlaget.

Every medical word and all common diseases are shortly explained. Some entries describes word origin. The entry words are in Norwegian, English or Latin. The explanations are in nynorsk [New Norwegian].

Using Medical Subject Headings (MeSH®) in Cataloging, www.nlm.nih.gov/tsd/cataloging/trainingcourses/mesh/index.html

This is a very useful course for librarians who use Thesaurus MeSH in cataloging.

CHAPTER 2.2.

Databases and searching

Ewa Czarnik

Once...

The Department of Health Sciences at the local university offers programs in Nursing and Midwifery, Public Health, Emergency Medical Care and Physiotherapy. The Dean of the Department had been receiving feedback from the faculty concerning the poor quality of papers submitted by students pursuing diplomas in the programs. The most frequently reported problem was that reference lists of the papers were inadequate, of poor quality, and cited outdated literature. The faculty attributed this problem to the lack of information literacy among the students. They noted that many students know how to use the Internet; however, most do not know what specialized databases are available and how to search them effectively. Students also face the somewhat daunting task of sifting through the abundance of information, which requires distinguishing between relevant and irrelevant information. Teaching librarians and faculties were faced with the task of developing classes on database searching that were to be tailored to various groups of students.

Introduction

The aim of this chapter is to equip novice teaching librarians with the knowledge of and skills in databases and their searching facilities that are required of a medical/health teaching librarian. They will have the opportunity to review their knowledge about available medical/health databases, their subject areas, search features and searching capabilities, in order to improve teaching competencies.

This overview offers some guidelines on teaching library users core competencies of information literacy. Teaching librarians might do this in several ways, either by providing face-to-face instruction, conducting medium/large group classes or hands-on workshops, or designing online courses.

2.2.1. Database types — know your resources

A database is a "collection of data or information organized for rapid search and retrieval, especially by a computer. Databases are structured to facilitate storage, retrieval, modification, and deletion of data in conjunction with various data-processing operations. A database consists of a file or set of files that can be broken down into records, each of which consists of one or more fields. Fields are the basic units of data storage. Users retrieve database information primarily through queries. Using keywords and sorting commands, users can rapidly search, rearrange, group, and select the field in many records to retrieve or create reports on particular aggregates of data according to the rules of the database management system being used." (Britannica Concise Encyclopedia, http://www.answers.com/library/Britannica)

Databases in the medical and health subject area are numerous and cover both medical specialties subject areas and interdisciplinary research. They provide a searchable facility to collections of various types of data:

- Journal literature, electronic books
- Dissertations & theses
- Conference proceedings
- Clinical trials and systematic reviews of clinical trials' reports
- Patent documents
- Drug information
- Images, videos
- Statistical data
- Structures of chemical substances, gene and protein sequences, chromosome maps

Depending on the content, some databases are useful for particular groups of health professionals (e.g. CINAHL for nursing, HTA for healthcare policy makers) or healthcare consumer groups (e.g. Interactive Health Tutorials, MedlinePlus); others provide information on a particular disease or condition (e.g. CancerLit by National Cancer Institute) or specific raw data to support scientists in a specific area of research (e.g. Human Protein Reference Database).

One way of classifying databases involves the type of content, for example: bibliographic, full-text, numeric, and image. Many scientific databases are either bibliographic databases, factual or a combination of both. At the end of this chapter there is the List of selected medical/health databases, which represents the major groups of scientific databases. The role of teaching librarians is to choose the most appropriate and useful databases for specific groups of library courses' participants.

2.2.2. Know the database's content and scope

The content, record structure, searchable fields and searching facilities of databases vary from data base to data base. In this chapter only Medline, EMBASE and The Cochrane

Library databases will be presented in more detail. They are essential online biomedical and health information resources and the entry point to scientific information. This is why they were selected as examples for discussion.

Medline	EMBASE	The Cochrane Library
• Medline is a primary component of PubMed produced by the National Center for Biotechnology Information (NCBI) within the U.S. National Library of Medicine. It contains bibliographic references to biomedical articles, editorials, letters to the editors, and other content in over 5,000 scientific journals. • The Medline database is the electronic version of Index Medicus, started in 1966. • NLM maintains OLDMEDLINE that contains records prior to 1966. • 89% of citations in English; journals in 29 other languages are indexed; 76% of records have abstracts (NLM began adding abstracts from 1975 onwards); • The primary interface is PubMed that is a part of the large Entrez system with free access for everyone. Commercial vendors such as DIALOG, OVID and EBSCO make Medline available on a fee basis. Interfaces of commercial vendors differ in appearance and internal logic. • PubMed provides access and links to more specialized databases (e.g., the integrated molecular biology and chemistry databases maintained by NCBI). • Overlap with EMBASE ca. 60% (at journal level).	Embase is a product of Elsevier and is comprised of content merged from following databases: Embase, the Excerpta Medica database from Elsevier — 1974 to present Embase Classic (Excerpta Medica Abstract Journals back file) — 1947–1973 • It contains biographic references to 7,000 journals. Holdings of over 1800 biomedical titles not offered by Medline. • Provides more international focus, including more non-English-language journals. (These journals are important for those carrying out systematic reviews and meta-analyses, who need access to all studies done across the world.) • Includes reports of randomized trials which are not included in Medline, especially reports in some languages other than English. (Lefebvre C, 2008) • Overlap with MEDLINE ca. 60% (at journal level).	• The Cochrane Library is produced by the Cochrane Collaboration, established in 1993, which is an international network of people who prepare, update and promote the accessibility of Cochrane Reviews. • It is published by the WileyInterScience. • The Cochrane Library is named in honor of Archie Cochrane, a British medical researcher who contributed to the development of epidemiology as a science and advocated the use of randomized controlled trials. • The Cochrane Library is a collection of 7 databases (a list in 2.2.4). One of them is, the Cochrane Database of Systematic Reviews (CDSR) is the largest collection of the systematic reviews of health and medical interventions and primary resource for Evidence Based Medicine. • CDSR consists of complete reviews, prepared and updated by Collaborative Review Groups and protocols for review currently being prepared. • Up to now CDSR provides over 4,000 reviews.

When teaching about databases, demonstrate the differences in their scope and coverage. Emphasize to your students the need to consult various databases to find the desired information.There is a wide collection of research studies comparing bibliographic databases based on the number of bibliographic references for different search topics, such as specific drug interactions, randomized trials, or articles on specific subjects. Conclusions of these evaluations provide evidence-based information on the content value of various databases for those searching for specific information.

For example, one study concludes that it is advisable to search EMBASE and Medline for randomized trials in addition to The Cochrane Central Registry Trials (Central) (Lefebvre, 2008). Lefebvre indicates that randomized trials published in recent years are not yet considered to be included in the Cochrane Central Register of Controlled Trials (Central) in The Cochrane Library. He concludes that EMBASE is a "rich source of randomized trials that are not included in Medline or not indexed as trials in Medline, especially reports in some languages other than English"(Lefebvre, 2008,17).

Research conducted by Barillot indicates that EMBASE provides significantly more bibliographic references on specific drug interactions than other databases such as Medline, TOXLINE, BIOSIS, Chemical Abstracts, PHARMALINE, and International Pharmaceutical Abstracts. Notably more citations were also retrieved on new drugs in EMBASE than Medline (Barillot, 1997). Literature search comparison studies on family medicine topics in Medline and EMBASE concluded that EMBASE provides twice as many citations per search than Medline and provides greater coverage of total retrieved citations (i.e. EMBASE contributed 65.2% of the total of all citations retrieved (Wilkins et al., 2005)). Wilkins et al. state that EMBASE offers comprehensive drug related information, as it indexes 350 more journals for this purpose than Medline.

2.2.3. Know the database's searching facilities

There is not one standard approach to searching that has been adopted by all database interfaces. The searching interfaces of databases differ from one to another and searching features are differently implemented within various systems. When you teach library users about database searching, make the point that each time the user searches for information, she/he needs to adjust the search strategy to allow for each database's syntactical and functional differences.

There are two ways of searching databases. Novice searchers enter only one or two words and expect to get results. More experienced searchers, on the other hand, take advantage of the subject terms or descriptors to accomplish more than retrieving a few relevant articles. In general, users can search by using natural language and by selecting terms from a defined list or thesaurus that have been used as assigned subject descriptors. Combining subject descriptors with natural language will result in a still more comprehensive search. Both methods of searching will be discussed later in this chapter. In order to retrieve focused and manageable output, the Boolean operators AND, OR and NOT are used to combine selected terms.

Boolean operators

The most common way of presenting Boolean logic is by using Venn diagrams. "Boolean logic is a form of symbolic logic named after George Boole, the nineteenth-century English mathematician who developed it. Boolean logic allows one to create and combine sets of items that meet criteria specified by the user." (Bopp, 1991, 88). Boolean logic uses common words such as AND, OR and NOT.

The diagram (Fig. 1) shows the search of two words combined with AND operator which retrieves a set of records containing both terms (the shaded area). That is the only set of garments of both colors: blue and green. The AND operator is used to find records that include both terms.

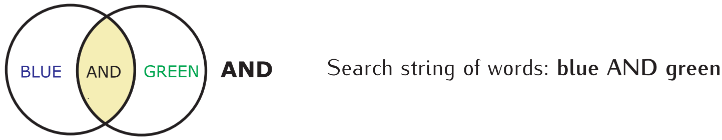

Figure 1: Boolean operator AND.

The diagram shows (Fig. 2) the search of two words combined with OR operator which retrieves a set of records containing sets including „blue garments" as well as „green garments". The OR operator is used to find relevant records by using synonyms and related terms.

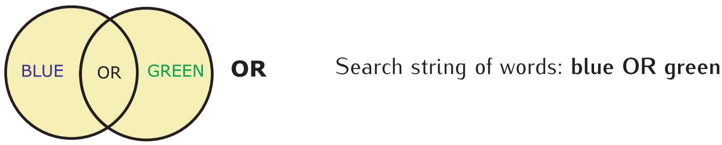

Figure 2: Boolean operator OR.

The diagram shows (Fig. 3) the search of two words combined with NOT operator which reduces the retrieved set of records by excluding the undesired term. The set shows all blue garments except "blue hats".

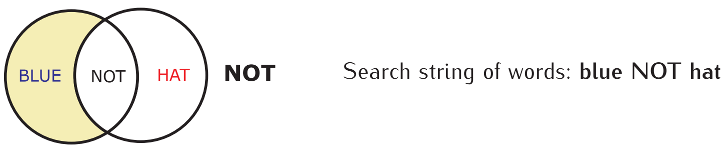

Figure 3: Boolean operator NOT.

The diagram shows (Fig. 4) the search of three words with AND and OR operators in the order in which the searcher wants them to be executed by the database software. We get all garments except "blue and green hats".

Figure 4: Nesting.

Source: Images of diagrams are courtesy of Andersen Library, University of Wisconsin, Whitewater. Boolean operators and search symbols at http://library.uww.edu/guides/boolean-operators.html#and

Truncation and other search symbols

Another capability for database manipulation is provided by truncation, which is a form of the Boolean operator OR. It compiles a set of materials that meets multiple criteria simultaneously. In truncation, the search engine puts into a single set all those items that share a common sequence of characters. The truncation symbol in PubMed is an asterisk "*", sometimes referred to as a "wildcard". Truncation can be used when you want PubMed to find all terms that begin with a given text string. For example, you are trying to search for all terms that have the root, mimic. PubMed will retrieve words such as mimic, mimics, mimicking, etc. The use of truncation varies from database to database. PubMed, unlike The Cochrane Library, has no single character truncation symbol. In The Cochrane Library you can use an asterisk to search for accented characters (within all fields except Author) by using both the accented and unaccented versions of a term, or by using wildcard (multiple: *) or (single: ?) characters.

Note: Examples from The Cochrane Library:
m?ni?re* matches *Meniere's* or *Ménière's*
reticulo* matches reticuloendotheliosis.

In PubMed, truncations need to be used with caution. Truncation turns off the automatic term mapping and the automatic term explosion of the MeSH terms (e.g. heart attack* will not map to the MeSH term Myocardial Infarction or include any of the more specific terms such as Myocardial Stunning; Shock, Cardiogenic.)

Note: Some databases differentiate between truncation and masking functions. Masking term is used to describe the function that permits unknown letters to be substituted within words, while truncation substitutes one or more letters at the start or at the end of the words with asterisk "*" or question mark "?".

Phrase searching

Another way, besides AND, to focus your search and reduce search results is to use phrases that occur in a specific order. You may consider using single and double quotation marks or in some databases parentheses with the use of the proximity operators NEXT and/or NEAR.

Example:

The search in the Cochrane Library for diabetes mellitus using field labels: (*diabetes near4 mellitus*):
ti, ab — Searches for diabetes within 4 words (established default is 6 words) of mellitus in the title or abstract field.

Example:

The EMBASE allows bind multi-word phrases with single quotations and hyphens:

'heart attack' — retrieves heart attack (phrase)

heart-attack — retrieves heart attack (phrase)

Example:

PubMed searches for phrases under following conditions:

Kidney allograft [tw] — the phrase is entered with a search tag "kidney allograft" — the phrase is enclosed in double quotes

First-line — the term is hyphenated

Note: Make your students aware that databases use many different symbols and operators, so it is advisable to check the search tips and/or HELP features in each database. Embase, unlike PubMed, uses the NEAR and NEXT proximity Boolean operators to combine search statements. Demonstrate them to your students by using examples.

The natural language searching

When novice searchers are faced with a blank query box, they enter one or few words, expecting to find articles on a topic. Using the requester's own words (i.e. natural language) and examining significant words or phrases that appear in the title, abstract or full text of an article is a quick way of locating material on a topic. Searching by natural language is an especially useful way to retrieve very recent material, especially in the case of newly coined phrases and newly developed products for which appropriate indexing terms have not yet been added to the vocabulary of a database.

Demonstrate the effectiveness of natural language searching by using examples. Let see how it works in PubMed. To search PubMed, one can simply enter search terms in the search box. For example, someone wants to know whether an aspirin is an effective drug for heart attack prevention. He types in the search box: aspirin heart attack prevention. In PubMed this simple user input is executed with a great deal of processing. PubMed uses the Automatic Term Mapping feature to search for unqualified terms (i.e. when entered words are not qualified by a tag field name). The PubMed search engine looks for a match for the submitted words in a search string conducted in several lists in the following order:

- MeSH Translation Table
- Journal Translation Table
- Author and Investigator Names
- Investigator Index

If no match is found in any tables, terms are searched in All Fields and put together with the Boolean operator AND.

- All Fields

To demonstrate how PubMed interpreted the search query aspirin heart attack prevention, show users the Search Details. PubMed mapped "heart attack" to the MeSH term "myocardial infarction" and "prevention" to the MeSH subheading "prevention and control". All terms were also mapped to All Fields and combined with either AND or OR operators. Translations details (on the Search Details screen) help your users to understand how each term is translated using PubMed's search rules and syntax.

Point out to your users that there are some instances when natural language searching has advantages over controlled vocabulary searching. Partially, it may come from the fact that the human indexing process is sometimes deficient. "Some of its [human indexing] limitations stem from the use of a thesaurus, which may not contain all the important terminology in a field or may not word the terms in a way that allows non-expert users to readily identify and apply them. One study of 75 Medline queries generated in a clinical setting contained terms that could not be found in the UMLS Metathesaurus, which is a superset of the MeSH vocabulary" (Hersh, 2009, p.183).

Natural language searching is a "broad" way to search and is often helpful for a first look at an unfamiliar concept. Advise library users to implement natural language searching whenever controlled vocabulary searches result in no recall or a very small set of citations. (See more on natural language searching in Chapter 2.1)

Controlled vocabulary searching

Despite some advantages of the natural language searching, the teaching librarian needs to focus on the importance of a controlled vocabulary. (About controlled vocabulary searching read more in Chapter 2.1)

Compared to natural language searching, the use of a controlled vocabulary can enhance the performance of an information retrieval system, if performance is measured by precision. It leads to a higher percentage of documents in the retrieval that are relevant to the search topic. Your students need to know that controlled vocabulary schemes allow the use of predefined, authorized terms, in contrast to natural language vocabularies, where there are no restrictions on the vocabulary, and reduce the ambiguity inherent in normal human languages. In short, it makes it possible to achieve high precision and low recall when searching a database.

Explain to database users how a distinctive feature of databases (such as defined lists of terms or thesauruses) works in different databases. Discuss PubMed's Medical Subject Headings (MeSH) and Embase's Emtree thesaurus, which aim to maintain uniformity and consistency in the indexing of biomedical literature. (See Chapter 2.1 for a thorough discussion on MeSH and Emtree terminology and their structure and function)

Basic and advanced search interfaces

Whether the user uses natural language or a pre-defined term from the list of controlled vocabulary, he needs to enter them into appropriate search boxes in the searching facilities of the choosen database. Many systems provide both "simple" (also called "Quick") and "advanced" search interfaces. Most basic interfaces are created for the novice searcher to use. By simply entering a few words, they are combined in a manner prescribed by the interface rules and the results appear instantly. The advanced option is provided either by the use of another screen or by the ability to enter qualifiers which allow the results to be expanded or narrowed by the use of additional search terms or features (i.e. various types of limits). The advanced screen requires the searcher to choose carefully the appropriate terms to be entered in each field. It also allows the user to decide which terms should be combined with OR and which terms should be combined with AND to complete the search.

For example, PubMed's Advanced Search Builder interface allows more tailored searches to be constructed by:

- Searching within a specific field
- Browsing the index of terms (i.e. an alphabetical list of terms for each field)
- Previewing the number of search results
- Limiting the search by various categories
- Combining searches using History
- Searching for a phrase using AND, OR and NOT operators and truncation

In addition, at the bottom of the Search Builder screen there are links to other PubMed interfaces, which enable users to submit Clinical Queries, find Systematic Reviews and conduct Medical Genetics searches.

Advise students also to use the Search History feature provided in the Advanced Search. The History section stores the search results, the number of citations in each set of search results and a search statement numbers menu for combining searches.

Distinctive searching interfaces

Besides the common search interfaces mentioned above, a teaching librarian should also demonstrate specific search features of discussed databases. Keep in mind that the publishers of databases constantly develop their services to meet the evolving needs of diverse groups of users in medical fields. For example, the publishers of Chemical Abstracts-SciFinder as well as CrossFire Beilstein have introduced a new feature to their services. Their unique sub-structure search module allows users to draw a molecular substructure and search it against the database. Pharmacists and chemists find this tool particularly invaluable for chemical substance name and chemical reaction searches.

Demonstrate the unique search features of databases to your trainees by using examples. Have a look at the examples provided below:

Example 1:

EMBASE offers unique search interfaces such as Drug Search and Disease Search. Drug Search allows searching for a drug by a generic name, proprietary name, laboratory code, or chemical name (e.g. Claritin, loratadine or sch 29851). Synonyms are automatically mapped to Emtree preferred terms. When searching for a drug, using a word or phrase, the query is automatically mapped to the corresponding Emtree thesaurus term. The search is run in the Disease Index Term and Drug Index Term fields. Words and phrases that cannot be mapped within Emtree are automatically searched as free text in all fields of the record.

When a drug name is entered into the Drug Name query box, there are two built-in search filters available to limit the search to specific aspects listed in the Drug Subheadings and the Routes of Drug Administration menus. These filters are provided to increase precision, refine the search strategy and pinpoint the most relevant articles. Drug Subheadings allow the search to be restricted to precise facets, such as adverse drug reaction, drug interaction, drug therapy, drug dose, etc. The Routes Drug Administration subheadings can be used to retrieve information about specific methods of administering a drug, such as Oral, Rectal, Transdermal, etc.

Use examples to help your student understand how the Drug Name feature works. Think about the following scenario: a user is looking for a comparison of two cholinesterase inhibitors drugs prescribed for Alzheimer disease — Aricept and Exelon. He wants to know what research says about the effectiveness of these two drugs. Choose the EMBASE Drug Search screen and enter Aricept AND Exelon into the searching box. Select the Drug comparison attribute from the Drug Subheadings and additional limits (e.g. Humans, Evidence Based Medicine: Systematic Review). Finally, execute search and look at the results. The drug trade name Aricept is mapped to the preferred Emtree term ‘donepezil’ and Exelon to ’rivastigmine’. The list of results shows what research says about the effectiveness of both drugs.

Note: Make students aware that many drug names have non-alphanumeric characters such as apostrophes, brackets, square brackets, hyphens, periods, and commas. Use these drugs names as phrases or exact searches between quotes.

The Cochrane Library is a key resource in evidence-based health care. Therefore, it is an indispensable resource for class presentations or workshops for clinicians. The best way to start is by formulating an answerable clinical question and analyzing it for key concepts. The PICO scheme is a helpful tool to construct a question (Read more about PICO scheme in Chapter 3.3). You may demonstrate the search in The Cochrane Library by using examples such as the following:

Example 2:

Find clinical evidence as to whether physiotherapy is an effective intervention for stroke rehabilitation and whether it improves the quality of life and social functioning of patients suffering from immobility after stroke. Here, using the PICO scheme, P is a group of patients suffering from stroke, I is physiotherapy intervention used for stroke rehabilitation, O is improvement of the quality of life and social functioning of patients. (C –comparison is not employed because physiotherapy is not compared with any other intervention.)

Below is the example of possible search strategy for this clinical question:

#1 MeSH descriptor Stroke explode all trees
#2 (physical therap*):ti,ab,kw OR (physiotherap*):ti,ab,kw
#3 (rehabilit*):ti,ab,kw
#4 #1 AND #2 AND #3

Search results are retrieved from all seven Cochrane databases including reviews and protocols. Discuss the search results and the status of particular citations with your students. Emphasize to your students that systematic reviews differ from traditional review articles with their focused questions, exhaustive review of the literature and use of pre-tested methodologies to identify the evidence-based literature. The high quality of information provided by The Cochrane Library is maintained by The Collaborative Review Groups (i.e. international specialists in the specific field of healthcare and medicine). (See also 3.3.3 Searching literature for evidence based health care)

Limits and filters

Teaching librarians need to demonstrate to their users the importance of refining the search strategy by using the limit features of databases. Limits allow setting commonly used parameters for a query, which may result in a more relevant retrieval. Limits help to refine the search by limiting the retrieval output to various types of attributes such as Type of Article, Languages, Gender, Ages, Subsets, or publication date range and others. While limits are straightforward and visible features of each database, filters need some "mining activities" to reveal their structure. Teaching librarians should demonstrate where they are hidden and how they are built.

"Search filters are pre-tested strategies that identify the higher quality evidence from the vast amounts of literature indexed in the major medical databases. Filters exist for most types of experimental design, and are comprised of index terms relating to study type and specific terms associated with the methodological description of good experimental design." (SIGN, http://www.sign.ac.uk/methodology/filters.html).

Comprehensive information on the evaluation of the performance of the filters used in Medline, Embase, PsycInfo, CINAHL, and LILACS (Latin American and Caribbean Literature in Health), as well as RCT filters, is provided by the Centre for Reviews and Dissemination, University of York, at www.york.ac.uk/inst/crd/intertasc/rct.htm; SIGN: Scottish Intercollegiate Guidelines Network at www.sign.ac.uk/methodology/filters.html. For alternative search filters used by different databases, including the EMBASE database, consult McKibbon, A. et al. (2009). Below is an example of how PubMed allows the search to be refined by employing filters.

Example:

PubMed features a "Clinical Queries" filter. It is designed to enable clinicians and health researchers to retrieve the best evidence based on principles of EBM for common types of clinical questions: etiology, therapy, diagnosis, and prognosis.

- Clinical Study Category — allows searches for the retrieval of evidence for etiology, diagnosis, therapy, prognosis and clinical prediction guides.
- Systematic Reviews — allows searches for the retrieval of systematic reviews, meta-analyses, reviews of clinical trials, evidence-based medicine, conferences and guidelines.
- Medical Genetics — allows searches for the retrieval of different aspects of genetics such as diagnosis, clinical description, management, genetic counseling, molecular genetics and testing.

Clinical Study Categories use built-in search filters that limit retrieval to citations reporting research conducted with specific methodologies. For each category five question types there are two filters provided: one emphasizing sensitivity results in higher recall (i.e. providing the most relevant,, but also some less relevant article) and the other emphasizing specificity results in higher precision (i.e. giving fewer but very relevant articles).

Note: Methodological search filters for PubMed were developed by Brain Haynes and researchers from McQueen University, Canada, to improve the retrieval of clinically relevant and scientifically sound study reports based on principles of EBM (Haynes et al., 1994). The impetus to undertake the study was provided by the observation of Brain Heynes that although medical literature was accessible through databases such as Medline, only a few clinicians were proficient in searching for it. They developed the search word strings that provide over 90% accuracy in searching PubMed database for clinical trials citations.

Clinical Queries Filter Table

Category	Optimized For	Sensitive/ Specific	PubMed Equivalent
therapy	sensitive/broad	99%/70%	((clinical[Title/Abstract] AND trial [Title/Abstract]) OR clinical trials[MeSH Terms] OR clinical trial[Publication Type] OR random* [Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])
	specific/narrow	93%/97%	(randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled [Title/Abstract] AND trial[Title/Abstract]))

Figure 1: Examples from The Clinical Queries Filter Table. PubMed Help.

Managing the search results

In the last part of each database presentation or instruction class, the teaching librarian should discuss the database features that allow the management of search results. The ways these features are designed and set up, as well as the ease of navigation between them, vary from database to database.

For example, PubMed offers:

- Various selections that allow the manipulation of search results such as: changing the display of the retrieved citations, adjusting the number of citations displayed on a page, sorting results, e-mail, downloading and printing selected citations, saving selected citations to the Clipboard and Collections, creating a bibliography and setting up filters for results

- The ability to save search strategies: by using the My NCBI Save Search feature and using Send to RSS (i.e. it an RSS feed to be generated to a PubMed search to display new results, with links back to the citations in PubMed)

- The export of citations into a reference management program (such as EndNote, Reference Manager, RefWorks and ProCite)

Show the students how to save retrieved citations temporarily by sending them to the Clipboard or indefinitely by using *My NCBI* Collections. The Clipboard gives a place to collect citations (up to 500) for 8 hours after searches have been concluded. The *My NCBI* is a unique feature of PubMed that allows one to personalize database. It permits the user to save a search, see a list of saved searches, update them by setting up email alerts, and customize the result display with filters and other options. The user can even receive automatic e-mail updates and decide how often searches should be updated. The user is required to register for the account by creating a User Name and Password. (For more details on how each of the My NCBI features works look on Tutorial on *My NCBI* (Cubby) under PubMed Tutorial).

My NCBI service is constantly evolving and new features have been added for the users' convenience. For example, at the end of 2009 My NCBI Bibliography was enhanced to allow users to add non-PubMed citations from books, meetings, presentations, patents, and articles.

Another important service provided by PubMed is the LinkOut feature that allows publishers, libraries and other Web resources to display links to their sites. This site directs the user to provider's site with electronic full-text articles. Most of libraries take the advantage of this service by linking their collection of full-text journals to PubMed records. This saves the users' time by immediate access to desired full text or information.

Note: From time to time teaching librarians should check whether new features have been introduced to the databases and include updates to a database instruction class. To stay abreast with new features or new developments, for example in PubMed, go to New and Noteworthy RSS link available under the "Using PubMed" section.

2.2.4. A list of selected medical and health related databases

The chosen scheme does not aspire to be a comprehensive or exhaustive classification of medical and related electronic databases, but rather representative, covering the diversity of medical content databases available.

Note: Next to the name of each database is provided information about the nature of the access to it: [FB] means fee-based access and [OA] means open access.

Bibliographic databases (comprehensive and broad in scope) — examples

Medline [FB], **PubMed** [OA]	Medline covers the world's biomedical and health sciences journal literature. It is produced by the US National Library of Medicine (NLM) and is made accessible worldwide from the NLM platform as the largest component of PubMed. Medline is also available on a fee-basis from commercial publishers' platforms such as EBSCO, ProQuest or OVID.
Embase [FB]	Covers a wide range of journals in the biomedical sciences. Embase is particularly useful for locating drug information, as it indexes many drug journals not covered by MEDLINE.
CINAHL [FB]	Covers nursing, physical therapy, occupational therapy, laboratory technology, health education and other allied health fields, such as respiratory technology, x-ray technology, etc. Topics covered by this database include patient care, health promotion, professional issues for health care workers, patient education, rehabilitation, and other related subjects.
British Nursing Index [FB]	It is a nursing and midwifery database, covering over 220 UK journals and other English language titles. A significant feature is the inclusion from medical journals of articles relevant to nurses and midwives, as well as to healthcare management and other professions allied to medicine.
SveMed+[OA]	Swedish bibliographical database that provides access to Scandinavian scholarly journals in health and medical fields. Uses the MeSH thesaurus in English and Swedish languages.
Polska Bibliografia Lekarska (Polish Medical Bibliography FB)	Database indexes Polish biomedical journals, doctoral theses, conference proceedings, and selected monographs. (Uses the MeSH thesaurus in Polish translation)

Evidence-Based Medicine Databases (examples)

The Cochrane Library [FB]	The Cochrane Library is a collection of six databases that contain different types of high-quality, independent evidence to inform healthcare decision-making, and a seventh database that provides information about groups in The Cochrane Collaboration.

• Cochrane Database of Systematic Reviews (Cochrane Reviews)	Contains regularly updated, full-text systematic reviews that provide an overview of the effects of interventions in health care. Protocols providing information about reviews which are currently being written.
• Database of Abstracts of Reviews of Effects (Other Reviews) (OA)	Contains critical assessments and structured abstracts of high-quality systematic reviews published in the scientific literature.
• Cochrane Central Register of Controlled Trials (Clinical Trials)	It is a bibliographic database of controlled trials.
• Cochrane Methodology Register (Methods Studies)	It is "a bibliography of publications that report on methods used in the conduct of controlled trials. CMR contains studies of methods used in reviews and more general methodological studies that could be relevant to anyone preparing systematic review" (About The Cochrane Library, http://www.thecochranelibrary.com/view/0/AboutTheCochraneLibrary.html)
• Health Technology Assessment Database (Technology Assessments) (OA)	Contains details of completed and ongoing health technology assessments (studies of the medical, social, ethical and economic implications of health care interventions) from around the world.
• NHS Economic Evaluation Database (Economic Evaluations) (OA)	Contains over 5000 abstracts of quality-assessed economic evaluations from around the world, identifying their relative strengths and weaknesses.
• About The Cochrane Collaboration (Cochrane Groups)	Contains records about the Cochrane Groups, Fields and Networks (i.e. their background, aims and activities, scope & topics, structure etc.).
Evidence-based Resources from the Joanna Briggs Institute (ProQuest) [FB]	It is a database of systematic reviews, evidence summaries, and best practice information sheets for nursing and the allied health professions.
UptoDate [FB]	Provides about 4,500 reviews in adult and pediatric medicine. Each topic has an outline. "Recommendations" outlines give specific clinical recommendations for diagnosis and/or treatment of the problem. The system provides links to PubMed Medline references, a drug reference and patient education information.
Medical Evidence Matters [FB]	Provides therapy options for known medical conditions by comparing outcomes from peer-reviewed literature.
Dynamed [FB]	It is an evidence-based clinical reference tool for physicians and other health care professionals created for use primarily at the 'point-of-care'.
Clinical Trials Registries Database [OA]	Consists of lists registries which provide information about on-going and completed medical trials which are not published in medical journals http://ssrc.tums.ac.ir/SystematicReview/Searching.asp).

Interdisciplinary databases (examples)

Web of Science [FB]	Provides access to leading scholarly literature in the sciences, social sciences, and humanities (including the proceedings of international conferences, symposia, seminars, workshops and conventions. Science Citations Index on the Web of Science lists citations of every scientific paper indexed in this source. Helpful in the field of bibliometrics for measuring individual contributions in science and the distribution of publications on topics.
Scopus [FB]	Includes records from 15,000 journals from 4,000 publishers, including 5,300 health science journals. Scopus also contains patents and scientific Web pages.

Health Statistical Databases (examples)

OECD Health Data [FB]	Source of comparable statistics on health and health care systems in OECD countries. It is an essential tool for carrying out comparative analyses and drawing conclusions from cross-country comparisons of national health systems data.
European Health for All (HFO-DB) (OA)	Basic health statistics database on health in the European Region provided by WHO. http://data.euro.who.int/hfadb/
Eurostat — Health [OA]	Public health database/Health and safety at work database http://epp.eurostat.ec.europa.eu/portal/page/portal/health/introduction
Surveillance Epidemiology and End Results (SEER) [OA]	Provided by the National Cancer Institute statistics on cancer in the United States.
WHO Statistical Information System (WHOSIS) [OA]	Interactive database bringing together core health statistics for the 193 WHO Member States: comprises more than 70 indicators. www.who.int/whosis/en/

Drug Information Databases (examples)

Micromedex [FB]	Provides access to drug information resources, including DRUGDEX; POISINDEX; Martindale, the Extra Pharmacopoeia; Index Nominum; and Physician's Desk Reference. In addition there is a drug interaction utility, dosing calculators, and differential diagnostic lists.
Martindale [FB]	Provides evaluated information on drugs and medicines used throughout the world, including facts about drug monographs, preparations, reference citations, manufactures as well as synopsis of diseases, pharmaceutical excipients, toxins, and poisons.
Chemical Abstracts — SciFinders [FB]	Includes over 20 million citations to the worldwide literature of chemistry and its applications from 1967 forward.

TOXLINE [FB]	It is one of the cluster databases provided by TOXNET: Toxicology Data Network (NLM). A bibliographic database providing comprehensive coverage of the biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals from 1965 to the present. TOXLINE contains over 3 million citations, almost all with abstracts and/or index terms and CAS Registry Numbers. http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE

Drug Product Databases (examples)

Drugs@FDA [OA]	Contains prescription and over-the-counter human drugs and therapeutic biologicals currently approved for sale in the United States. Allows you to search for official information about FDA approved brand name and generic drugs and therapeutic biological products. It is provided by U.S. Food and Drug Administration. http://www.accessdata.fda.gov/scripts/cder/drugsatfda/
Drug Product Database [OA]	Database provided by Canadian ministry of health — HealthCanada. Before drug products are authorized for sale in Canada, Health Canada reviews them to assess their safety, efficacy and quality. Drug products include prescription and non-prescription pharmaceuticals, disinfectants and sanitizers with disinfectant claims www.hc-sc.gc.ca/dhp-mps/prodpharma/databasdon/index-eng.php

Drug Patent Register Databases (examples)

Drug Patent Register [FA]	A database provided by Health Canada at www.patentregister.ca/. The Patent Register is an alphabetical listing of medicines and the associated patents, patent expiry dates and other related information established in accordance with the Patented Medicines (Notice of Compliance) Regulations

Databases focused on subject-specific areas (examples)

CEPH Genotype Database [OA]	Database of genotypes for genetic markers that have been typed on the CEPH reference family resource for linkage mapping. http://www.cephb.fr/en/cephdb/
PEDro — Physiotherapy Evidence Database [OA]	Database of over 16,000 randomized trials, systematic reviews and clinical practice guidelines in physiotherapy http://www.pedro.org.au
Manual Alternative and Natural Therapy Index System (MANTIS) [FB]	Database includes of peer-reviewed journal literature for complementary and alternative medicine field; records from more than 1,000 journals. http://www.healthindex.com/Start.aspx

Medical Image Databases (examples)

Visible Human [OA]	Provided by National Library of Medicine. (It requires registration) http://www.nlm.nih.gov/research/visible/visible_human.html
Atlas of Dermatology [OA]	Provided by Loyola University Medical Center www.meddean.luc.edu/Lumen/MedEd/medicine/dermatology/melton-/atlas.htm
Pathology Atlas of Gross and Microscopic Images [OA]	Provided by Columbia University http://cpmcnet.columbia.edu/dept/curricpathology/pathology/pathology/pathoatlas/index.html
Interactive Radiology Atlas [OA]	Provided by SUNY Downstate Medical Center http://ect.downstate.edu/courseware/rad-atlas/

For a selective list of medical image databases on the Web consult Hersh's book (Hersh, 2009, 146).

Databases which include Grey Literature

BIREME Databases [OA]	provides access to the medical journal literature in Portuguese and Spanish not indexed by other sources. It is produced by Regional Library of Medicine (BIREME, acronym in Portuguese), which is a specialized center of the Pan American Health Organization World Health Organization (PAHO/WHO) oriented to technical cooperation in scientific health information. http://regional.bvsalud.org/php/index.php?lang=en
Dissertation Abstracts Online [FB]	A guide to virtually every American medical/health dissertation accepted at an accredited institution since 1861. In addition it includes citations for dissertations from 50 British universities. It is published by Dialog LCC.
Health Services / Technology Assessment Text (HSTAT) [OA]	Web-based resource of full-text documents that provide health information to support health-care decision making produced by the NLM. http://www.ncbi.nlm.nih.gov/bookshelf/br.fcgi?book-=hstatcollect

Book Databases (examples)

Books in Print [FB]	a major online bookseller providing a database of all available books by R.R. Bowker. www.booksinprint.com
Barnes & Noble [OA]	a major US bookseller. www.bn.com
Electronic books — [OA]	Karolinska Institut Library provides links for hundreds of freely available scientific and medical E-Books http://ki.se/ki/jsp/polopoly.jsp?d=18616&a=47721&l=en

A comprehensible source of information on available databases in all subject areas is the Gale Directory of Databases. Detroit: Gale Research Inc. One might consult also publishers product catalogues or other libraries' listening of databases resources.

Portals worthy of exploration for every medical librarian — each portal provides access to a number of subject specific databases:

- NLM Gateway (more in Chapter 2.3)
- WHO International Clinical Trials Registry Portal This search portal provides access to a central database containing the trial registration datasets provided by Australian New Zealand Clinical Trials Registry, ClinicalTrials.gov, ISRCTN
- CRD, Center for Reviews and Dissemination, University of York, UK
- HTAi Vortal. All kinds of information on health technology assessments provided by The International Society for Health Technology Assessment at http://www.htai.-org/index.php?id=229/chapter10]

Useful links to databases' instructions

United States. National Library of Medicine. National Institutes of Health, NLM Training Manuals and Resources at www.nlm.nih.gov/pubs/web_based.html.

United States. National Library of Medicine, PubMed Tutorials at www.nlm.nih.gov/bsd/disted/-pubmed.html

National Center for Biotechnology Information (US) PubMed Help, www.ncbi.nlm.nih.gov/books-helf/br.fcgi?book=helppubmed&part=pubmedhelp#pubmedhelp.PubMed_Quick_Start.

Elsevier B.V. (2009) Embase ® Biomedical Answers — Embase Online Help, http://info.embase.-com/helpfiles/

Australasian Cochrane Centre (2008), The Guide, www.cochrane.org.au/libraryguide/guide.php.

The Cochrane Library. The Cochrane Library on Wiley InterScience: User Guide, ver. 2.2, www.thecochranelibrary.com/SpringboardWebApp/userfiles/ccoch/file/userguide_english.pdf

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Countway Library of Medicine (US) Expert Searching in PubMed.. Reference and Education Services at www.countway.harvard.edu/reference/courseware/PubMedTips.pdf

University of Alberta Libraries (Canada) Cochrane Library: Quick-Start Guide at www.library.-ualberta.ca/subject/healthsciences/cochranelib/index.cfm

NHS (UK) An introduction to the Cochrane Library (Wiley version) at www.eclaksa.nhs.uk/Up-loads/45/Intro%20to%20Cochrane%20Library-Wiley%202006.doc

Yale University (USA) Find it fast! Harley Cushing/John Hay Whitney Medical Library at www.med.yale.edu/library/education/guides/feature/finditfast

Univeritetet i Bergen (Norway) Search and Write at www.sokogskriv.no/english

NTNU, Universitsbiblioteket i Trondheim (Norway) VIKO. Your guide to information literacy at www.ntnu.no/viko/en/

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Pai, M. et al. (2004) Systematic reviews and meta-analyses: An illustrated, step-by-step guide. The National Medical Journal of India [serial online], 17(2), 90.

Sackett, D.L., Rosenberg, W.M., Gray, J.A. et al. (1996) Evidence based medicine: What it is and what it isn't, BMJ [serial online], (312), 71.

Wilkins, T., Gilles, R.A. and Davis, K. (2005) EMBASE versus MEDLINE for family medicine searches: can MEDLINE searches find the forest or a tree? Canadian Family Physician [online serial], June, 849.

Suggested exercises

Exercise 1. You were asked by the Pharmacology Department of your university to give an instruction class for pharmacists and pharmacologists. Make a comprehensive list of databases for presentation and discussion in your class.

Exercise 2. Imagine another scenario. You are asked to prepare a class instruction for local public health managers, the health policy and decision makers (i.e. hospital administrators, public health department officers and public health researchers) about available resources, including databases. Make a comprehensive list of databases geared to this particular healthcare professional group.

Teaching tips and recommended methods

When designing the class course or lecture on biomedical databases for groups of library users, these key steps need to be considered:

1. Database content
2. Database Scope/Coverage
3. Database structure
   - What is in a record?
   - How much information is/can be included in a database record?
   - Which fields are searchable?
4. Indexing: thesaurus construction and controlled terminology.
   - The depth and breadth of indexing:
     - specificity refers to detail or precision of the indexing process
     - exhaustivity indicates the completeness of indexing or its breadth
5. Building a search query:
   - Formulate a search question: identify main concepts, translate them into the database's term.,

- Relate the search terms (i.e., Boolean operators, truncations, parentheses, etc.),
- Restate searchable terms using the vocabulary of selected database(s) (i.e. control vocabulary, natural language searches),
- Based on the results, users may return to earlier stages and modify the search strategy.

6. Managing the search results.

7. Hands-on exercises.

Additional readings and links to educational materials

Association of College & Research Libraries. Standards & Guidelines: Guidelines for Instruction Programs in Academic Libraries'. http://www.ala.org/ala/mgrps/divs/acrl/standards/guidelines-instruction.cfm

A good source with a clear outline of steps that should be undertaken when planning instructional programs at an academic library.

The Board of Regents of the University System of Georgia, A Primer on Databases and Catalogs (Unit 4), www.usg.edu/galileo/skills/unit04/

This web page provides information about the structure, content and searching tools and facilities of databases to better understand the fundamentals about database searching. A Primer on Databases and Catalogs (Unit 4) consists of 16 chapters such as Types of Databases, Natural Language Search, and Proximity Operators, Browsing a Thesaurus or Index and many others.

Hersh, W. (2009) Information retrieval: a health and biomedical perspective, 3rd edn, Springer Science +Business Media, LLC.

The updated edition of William Hersh's book provides a valuable description of the theory and context of information retrieval in health and biomedicine. Chapter 4, on Content, provides an introduction to bibliographic databases and describes Medline as well as other health and medicine-related databases and their searching features.

Hunt, D.L., Jaeschke, R. and McKibbon, K.A. (2000) User's guide to the medical literature. XXI. Using electronic health information resources in evidence-based practice, JAMA [serial online], 283(14), 1875–1879.

This paper starts with the scenario of a general internist reviewing the condition of a 55-year-old woman with type 2 diabetes mellitus and hypertension. In order to answer specific clinical questions the authors resolve the scenario by demonstrating the most efficient research steps, such as formulation of the clinical question; matching the question to the best medical information resource; using prefiltered Evidence-Based medicine resources; and finding answers to more general questions using textbooks and the Internet.

Jankowski, T.A. (2008) Essential guide to becoming an expert searcher: Proven techniques, strategies, and tips for finding health information, Neal-Schuman Publishers, Inc.

This guide gives an overview of key elements regarding database searching processes.

CHAPTER 2.3.

Search engines, websites and web portals

Ireneusz Korfel

Once...

A pharmacist, the owner of a drug store chain, was faced with a new problem. He had been running his business for a long time with great success. His drug stores were gaining popularity and the sale of health supplements was significantly on the rise. But more and more frequently his personnel — the pharmacists, reported to him that there was a problem with the reliability of information provided by pharmaceutical companies on the warning labels attached to the products. In order to verify the information in the warnings they turned to Google, but these searches were time consuming and usually disappointing. The pharmacists often had doubts about the credibility of the information provided on the web pages found in Google. After hearing his employees' complaints, he recalled that as a student he had attended a course on database and medical information searching which was offered by the university medical library. He had enjoyed the class and found it very helpful. Wouldn't this type of training in searching be helpful for my employees, he thought, so he called the medical library to find out if a specialised training in searching for pharmacists was possible, with special focus on the reliability of web open access resources.

Introduction:

Over the past few years, there has been a huge increase in the number of information resources on the Internet. Internet resources include thousands of specialist medical and health related web pages, services, directories and open access databases. The Internet can be compared to a large library, which includes both great scientific and professional books and popular entertainment literature. Health librarians who teach information users should be able to guide them and teach how to make good use of this virtual library. To do so they should have relevant up to date knowledge of available tools and skills needed for effective searching of the WWW resources. This chapter presents both general and scientific search engines used for looking for scientific and general information on the net, major portals and directories, and helpful tools in accessing the invisible internet.

2.3.1. General issues

Internet resources contain several billion web pages with information on any subject, including a broad spectrum of sites, from the very general to the very specific, in every field of medicine and health. Though there is no doubt that the Internet is an extremely valuable, comprehensive source of medical and health related information, problems arise with finding specific information efficiently and effectively. Both the volume and diversity of the information make finding information of particular interest similar to finding, the proverbial, “needle in a haystack.” To enable users to find the materials they are looking for, numerous tools have been created. One of the most commonly used tools are search engines.

Search engines came into existence along with the creation of the World Wide Web. The first tools of this type include WebCrawler and Yahoo, originated in 1994, which initially took the form of a simple directory. Later, other engines were created, such as: Altavista, Excite, HotBot, Infoseek. Some of them are still in use today, some have evolved into informational sites and services. In 1998, Google launched its search engine, which quickly gained immense popularity (Giustini, 2005).

With the growth of the Internet, it soon became necessary to organize information so it could be found more easily. In the early stage of the development of the Internet, a solution to this problem was a subject directory, such as Yahoo, which grouped websites by subject. These simple online directories, however, quickly became inadequate, and were expanded and became subject guides to online resources, organized by thematic categories and sometimes selected using quality criteria. Such guides are called “internet gateways” or “subject gateways” or portals.

2.3.2. Portals and other medical websites

A portal is space on the Internet that allows users to access information held in one place, searching for documents and mutual cooperation (The New Book of Knowledge. Dictionary, 2000, 21). Portals can be divided into those that are general — covering a wide range of subjects (e.g. MSN, http://www.msn.com/), and specialized — covering one specific subject. (e.g. Medscape, http://www.medscape.com/). Specialized portals are often created by members of a particular organization.

In addition to the standard feature of a web search, portals often offer other features such as: electronic mail, news, stock quotes, information, databases, periodicals. Organizations which own the portals, have an opportunity to create a consistent appearance of the whole site and the possibility of supervising access to multiple applications and interfaces, and databases that would otherwise be available on the Internet independently.

Medical portals provide communities associated with medicine and health access to information from a web browser, using Web-based technology and creating the so-called Access Gateway. Medical Portals are usually vertical portals (in certain domain), usually intended for a given group of recipients: nurses, physicians, patients. These portals facilitate, for example, patients' access to doctors, hospital administration, residents, nurses, insurers or other health services.

A teaching librarian has to make an effort to learn in detail what is the particular portal's scope and what they offer, and also to find other portals and match them to a particular group of library course participants (Lundberg et al., 2003).

NLM Gateway

NLM Gateway (http://gateway.nlm.nih.gov/) is the largest medical portal on the Internet, available free of charge. It is created by the National Library of Medicine (NLM) belonging to the National Institutes of Health , USA. It provides catalogs, bibliographic databases and other factual sources. NLM Gateway is not limited to the core medical fields, but also covers the literature and other resources in the area of genetics, toxicology, public health, etc. These sources may be complementary to searching big medical databases, like Medline, to which NLM Gateway gives access. At NLM Gateway all resources can be searched simultaneously by meta-search engine. It is also possible to enter each of the databases and do an advanced search (which is not possible when you use meta search engines). The portal has a very user-friendly interface. For the selection of keywords that are needed for precise searching, a helpful tool might be "Term Finder" which enables the use of MeSH controlled vocabulary. Portal resources are organized in three categories: Bibliographic Resources, Consumer Health Resources, and Other Information Resource (Kingsland et al., 2004). (See also Fig.1)

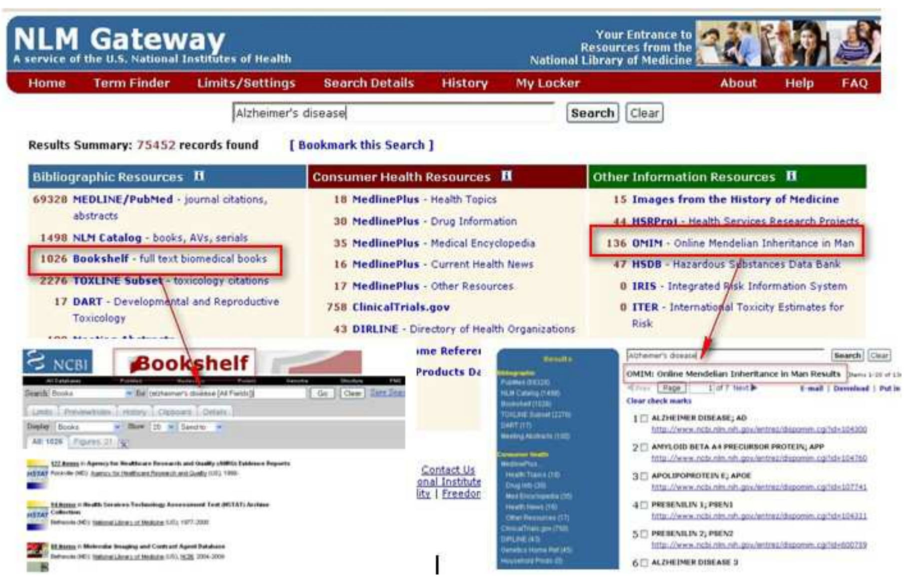

Figure 1: NLM Gateway

NLM Gateway currently provides 24 collections:

- 6 Literature Databases — including: PubMed, Meeting Abstracts, NLM Catalog, Bookshelf
- 9 Consumer Health Resources — including: MedlinePlus, Genetics Home Reference, and Household Products Database
  9 Other NLM Resources — including: Research and Toxicology databases, Images from the History of Medicine and Profiles in Science
- Particular attention should be given to two databases: TOXLINE (a database on toxicology and hazardous substances) and OMIM (a database of genetically determined diseases). These databases contain literature which is not available in other sources, such as Medline or Embase, and constitute a good supplement.

Examples of other national portals, which can also be used internationally, are:

The Norwegian Electronic Health Library (Helsebiblioteket.no), established 2006, is a publicly funded electronic knowledge service that provides Norwegian health workers with access to updated professional information and clinical decision tools (Nylenna et al.2010). This is done by: providing free access to clinical point-of-care tools, electronic journals and databases through national subscriptions; translating systematically reviewed research and making it accessible to Norwegian readers; collecting web resources; news articles. The Norwegian Electronic Health Library provides access to new research, advice and guidelines from national authorities, as well as guidelines, advice, and procedures developed by renowned professional institutions. The library includes also topic libraries for drugs, mental health, poisoning, quality assurance and public health.

The NHS Evidence Health Information Resources website (formerly the National Library for Health) www.library.nhs.uk. provides free access to clinical and non-clinical information — local, regional, national and international. Information includes evidence, guidance and Government policy. NHS staff can also get free access to paid for journals. Health librarians have area designated for them in this portal http://www.library.nhs.uk/forlibrarians

There are many other popular medical portals among them:

Medscape (http://www.medscape.com/) for physicians and other health professionals. It features peer-reviewed original medical journal articles, CME (Continuing Medical Education), a customized version of the National Library of Medicine's Medline database, daily medical news, major conference coverage, and drug information amongst others

BioMedCentral (http://www.biomedcentral.com/) views open access to research as essential in order to ensure the rapid and efficient communication of research findings. BioMed Central's portfolio of 206 journals includes general titles *BMC Biology* and *BMC Medicine* alongside specialist journals (*e.g. BMC Bioinformatics*, Malaria Journal) that focus on particular disciplines. All the research published by BioMed Central's journals is open access, but BioMed Central also provides access to various additional products and services that require a subscription.

HardinMD (http://www.lib.uiowa.edu/hardin/md/ Hardin MD was first launched in 1996, as a source to find the best lists, or directories, of information in health and medicine. The site contains also a large medical picture gallery with free-to-copy-pictures

WebMD (http://www.webmd.com /) WebMD provides health information and tools for managing personal health to patients and clients of health care system, presented in easy to comprehend way.

There are also many subject portals. Their content is restricted to one, although sometimes broad area of knowledge. An example of such portal is HTAi Vortal — a searchable repository of links and resources in the field of Health Technology Assessment http://www.htai.org/index.php?id=577. More information about medical and related portals can be found in the Chapter 2.4.2.

2.3.3. Scientific search engines

Scientific search engines are another type of valuable tools for the acquisition of scientific information. In contrast to standard Internet search engines, Scientific search engines ignore websites that are not scientific, and on request can search for information only from the realm of medicine and related sciences. They index primarily online journals, databases, e-books, library catalogs, conference materials, including "grey literature." Through agreements with publishers they also have access to information about the content of paid magazines and websites, but in this case only bibliographic descriptions and abstracts of the texts can be viewed. However, this is valuable information for a user who wants to locate a given publication. Particularly noteworthy are two tools: Google Scholar and Scirus.

Note: Teaching librarians should make their students aware of the fact that health libraries subscribe to databases and that is the reason why the access to paid resources is available only in a given location (usually only in a given university or library network).

Google Scholar

Google Scholar (http://scholar.google.com/) — was founded in 2004 and is currently the most popular scientific search engine. It makes finding scientific texts easier. One can search various types of information from any discipline: peer-reviewed articles, academic papers, books, writings submitted for publication, abstracts, but also repositories, universities and other academic organizations.

Google Scholar also finds the literature that is indexed in Medline, automatically shows how many times the publication has been cited and gives links to related articles. The advanced search function has a filter to narrow down the search to a specific field, such as Medicine, Pharmacology, and Veterinary Science. According to the search string and previous request, the most relevant results are displayed on the first page. In the advanced search form it is possible to define an additional search by author, title, publication year (Jacso, 2008).

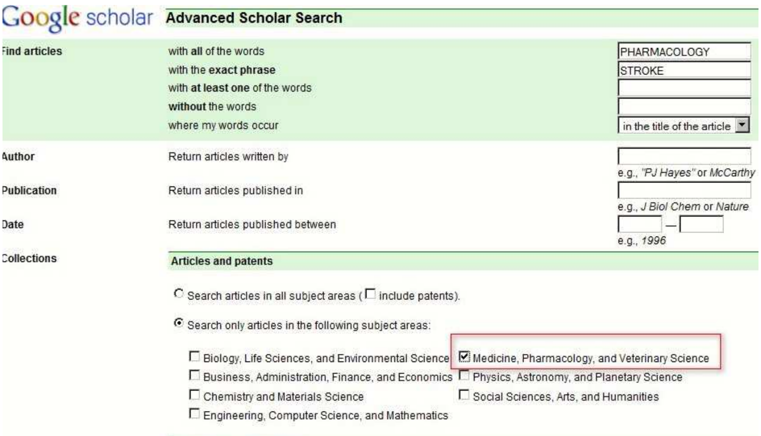

Figure 2: Google Scholar advanced search

It is important to know that Google Scholar does not index all scientific literature, but only those published by certain scientific publishers. In 2010 it was 29 publishers, including BioMed Central, Blackwell Publishing, BMJ, Nature Cambridge UP, Oxford UP, Springer-Verlag, Taylor & Francis, Wiley, Kluwer. Useful information for teaching librarians is, that from the year 2007 Elseviers ScienceDirect (one of the leading world scientific publishers) can be searched by Google Scholar.

Unfortunately, one cannot find exact information about which publishers Google Scholar indexes or how it is updated. There are also large discrepancies in the resources and range of indexed materials, particularly those from recent years. For example: in 2009, PubMed indexed about 700,000 of all the records in its database. By contrast, the Google Scholar has only about 100,000 records from the PubMed database (from 2009). The same is true of the resources from publishers of scientific journals (e.g. Nature, Wiley), GS finds only part of them.

Another disadvantage is that Google Scholar does not use any controlled vocabulary (e.g. MeSH), which would allow for a precise topic search. Other scientific search engines, discussed here, also lack this feature (Giustini & Barksy, 2005).

However, Google Scholar offers various additional useful functions. The following are especially useful:

- Library Links (http://scholar.google.com/intl/en/scholar/librarylinks.html). The user can find out whether a given article is available in the online form at a selected library. This service can be activated by completing the appropriate registration form. The detailed instructions can be found on the following webpage: http://scholar.google.com/intl/en/scholar/librarylinks.html
  In Google Scholar it is also possible to connect commercial linking tools, link resolver (e.g. 360 Link Serials Solutions). This tool allows the user to see if it is possible to access the full-text articles from the level of the search engine
- The ability of exporting obtained results to the popular bibliographic management software (EndNote, RefWorks, ProCite)

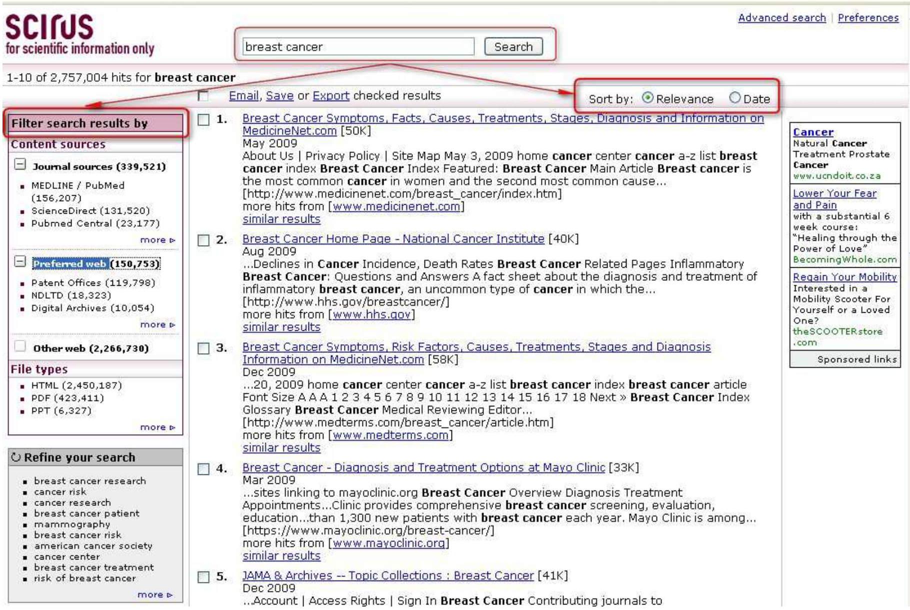

Figure 3: Scirus search screen

Scirus

The Scirus search engine (http://www.scirus.com/) was founded in 2001 by Elsevier. Like Google Scholar, it searches mostly research databases and articles from scientific journals. It indexes approximately 470 million websites containing scientific, technical and medical information, the latest scientific reports, reviews, patents, reprints, repositories and journals, including those which are often overlooked by other search engines (Greg, 2005).

Scirus finds articles from databases and journals such as Medline, Pubmed Central, Beilstein, Neuroscion, Biomed Central, Nature, and Royal Society Publishing. It also searches Elsevier's electronic journals on the ScienceDirect platform (though access to the full text is limited). At the selection stage, it eliminates sources that do not contain scientific information, preferring sites with addresses: edu, gov, org. The complete list of indexed resources can be found at: http://www.scirus.com/srsapp/aboutus/

Scirus has a very detailed advanced search tool. (http://www.scirus.com/srsapp/-advanced/index.jsp?q1=), which allows you to define your search question very precisely (search by author, title of work, the source or type of documents). It then presents the results in a transparent manner, grouping them into appropriate categories.

For example, typing in the keyword: "breast cancer", the user gets information about the topic grouped into specific categories: Journals Sources, Prefered, Web, File Types. The tool also suggests, through the Refine Your Search, other keywords. This combination gives the possibility of additionally filtering search results. Elsevier often attach Scirus to the commercial databases (e.g. Embase) as an additional tool for searching. The value of Scirus is demonstrated by the fact that it was awarded several times by institutions which evaluate and rank search engines (Search Engine Watch Awards and Best Speciality Search Engine).

Tools like Google Scholar and Scirus should be used for the initial, fast search for information on a given subject, or complementing the results of the search in databases with the main aim of finding "grey literature". You can also use them as way of finding information about how to access the full text of articles offered for commercial and free publications. But these search engines cannot replace the bibliographic databases such as PubMed and Embase (Notess, 2005).

There are other tools of this type. But they are not as relevant in the search for medical and health related information, e.g.:

- CiteSeer ResearchIndex (http://citeseer.ist.psu.edu)
- WorldWideScience.org (http://www.worldwidescience.org/)
- Science.org (http://www.science.org/)
- SearchEdu.com (http://www.searchedu.com/)

2.3.4. Popular Internet search engines and directories

Scientific search engines narrow down the search to scientific sources. But often general search engines, when consciously and skilfully used, can also be of assistance. Currently, there are hundreds of search engines on the Web, both general and specialized. Each of them has different search algorithms and thus provide different results. Therefore, to make the search more complete two or more tools of this type should be used. Before begin using these tools, we should have a good understanding of their functions and search mechanisms. Their description can be found in their "Help" icons. Presented below is a list of the best/most popular search engines.

Google (http://www.google.com/)

Without any doubt the largest and most popular search engine right now. According to ComScore Inc. (http://www.comscore.com) and Compete (http://compete.com), approximately 75% of Internet users employ this search engine. For many users, the use of Google services has become the sole determinant of the use of network resources. Many also believe that the search engine indexes all of the content which can be found on the web. Its high popularity is primarily due to the vast database of indexed web pages, giving easy access to billions of websites. Google also has a simple, intuitive interface in many languages, and provides many options to help you define precisely what you are looking for.

To achieve high efficiency of the Google system a unique solution has been created, called PageRank™, determining the ranking of search results. With this mechanism, documents are placed in order of importance according to the number of times the given documents have been referred to (which has the most links) at other sites. However, it is important to remember that as of the past several years creators/developers of websites and web services have begun positioning web pages (SEO — Search Engine Positioning) to achieve top spots (positions) in search engines, which has a direct impact on their popularity. Sometimes, these undertakings are carried out in contravention of the accepted rules (known as Black Hat SEO) and may adversely affect the search results. Therefore, when viewing our search results, we should also take into account the items displayed in the remainder of the list of results.

Google has pioneered the search for not only Web pages, but also documents in PDF, Word, Excel, or presentations made in PowerPoint. It is especially worth noting the set of special instructions (directives), which give the possibility of additionally narrowing down the search. A detailed description can be found at: http://www.google.com/about.html.

Examples of such directives:

intitle: lung cancer — search words contained only in the title of sites

site: loc.gov stroke — search words on a website of The Library of Congress

heart disease (site: bbc.co.uk OR site: cnn.com) — to view web pages with reports from the BBC or CNN on heart disease

Breast Cancer filetype: pdf — search for words in a specific type of documents — PDF

Instructions and searching guidelines can be fund at: http://www.google.pl/intl/pl/-about.html In addition, one can search certain types of internet resources, such as:

- directory (http://directory.google.com/)
- graphics (http://images.google.com/)
- media files (http://video.google.com/)
- discussion groups (http://groups.google.com/)
- news (http://news.google.com/)
- patents (http://www.google.com/patents)

Google's undertakings go beyond the traditional Web search engine. Google's intention is to organize all the information available in the world and make it universally accessible. It is constantly looking for new technological solutions. Therefore, proposals of new services keep surfacing, such as: Google Chrome, Google Desktop, Picasa, Google Maps. More information can be found at: http://www.google.com/intl/en/options/.

Recently Google has been engaged in Mobile Internet, adapting its services to be used by cell phones (http://www.google.com/mobile/).

The service called Google Books might be of particular interest to teaching librarians and their trainees (http://books.google.com). It gives the possibility of searching for the full texts of books provided by libraries and publishers (Library Project). Depending on the availability of a book, in terms of the copyright law, you can see a preview of the cover page, or even the full text. It is also possible to get reviews and links which direct us to a particular piece of writing. We can also determine where the book can be bought or borrowed. Below is a comparison showing the characteristics of Google, Google Scholar, Scirus compared to PubMed.

	Google	Google Scholar	Scirus	PubMed
What it searches:	Main websites	Websites and scientific journals, databases, patents, U.S. government documents. Undefined chronology	Websites and scientific journals (preferred Tit. ScienceDirect), databases, patents. Provides literature since 1900	MEDLINE database containing peer-reviewed biomedical literature. Indexes publications from 1966 and OLDMEDLINE (1947–65)

	Google	Google Scholar	Scirus	PubMed
How it searches:	Complex algorithm combining "website ranking" and text matching techniques	Searches for text links. When displaying search results, tries to provide the author's assessment, publications and the number of citations	Searching is done using an algorithm to check the statistics on the number of words and links to the page. Search results are sorted by relevance	Finds a link between given date fields (author, title, MeSH) used to describe each item. Does not search the full text of articles
Basic search techniques:	Keywords and the phrases in quotes	Keywords and the ability to use Boolean operators. The possibility of limiting the search to a given field, magazine, author, date	Keywords and the ability to use Boolean operators, search fields. The possibility of restricting the type of document	Keywords and the possibility of using operators (AND, OR, NOT), searching fields and by the terms; MeSH
Search results:	It is not possible to change how items are displayed	Possibility of sorting articles by date and determine the type of publication	A large number of options for sorting results. Suggests additional keywords	Possibility sorting articles by author, publication date or title of the magazine
Controlled by:	The creators of Google control the search algorithm, but cannot affect the web resources	Content is selected by the staff of Google Scholar, who do not reveal the incorporated sources. Some publishers do not allow Google Scholar to search their resources	Created by Elsevier, the additional oversight advisory committee (experts from different fields of science)	PubMed is supervised by experts who regularly browse the data to be included in the database, and then describe it and make sure its well organized
Access to full text articles:	Google search results cannot be linked directly to the resources of the Library	Search Results in Google Scholar can be directly linked with the Library full-text articles. (Library Links)	As in the GS, results are directly attributable to full-text articles from the Library (Library Partner Links)	PubMed search results can be directly linked with the Library full-text articles by clicking on the logo (in purple) UW Article Online
Best used with:	General Web Search, to find the latest scientific reports in medicine	Quick, easy access to the search of scientific information. Allows you to identify the basic work of the field	The initial search of scientific texts. Allows you to search the journals published by ScienceDirect	The most recent and most comprehensive source for biomedical literature search

Fig. 3. A comparison showing the characteristics of Google, Google Scholar, Scirus compared to PubMed taken from: HealthLinks http://healthlinks.washington.edu/howto/-googlechart.html).

Yahoo (http://www.yahoo.com/)

Yahoo — the oldest tool of this kind, was launched in 1994. After Google, it is the second most popular search engine in the world. Yahoo's characteristic product is the thematic directory. It is an integral part of the website, combined with a search engine. This additional feature allows you to browse internet resources by category, such as: Medicine and Health: http://dir.yahoo.com/Health/. The advanced search form enables precise wording, use of Boolean operators, search by fields and search by specific domains (edu, gov, org).

Over the years, Yahoo has refined introducing new technology. Currently, Yahoo allows you to search web pages, graphics, and browse directories and news groups. With the launch of the service called "My Yahoo" (http://my.yahoo.com/) users can personalize the website, choosing one of the nine versions of website graphics, set up their own blocks of content (news, video clips or horoscopes). Europe is also creating versions of Yahoo, e.g. including Yahoo UK and Yahoo Norge (.http://no.yahoo.com/?p=us). In addition, Yahoo offers the following services: e-mail and instant messenger, Internet radio, search engine and web directory, image search and blogs.

Google and Yahoo are the most popular search engines, but a teaching librarian must keep in mind that there are many others similar instruments. The search results may differ depending on which search engine was applied; sometimes other search engines give better results or more of them than Google or Yahoo.

Examples of other popular search engines:

AlltheWeb (http://www.alltheweb.com/) offers the standard search tools: images, news, directory, people, PDF, and MS Word files from around the world. Users can search in 36 different languages. Their advanced search filters are easy to use and return pretty good results.

Bing (http://www.bing.com/) is a new search engine owned by Microsoft Corporation, based on semantic technology. Bing offers several unique features which help to find information more quickly and easily (a special tool, the Decision Engine).

Clusty (http://clusty.com/) is a meta search engine, which sorts results into subject folders. Clusty can be useful in searching for broad topics.

When trying to find information from the past years which is not searchable using the current search engines, one can turn to the archival websites. A very useful tool in finding older websites is the Internet Archive Wayback Machine (at http://www.archive.org/) — web archive service. Its database contains 150 trillion websites, collected since 1996. With the Wayback Machine you can type in the URL address and gain access to the archive of that website. Wayback Machine is also used in various tools to study the popularity of various websites.

Remember that... In searching for specific information concerning a country, it is sometimes useful to use local search engines. In the case of Poland, the search engine worth recommending is NetSprint (http://www.netsprint.pl/).

2.3.5. Semantic Search Engines

None of the popular search engines understand the meaning of the words typed in by the user. Nor can the search engine embed the words into context, or fully interpret the questions formulated in natural language. For years, work has been done to create a new generation of internet services, which would not be subject to such restrictions.

With the development of the Semantic Web (Web Era 3), semantic search engines have been formed along with it. The mechanism of this kind of search is based on an analysis of grammatical and semantic questions. These tools analyze the entered keywords and try to find relationships between the terms.

On the basis of previous searches, they are continuously building a database. In the case of an ordinary search engine by typing the question: "how to treat stomach ulcer", the result will contain the main phrase found in the question based on keywords. By contrast, a semantic search, analyzing the meaning of questions, will try to find the answer, for example „Glutamine supplements show promise in treating stomach ulcers". Research on the tools of this type are still in the experimental stage, but certainly in the future they will replace traditional search engines.

Examples of semantic search engines:

- Hakia (http://www.hakia.com/)
  is a semantic search engine that is focused on quality and elevated user experience. Unique to Hakia, a single query brings a full set of results in all segments including Web, News, Blogs, Hakia Galleries, Credible Sources, Video, and Images.
- GoPubMed (http://www.gopubmed.org/)
  Searches medical resources using the PubMed database.

2.3.6. Internet directories

Unlike search engines that operate automatically, directories are the result of human work or the work done by editors, or Internet users who tidy resources in accordance with accepted principles. They are designed so that it is easy to find information on a specific subject or field (e.g. cardiology). Internet directories have two main features:

- they are selective (pages are selected by content)
- they are categorized (websites are grouped by field)

The thematic scope of directories of this type is limited, and new pages are assigned to specific topics over time. Currently, the differences between a search engine and directory are slowly dissolving and directories are becoming more like search engines (Yahoo, Onet). Using general search engines and directories for scientific and professional use should be limited to a minimum. Those should primarily be used in order to direct you to a specialized website, exclusively devoted to a specific field. As far as specialized websites are concerned, we can be more confident of the completeness of the sources, and be certain that the linked sites have been well selected and checked.

Directories are slowly moving towards becoming Internet junk (unneeded software that your computer picks up when entering websites), and their place is being taken over by thematic services with controlled quality (quality-controlled subject gateways or just subject gateways).

Major general directories:

- DMOZ (http://dmoz.org/)
- Directory Galaxy (http://www.galaxy.com/)

- Directory Google (http://directory.google.com/)
- Directory Yahoo (http://dir.yahoo.com/)

In contrast to the general directories (such as DMOZ or Yahoo), there are websites ordered according to specific classification, which function as internet guides, and their resources are catalogued by librarians and experts in the field. These services are especially useful for those looking for specialized high-quality information. These websites have a hierarchical structure based on classification systems. The most commonly used classifications are: Universal Decimal Classification, Dewey Decimal Classification, Library of Congress Classification (Derfert-Wolf, 2004).

The largest websites registering and cataloguing sources from different fields include:

BUBL LINK (http://bubl.ac.uk/) Directory of Internet sources in all areas of academic knowledge, created by librarians at University of Strathclyde, UK. Can be browsed using Dewey Decimal Classification, types of documents, and countries and can be searched by keyword. In Medical sciences, medicine (DDC 610) users can find many valuable and unique information resources. (Medicine: discussion lists, Directory of Electronic Health Sciences Journals), which cannot be found with the use of popular search engines.

INFOMINE (http://infomine.ucr.edu/) Collection of internet sources (virtual library), focused on academics, created by librarians. It includes databases, electronic journals and books, newsletters, discussion lists, library catalogs, articles, lists of researchers and many others. Possibility to browse directories by subject or search sources by many criteria.

LIBRARIAN'S INDEX TO THE INTERNET (http://www.ipl.org/) This website is considered to be one of the most popular American directories, which collects information in many fields including information science, bibliography science, the biological sciences and the humanities. The website's main mission is to provide access to organized, reliable and valuable electronic resources, selected and reviewed by librarians.

INTUTE (http://www.intute.ac.uk/). This website is maintained by British universities, it gives access to the best, selected and reviewed by specialists, internet resources, intended for science and education. It covers four main areas: science and technology, arts and humanities, social sciences, medicine and science. The database contains approximately 115 thousand records with links to resources from around the world. Each thematic sub-base can be searched individually or together. More about quality controlled web sites in Module 3.

More information on directories and search engines can be found at:

- Search Engine Watch (http://searchenginewatch.com/)
- Search Engine Guide (http://www.searchengineguide.com)
- Search Engine Showdown (http://www.searchengineguide.com/)
- Educator's RefernceDesk (http://www.eduref.org/)

2.3.7. Invisible Web

Even the best search engines and websites are not able to crawl the entire World Wide Web. (Beyond Google, http://library.laguardia.edu/invisibleweb). There is a large part of online resources, which, mainly for various technical reasons (different document formats, databases requiring registration, addresses with dynamically generated web pages), is not searchable by traditional means. These resources are called the Invisible Internet, Invisible Web or Deep Web. The term was first used in 1994 by J. Ellsworth (The Deep Web, http://www.brightplanet.com).

Currently, modern search engines and directories, such as subject gateways, can be partially indexed. However, there is still a significant part of online resources that is not readily available through search engines, though very valuable: databases, scientific reports and publications, dissertations, journals and open access repositories, government documents, archives, source materials and reference, library resources. That is why special websites, which register Invisible Internet resources may be helpful. The most popular ones are:

- CompletePlanet (http://www.completeplanet.com/)
- Incywincy (http://www.incywincy.com/)
- DeepDyve (http://www.deepdyve.com/)

The good news is that over time specialist catalogues and search engines will index more and more of the hidden Internet resources. It is also worth mentioning that library systems, like Agricola, BIBSYS, or Library of Congress deliver bibliographic data to Google, and thereby allow data to be revealed from the Deep Web.

2.3.8. Criteria and tools used in evaluating web sites

Medical and health related websites can be of various quality. That is why a lot of initiatives were undertaken by both academic and commercial institutions to develop the criteria of Internet resources quality monitoring and assessment (Marcinkowski and Właśniak, 2007).

Teaching librarians should be aware of these methods and tools and teach library course participants how to use them. There are two basic evaluation methods:

- Analytical (expert), the most reliable method from the user's point of view. In this method the evaluator browses the site and applies different criteria, assessment tools, checklists, or guidelines to asses its quality.
- Technical (automatic), a method in which webpages analysis tools are applied, e.g. AWStats (http://awstats.sourceforge.net), Alexa (http://www.alexa.com).

Analytical tools

A well known universal tool which can be used for the quality assessment of websites and their content are Five Typical Traditional Evaluation Criteria (Kapoun, 1998).

Another similar set of criteria is eEurope 2002: Quality Criteria for Health related Websites approved by European Committee. Reliable and credible websites, in accordance to the guide, are those that meet the following criteria:

1. Transparency and honesty

   - Transparency of provider of the site — including name, physical address and electronic address of the person or organisation responsible for the site (see Article 5 and 6 Directive 2000/31/EC on Electronic Commerce).Transparency of purpose and objective of the site
   - Target audience clearly defined.
     Further detail on purpose, multiple audience could be defined at different levels
   - Transparency of all sources of funding for site like grants, sponsors, advertisers, non-profit, voluntary assistance

2. Authority

   - Clear statement of sources for all information provided and date of publication of source
   - Name and credentials of all human/institutional providers of information put up on the site, including dates at which credentials were received

3. Privacy and data protection

   - Privacy and data protection policy and system for the processing of personal data, including processing invisible to users, to be clearly defined in accordance with community Data Protection legislation (Directives 95/46/EC and 2002/58/EC)

4. Updating of information

   - Clear and regular updating of the site, with date of up-date clearly displayed for each page and/or item as relevant. Regular checking of relevance of information

5. Accountability

   - Accountability — user feedback, and appropriate oversight responsibility such as a named quality compliance officer for each site
   - Responsible partnering — all efforts should be made to ensure that partnering or linking to other websites is undertaken only with trustworthy individuals and organisations who themselves comply with relevant codes of good practice
   - Editorial policy — clear statement describing what procedure was used for selection of content

6. Accessibility

   - Accessibility — attention to guidelines on physical accessibility as well as general findability, searchability, readability, usability, etc.

One of the most recognized criteria of quality of medical and health related websites was developed by the *Health on the Net Foundation* (HON). The Foundation (http://www.hon.ch) and the Health Improvement Institute (http://www.hii.org/) allow a website publisher to obtain a certificate and place the HONcode icon on his homepage if it follows all eight principles of HON code of conduct.

The HON code of conduct 's principles of a web site are as follows:

1. Authoritative — Indicate the qualifications of the authors.

Figure 4: Example of a web site which carries HON Foundation quality sign.

2. Complementarity — Information should support, not replace, the doctor-patient relationship.
3. Privacy — Respect the privacy and confidentiality of personal data submitted to the site by the visitor.
4. Attribution — Cite the source(s) of published information, date and medical and health pages.
5. Justifiability — Site must back up claims relating to benefits and performance.
6. Transparency — Accessible presentation, accurate email contact.
7. Financial disclosure — Identify funding sources.
8. Advertising policy — Clearly distinguish advertising from editorial content.

HON provides search engine and checker of the certification status. In addition, it allows searching for medical and health information using MeSH. Navigating the HON home-page is available in several languages including Polish (http://www.hon.ch/home1_pl.html) and Norwegian (http://www.hon.ch/HONcode/Norwegian/). Currently the HONcode is used by almost 7,000 certified websites published in 118 countries.

Technical (automatic) methods of assessing websites quality

The other method of websites' evaluation is the ranking method. Medical resources are evaluated based on a number of entries to a webpage. Popularity of a website is thus determined by statistical frequency. Alexa (http://www.alexa.com/) is one of the tools, which rank web site traffic. This powerful tool is widely applied by webmasters for websites' content positioning. Alexa provides a ranking of the most popular web pages by category (e.g. public health), country, and language. Alexa indexes over 4,5 billion web pages. Nevertheless, ranking tools should be considered only as a supplementary for the quality assessment tools, which are of the primary importance.

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Health Improvement Institute, http://www.hii.org/

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Suggestions for exercises

Exercise 1: With the use of Google, find PowerPoint presentations dealing with: Diabetes Ulcer.

Exercise 2: Apply the Google Scholar and Scirus search engines when looking for information about popular methods of losing weight, and compare the results.

Exercise 3: Search some selected global directories (DMOZ) for the literature on the quality of life after a heart attack. Compare results.

Exercise 4: Find appropriate subject gateways for looking for information about "breast cancer.

Exercise 5: Find Information about: "human papilloma virus" (hpv) using metasearch in NLM Gateway. Do such a search for "schizophrenia Phenotype". (use other concepts or terms). Then repeat the same searches in the database "OMIM". Compare results.

Exercise 6: Search the NLM Gateway (metasearch) for Asbestos AND "Cancer Risk". Then conduct the same search in the database "TOXNET". Compare results.
Exercise 7: Perform a search using Hardin MD concerning " breast cancer" and tamoxifen. Find pictures of glaucoma using Hardin MD
Exercise 8: Search for information about Lung cancer in Subject Gateway BUBL Link (http://bubl.ac.uk)
Exercise 9: Search the website WebMD.com for health information for patients in regard to (for example: Schizophrenia Symptoms).
Exercise 10: Search the INTUTE Virtual Training Suite for educational materials dealing with medical information retrieval.
Exercise 11: Evaluate reliability of the following websites dedicated to: (Use a grading scale 1–3)

Doctors or medical specialists

— http://www.rarediseases.org/

— http://www.cancer.gov/

— http://www.ehow.com/how_2175188_pick-family-doctor.html

Students

— http://www.medicalstudent.com/

— http://www.medstudent.ucla.edu/

— http://medicine.com.my/wp/?page_id=19

Patients or public service

— http://www.psqh.com/

— http://www.nlm.nih.gov/medlineplus/

— http://www.vilcacora.co.uk/

Exercise 12: Search for websites and services that have the HON CODE medical certificate. In order to locate the certified medical websites use the HONcode site browser (http://services.hon.ch/cgi-bin/HONcode/browse.pl).
Exercise 13: Use Alexa (http://www.alexa.com/) to assess quality of chosen medical/health websites or services.

Teaching tips and recommended methods

- During classes concerning Internet information retrieval, the differences between popular and scientific search engines should be emphasized. Some examples of the usage of both search engines should be presented.
- The teaching librarian should regularly browse some previously selected services and rankings of the best information search tools (see also paragraph: 2.3.6).
- The Subject Gateway and The Invisible Web have been created as directories so they should be successively browsed with special attention paid to a certain discipline. The teaching librarian should create an address database which could be used during the practical classes. There are special addresses management tools which can be used (e.g. http://www.connotea.org/).
- The teaching librarian should indicate not only the positives but also negatives of the Internet resources. The web information often is ephemeral and quickly becomes outdated.

- During classes, evaluation of web resources should be demonstrated best on pre-selected web sites of good and bad quality, by comparison.
- Invisible Web directories mostly contain databases and other general sources of information. It is better to look for the broad subject rather than a narrow topic. Many of the Deep Web directories are also searchable by subject areas or keywords. Using any search engine, enter your keyword plus database to find any searchable databases (for example, canavan disease "+database").

Additional readings and links to teaching materials

Baylin, E., Gill, J. (2005) Effective Internet Search: E-Searching Made Easy, Baylin Inc.,
[This book discusses essential issues concerning effective searching on the net].

Choose the Best Search for Your Information Need, Noodle Tools, Inc, http://www.microsoft.com/-athome/moredone/searchenginetips.mspx
[Practical tips for effective web searching].

Evaluation Toolkit. Health Information Resources, http://www.library.nhs.uk/forlibrarians/toolkits/-evaluation
[Evaluating web pages: Tutorial from National Library for Health].

Finding Information on the Internet, UC Berkeley Library, http://www.lib.berkeley.edu/Teaching-Lib/Guides/Internet/About.html
[Useful website containing basic information about using Internet resources: search strategy, websites searching and website assessment].

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NLM Training Manuals and Resources, http://www.nlm.nih.gov/pubs/web_based.html
[A practical guide to The National Library of Medicine: NLM Gateway, PubMed, et al].

VIKO: veien til informasjonskompetanse [Online]. Universitetsbiblioteket i Tronheim, NTNU. Available: http://www.ntnu.no/viko/ [Accessed 23.09 2010]

[This is an information competency tutorial from The Norwegian University of Science and Technology. It has good pages about search engines, and also about evaluating web pages].

CHAPTER 2.4.

Keeping up to date with the medical knowledge

Małgorzata Sieradzka-Fleituch

Once...

A university clinic, where transplantations were performed, housed a library. The medical doctors of this clinic frequently faced atypical or rare problems so they were regular guests in the library and habitual users of the databases. The library was well stocked with current titles and databases, but the doctors were in constant search of the latest resources. Some of them took part in courses organized to introduce a newly purchased or updated and improved database and the teaching librarians noticed that the doctors expected the teaching to be based on examples closely connected with their specialties. The librarians did not feel very knowledgeable about transplantations. The deadlock was resolved by one of the librarians who came up with an idea to create a RSS feed for Transplantation Reviews. The librarians do not read all of the articles, but browse through them to select useful information for their teaching needs. Now the librarians are more self-confident and the doctors more satisfied with their contacts.

Introduction

Medical librarians usually do not have medical or any other scientific background so they often feel lost and confused surrounded by highly specialist resources and demanding users. However, it seems almost impossible to teach effectively the usage of medical or health-related databases without an idea about their content. The days when popular medical knowledge was sufficient are passing away. The 'teaching librarian' is in an unenviable position: users ask difficult questions employing incomprehensible terms and demand help in retrieval of very detailed and specific information. When the librarian does not understand what student says, he or she becomes even more uncertain and shy. Communication with the users becomes more difficult and teaching less effective.

It is possible for a person to educate himself without help or support from others. Nobody becomes a specialist from one day to the next, but systematic, unassisted exploration of medical knowledge will surely allow the teaching librarian to overcome obstacles and become a perfect, self-confident, communicative guide in the bewildering world of medical information. Self-educated people are not dependent on others for knowledge. If they need a specialized skill, they know how to acquire it.

Medical librarians who teach are especially required to keep up to date with medical knowledge. This problem consists of two sub-problems: how to supplement the basic knowledge and how to stay up to date with basic precepts, theories, methodologies, and topics within medicine and health. When supplementing the basic knowledge, it is usually sufficient to read some paragraphs from a properly chosen, (that most often means newly updated) textbook, online or printed, or look through an encyclopaedia (e.g. Britannica [http://www.britannica.com/]) or lexicon. Wikipedia [http://en.wikipedia.org] can be of help in finding quick information, but one should always keep in mind that the articles are written collaboratively by volunteers, so Wikipedia is prone to inaccuracies, vandalism, and may contain spurious or unverified information.

Staying up to date with the ever expanding avalanche of medical literature needs regularity and can be realized in various ways. There is such a deluge of medical information that it is very easy to get confused. Modern computer techniques are of help in searching and selecting the best personalized information. It is recommended to find one's own way using the journals listed below, other Internet resources, and different methods of obtaining medical information.

Teaching librarians can use these tips in more than one way: to educate the trainees about the tools that can be used to stay up to date in any field of medicine or health, but, first of all, this chapter is intended to give the teaching librarians some instructions on how to perform medical self education.

As Sir Walter Scott said: "All men who have turned out worth anything have had the chief hand in their own education." (Letter to L.G. Lockhart, 1830)

2.4.1. Most popular medical journals online

Regular perusal of specialist journals is an obvious way of keeping up to date for both medical professionals and teaching librarians, although for librarians it will be enough to browse through the journals' content. Self-discipline is required to read or browse journals regularly, therefore, the creation of a journal club may be helpful. A journal club is a group of individuals who meet systematically to critically evaluate recent scientific articles in particular. Journal clubs are usually organized around a defined subject and they gather clinicians or other scientists. This kind of a club can also be formed by librarians meeting personally or online to discuss what they have read or how to deal with difficult, highly specialist queries. Journal clubs help improve the members' skills of understanding and debating current topics of active interest in their field.

According to various sources [EMBASE http://www.info.embase.com/, Medline http://-www.nlm.nih.gov/pubs/factsheets/medline.html], there are 5,000 to 7,000 active, peer-reviewed biomedical and health-related journals published all over the world, but the total number of journals can even reach 15,000 [Manske, 2009]. In the face of such a flood of information, a kind of guidance or assistance is necessary. Several medical web pages offer lists of core journals in medicine or in a narrower health-related discipline. For instance, Medscape identified 269 of the "best" medical journals [Medscape core medical journals http://www.medscape.com/viewarticle/457683?mpid=15261], and PubMed developed a list of 119 journals known as Abridged Index Medicus (AIM) [http://www.nlm.nih.gov/bsd/aim.html]. The selection criteria combine commercial readership data with scientific and bibliometric quality indicators.

Among these selected journals, a special place belongs to the so-called “Big Five”—JAMA, Lancet, BMJ, Annals of Internal Medicine, and NEJM. These are the world’s most widely read and most influential journals dealing with general medicine. A good habit is to browse or read the journals of choice on the day they are published online, for example, NEJM and JAMA on Wednesdays and BMJ on Fridays.

Journal of the American Medical Association (JAMA) [http://jama.ama-assn.org/] — an international peer-reviewed general medical journal, published 48 times per year in multiple international editions and languages. It is the most widely circulated medical journal in the world. JAMA publishes original research, reviews, commentaries, editorials, essays, medical news, correspondence, and ancillary content.

The Lancet [http://www.thelancet.com/] — a peer-reviewed general medical journal, published weekly. One of the world’s best-known and most respected general medical journals. It publishes original research articles, review articles (”seminars” and ”reviews”), editorials, book reviews, correspondences, amidst other regulars such as news features and case reports. The Lancet is considered to be one of the ”core” general medical journals

British Medical Journal (BMJ) [http://www.bmj.com/] — a partially open access medical journal. It is among the most influential and widely read peer-reviewed general academic journals in the field of medicine in the world. BMJ is an advocate of evidence-based medicine. It publishes original research as well as clinical reviews, news, editorial perspectives, personal views, and career focus articles.

Annals of Internal Medicine [http://www.annals.org/] — publishes research articles and reviews in the area of internal medicine.

New England Journal of Medicine (NEJM) [http://content.nejm.org/] — peer-reviewed medical journal featuring current medical research information, reviews, and articles for biomedical science, internal medicine, and clinical practice. The most widely read, cited, and influential general medical periodical in the world. It publishes editorials, papers on original research, widely-cited review articles, correspondences, case reports, and has a special section called ”Images in Clinical Medicine”.

Besides the general medicine journals, it is recommended to browse or read regularly one or more subspecialty journals in the field of interest.

A convenient way of gaining access to free medical full-text journals is the webpage Free Medical Journals [http://www.freemedicaljournals.com]. For journals, books and podcasts see also the Medical Literature Guide Amedeo [http://www.amedeo.com/], which offers weekly e-mails with bibliographic lists of new scientific publications, personal Web pages for one-time downloads of available abstracts, and an overview of the medical literature published in relevant journals over the past 12 to 24 months. This service has been created to serve the needs of healthcare professionals, including physicians, nurses, pharmacists, administrators, other members of the health professions, and patients.

2.4.2. Useful medical web pages

There are plenty of websites that offer medical or health-related information. In order to find those that are most useful, it may be a good idea to look at rankings of the websites. Websites are evaluated using various criteria and scoring systems. Usually **National Library of Medicine — National Institutes of Health** [http://www.nlm.nih.gov] with **PubMed Central** [http://www.pubmedcentral.nih.gov] and the websites of the most prestigious journals are among leaders of various rankings. Below there are some examples of reliable web pages that provide general medical information.

NHS Evidence Health Information Resources (formerly the National Library for Health) [http://www.library.nhs.uk] provides access to all the electronic NHS resources and to a number of additional resources (evidence based reviews, databases, images, drugs, for patients, tutorials) with emphasis on European sources. Some of the content is free.

BioMedCentral [http://www.biomedcentral.com/] views open access to research as essential in order to ensure the rapid and efficient communication of research findings. BioMed Central's portfolio of 206 journals includes general titles *BMC Biology* and *BMC Medicine* alongside specialist journals that focus on particular disciplines. All the research published by BioMed Central's journals is open access, but BioMed Central also provides access to various additional products and services that require a subscription.

WebMD [http://www.webmd.com/] — public Internet site, which has information regarding health and health care, including a symptom checklist, pharmacy information, news, chat forums, health quizzes, consumer product updates, blogs of physicians with specific topics, and a place to store personal medical information. It is reviewed by a medical review board consisting of four physicians to ensure accuracy. Health resources for consumers, physicians, nurses, and educators.

Medscape [http://www.medscape.com/] — a web resource for physicians and other health professionals. It features peer-reviewed original medical journal articles, Continuing Medical Education materials, a customized version of the National Library of Medicine's Medline database, daily medical news, major conference coverage, and drug information - including a drug database (Medscape Drug Reference, or MDR) and drug interaction checker. The problem of overwhelming the user with information was solved by:

- Collecting clinically-relevant medical literature from multiple medical publishers
- Filtering the literature from a "who should see this" perspective, as opposed to the print "what can we fit in this issue" perspective
- Publishing the literature online in an easy-to-print, easy-to-read, everyone-can-access-it format
- Making it freely available to everyone

MayoClinic.com [www.mayoclinic.com] — medical information and tools for healthy living. Provides information and services from the world's first and largest integrated, non-profit group of medical practice. The information and tools offered reflect the expertise of Mayo's 3,400 physicians and scientists.

2.4.3. Sources of popular science

Popular science is interpretation of science intended for a general audience thus creating a bridge between scientific literature and popular discourse. The goal of the genre is often to capture the methods and accuracy of science, while making the language more accessible.

Popular science attempts to inform and convince scientific outsiders (along with scientists in other fields) of the significance of data and conclusions, so it may serve as a perfect source of knowledge for a teaching librarian. All life-long learners can benefit from browsing selected sources of popular science on a regular basis. It is also recommended for teaching librarians as an educative reading.

Ask A Biologist [http://askabiologist.asu.edu/] — a pre-kindergarten through high school program dedicated to answering questions from readers. This science outreach program originates from Arizona State University's School of Life Sciences. It connects general readers with working scientists through a question and answer Web e-mail form. The Web site also includes a large collection of free content and activities. This source can be very useful for teaching librarians who sometimes need authoritative answers to scientific questions which cannot be easily found in literature; here they are provided with individual expert consultation.

BBC Focus [http://www.bbcfocusmagazine.com] — a British monthly magazine about science and technology. It covers all aspects of science and technology and is written for general readers as well as people with knowledge of science. It contains articles from the field of life sciences, genetics, but not strictly medical.

Discover [http://discovermagazine.com] — a science magazine that publishes articles about science for a general audience intended to be somewhat easier to read than Scientific American, but more detailed and science-oriented than magazines like Popular Science. It contains, among others, sections Health & Medicine, Mind & Brain, Human Origins, Living World, and Environment.

New Scientist [http://www.newscientist.com] — is a weekly international science magazine and website covering recent developments in science and technology for a general audience. It often features speculative articles, ranging from the technical to the philosophical. It is read by both scientists and non-scientists, as a way of keeping track of developments outside their own fields of study or areas of interest. Daily news articles are available on their official website as well as extracts from longer articles, with a subscription service required to view full content. Much up-to date medical information.

Popular Science (Magazine) [http://www.popsci.com] — American monthly magazine carrying articles for the general reader on science and technology. It contains hundreds of short, easy to read articles with a lot of illustrations. Contains sections: human sciences and biology.

Scientific American [http://www.scientificamerican.com] — a popular science magazine. It brings articles about new and innovative research to the amateur and lay audience. It is not a refereed scientific journal, such as Nature, rather, it is a forum where scientific theories and discoveries are explained to a broader audience. Much on medical and biological sciences.

Science News [http://www.sciencenews.org/] — an American bi-weekly magazine devoted to short articles about new scientific and technical developments, typically gleaned from recent scientific and technical journals. Much on medicine and biology.

2.4.4. Modern approach to self-education

Current awareness services are tools that can be used to keep up to date with the latest professional literature in the field of interest. There are different types of such services available and different information providers may refer to their current awareness tools using various names. These are **search alert services** which allow to automatically run saved database searches with the results delivered by email or to an **RSS reader**. **Citation alert** services enable to track new articles that cite a chosen article by sending an e-mail every time the article has been cited. **Journal Issue or Table of Contents** (**TOC**) services are offered by many professional journals. With TOC alerts the latest table of contents is sent via e-mail or available on a web page. **Persistent search** gives an opportunity to obtain information in real time and blogs connect people with the same interest.

Search alert services

A good example of search alert services is "My NCBI". It is a personal space on the NLM computer system for saving searches, results, PubMed preferences, and for creating automatic email alerts. **PubMed My NCBI** Registration is required (free). It is a very convenient tool which enables the user to configure this database interface individually and create own literature resources. E-mail alerts give insight into the newest search results without entering PubMed. More details, and step-by step instructions on how to use this instrument are available online on PubMed: My NCBI [http://healthlinks.washington.edu/howto/myncbi.html], (See also Chapter 2.2.3). Similar services offers BioMedCentral (**My BioMedCentral**) [http://www.biomedcentral.com/] and Medscape [http://www.medscape.com/].

A stored search is a completed search executed without entering or modifying search conditions. It is very convenient to store a search that is performed regularly to save time. A search template is a partially completed search that can be opened, modified as needed, and run to retrieve documents that match assumed criteria. Required and optional values can be entered, but operators or properties in a search template cannot be modified. Both types of searches save time, because the search criteria do not have to be redefined.

RSS feeds

RSS feeds alert when a new content has been added to the website. It is possible to get the latest news in one place, as soon as it is published, without having to visit the websites that the feed has been taken from. Feeds are also known as RSS. There is some discussion as to what RSS stands for, but most people plump for 'Really Simple Syndication'. In essence, the feeds themselves are just web pages, designed to be read by computers rather than people.

To start using feeds, in general the first thing needed, is something called a news reader. This is a piece of software that checks the feeds and enables reading any new articles that have been added without the necessity of looking through the entire website. There are many different versions, some of which are accessed using a browser, and some of which are downloadable applications.

Persistent (Prospective) searches

Persistent search is a method of searching on the Internet where the query is given first and the information for the results is then acquired. In traditional or retrospective search (made by search engines) the information for the results is acquired and then queried. Retrospective search (made by matching engines) starts by gathering the information, indexing it and then letting users query the information. The results do not change until the index is rebuilt, often months apart. Prospective search stores a user's queries and matches them against new information items passing through their matching engine. The information received is as fresh as possible. Real-time access to information is core to the future of the Web and the future of search. Matching technology is also much better than traditional search at providing access to the "hidden web" — information not "crawlable" by traditional search engines (Wyman, 2005).

PubSub [http://www.pubsub.com/] is a real-time search engine which can find the latest news usually within minutes of their publication and sometimes within seconds. PubSub's matching engine is currently able to handle billions of matches per second. The Search page presents up-to-date search results in a single query format. The Real Time page allows to create multiple standing searches, which can be then monitored as new results appearing in real time.

True prospective search (versus traditional retrospective search) on an Internet scale allows subscribers to be alerted whenever relevant news is published. Therefore, users are aware of news as it happens. This bears importance to material events such as travel, natural disasters and local weather alerts, to name a few. Medical librarians can be notified whenever something new appears on their subject of choice (medicine or a narrower term selected from PubSub Topics).

Blogs

A blog is a website where entries are commonly displayed in reverse chronological order. The history of blogs is closely connected with the history of the Internet itself. Reputable medical blogs gather highly educated health professionals. The medical bloggers often include direct contact information, links and quoted original sources in their posts. Medical blogs are frequently picked up by mainstream media; thus, blogs are an important vehicle to influence medical and health policy (Kovic et al., 2008).

Medical librarians are recommended to subscribe to high-quality medical blogs in the field of interest — they often review most of the important new articles. There are thousands blogs dealing with medicine on the Internet. One of the many lists of blogs available can be found on **Medworm** [http://www.medworm.com/rss/blogs.php].

Social networking and micro-blogs

Social networking focuses on gathering individuals into specific groups sharing interests, activities, ideas, and events. They function like an online community of Internet users and their websites are known as social sites. Social networking services consist of representations of users (often profiles), social links, and a variety of additional services [Social Networking http://www.whatissocialnetworking.com/, Microblogging.com http://microblogging.com/]

The most popular social networking and micro-blogging service is Twitter. Launched in 2006, quickly reached enormous popularity. The limit for a "tweet" is 140 characters.

For the reader, it is easy to stay connected to many sources without setting aside the time needed to read full-length blog entries .

Medical applications

Social networks are beginning to be adopted by healthcare professionals as a means to manage institutional knowledge, disseminate knowledge and to highlight individual physicians and institutions. The role of social networks is also of interest to pharmaceutical companies.

Twitter [http://twitter.com] can be a space for the informal sharing of health information and advice, both valid and invalid. Scientists and health care professionals are among those who are finding Twitter very useful. The key lies in accepting its limitations. Respected scientists, editors, publications, libraries, academic departments, companies and journalists can all provide a steady stream of information, opinion, and referrals without needing to commit the resources and time required for long-form blogging.

People taking medications can sign up to receive Twitter updates reminding them to take their medication at proper intervals. Twitter-based reminders can be of help in prevention of sexually transmitted diseases, smoking cessation, improving travel vaccination rates, and supporting insulin therapy (Martens, 2010; Scanfeld, et al. 2010).

PatientsLikeMe [http://www.patientslikeme.com] launched in 2005 is a social networking health site that enables its members suffering from life altering diseases to share treatment and symptom information. They can converse with one another, share data on improving the outcomes, empathize with each other and learn any techniques or medication other sufferers are trying in order to improve their health. PatientsLikeMe has communities for amyotrophic lateral sclerosis (ALS), multiple sclerosis (MS), Parkinson's disease, fibromyalgia, HIV, chronic fatigue syndrome, mood disorders, progressive supranuclear palsy, multiple system atrophy, Devic's disease (neuromyelitis optica) epilepsy, and others. Physicians and researchers can access the site to find out what treatments the patients have tried and how successful the outcome of the treatments were.

DailyStrength [http://www.dailystrength.org] creates support groups focused on depression, divorce, parenting, and a wide variety of cancers. Users can remain anonymous and can provide one another with emotional support by discussing their struggles and successes with each other. Medical professionals are also available through contact information, and treatments for a variety of illnesses and problems are also listed on the site.

SoberCircle [http://www.sobercircle.com] gathers alcoholics and addicts whereas **SparkPeople** [http://www.sparkpeople.com] offers support during weight loss.

2.4.5. Courses for librarians

There are not many courses or trainings available for librarians which deal with how to stay updated with medical problems or on current medical problems themselves. Those few which have been held showed that medical librarians are capable of assimilating new and complex knowledge and that highly educated librarians can provide a wide range of biological information services to researchers (Lyon, 2004).

An interesting initiative is "**Mini-Medical School for Librarians**" designed in United States to improve librarians' understanding of medicine and medical education. They are sponsored by medical schools or hospitals and taught by medical faculty. Mini-medical schools tend to be offered as a series of lectures that spans several weeks and addresses a broad range of health topics. The programs encourage participants to interact with health care professionals and expose themselves, if briefly and superficially, to information that a typical medical student might learn. Mini-medical schools are very popular, well attended, and often filled to capacity (Dunn, 2006). A list of mini medical schools and more details can be found on the web page of **the University of Illinois** [http://www2.uicomp.uic.edu/minimed/]. The website of **National Institutes of Health** [http://science-education.nih.gov/home2.nsf/feature/index.htm] presents more documents on medical education on the basic level.

The Medical Library Association (MLA) [http://www.mlanet.org/] and its chapters are well known for the continuing education (CE) programs they offer. CE programs are timely, address professional concerns and meet member-requested needs.

Since 1992, a week-long course has been offered by the National Library of Medicine (NLM). It is known as a "Woods Hole course" and the participants include librarians, clinicians, educators, and administrators. Since its inception, the reputation and prestige of the "Woods Hole" course for biomedical informatics has been increasing among medical librarians. The course brings together elements of database design, human-computer interfaces; medical vocabularies, and coding systems, medical decision analysis methods, evaluation methods in medical informatics, technical exercises, knowledge-based databases, telemedicine, consumer informatics, education informatics and strategies for designing and managing clinical information systems (Bridges, et al. 2006, NLM Resources and Infrastructure for the 21st Century Contents http://www.nlm.nih.gov/pubs/-plan/lrp06/panel1report.doc .

The European Association for Health Information and Libraries (EAHIL) [www.eahil.net] organizes each year a conference or a workshop. During these events, the participants have an opportunity to attend many courses or trainings. More details on their website.

Another professional organization for librarians in general is **Chartered Institute of Library and Information Professionals (CILIP)** [http://www.cilip.org.uk/Pages/-default.aspx]. CILIP provides practical support for members; it maintains, monitors and promotes standards of excellence in the creation, management, exploitation and sharing of information and knowledge resources. CILIP is the leading provider of topical and quality training for the library and information community, with emphasis on learning through interaction, discussion and participation. CILIP also offers very convenient onsite courses — cost effective and ready to attend whenever the trainee decides. Participants are provided with certificates of attendance. For the full list of courses, interest groups and many other interesting details it is recommended to visit the CILIP web page.

The HTAi Information Resources Group (IRG) of the Health Technology Assessment International [http://www.htai.org] focuses on leading workshops, panel sessions and educational courses at HTAi's Annual Meetings. During these meetings the newest resources of scientific information and advanced retrieval methods are discussed. IRG maintains the HTAi Vortal, a web based source of HTA information which is available to anyone. All librarians interested in learning more on the recent sources and tools can sign up to IRG mailing list or watch the Vortal.

2.4.6. Forums, newsletters, discussion lists (listservs)

Another way a teaching medical librarian can manage to keep updated with the basic percepts, theories, methodologies and topics within medicine and health, is participation in discussion groups, forums or subscription of newsletters. They are usually topic-oriented and the topic can range from extremely narrow to ”whatever you think could interest us”. Many newsletters are published by societies to provide information of interest to their members.

Several mailing lists are maintained by the **Cochrane Collaboration** [http://lists.cochrane.org/mailman/listinfo/]. An exhaustive list of health-focused discussion groups dedicated especially to medical librarians are presented on the webpage of **Rouen University Hospital** [http://www.chu-rouen.fr/documed/lis.html]. It is also recommended to visit websites of various health organizations which usually maintain discussion groups (EAHIL, HTAi, WHO, AlHeLA, CILIP, MLA, and many others).

2.4.7. Final remarks

Any teaching medical librarian needs to keep his or her finger on the pulse of what is new and trendy in health. As information becomes increasingly specialized and new forms of data and databases are developed, librarians must adapt their skills and expertise to position themselves to meet their organizations' existing goals and to anticipate future needs. These concerns are critical in the area of biomedicine where rapidly accumulating information is increasingly affecting the practice of medicine. It is therefore imperative that teaching librarians proactively prepare to meet the changing information requirements of health care professionals.

Teaching tips and recommended methods

Lecture + individual consultations

- The lecture should be preceded by an evaluation of educational background, professional experience and needs of the course participants. The content depends from these factors nevertheless should be presented broadly as the main goal of such course is to provide the trainees with the tools for individual work.
- During the individual consultations (or with the entire group if their problems are similar) the tools, their advantages and disadvantages should be discussed. This would prepare the course participants to design their personal methods of staying updated.

Suggestions for exercises

Exercise 1: Subscribe to the RSS feeds of the ”Big Five” medical journals (NEJM, JAMA, BMJ, Lancet and Annals of Internal Medicine) plus 2-3 subspecialty journals in your field of interest or invent your own configuration. You can choose either Google Reader (a powerful RSS reader) or the simple iGoogle personalized page (if you subscribe to less than 10 feeds). To personalize iGoogle, you need to register (free) and log in first. After clicking the "Add stuff" button, type "medical journals" into the window and select the interesting journals which you wish to appear on the iGoogle main page. The chosen medical journals can be read or listened as podcasts (iPod+broadcast), which also applies the RSS feeds technology. There is even a text-to-speech module that works with iGoogle (converts normal language text into speech).

Exercise 2: Subscribe to RSS feeds for persistent searches in PubMed and Google. Choose a search term in your field of interest, run the search in PubMed, then subscribe to the feed for the search. The same process can be repeated with Google News and Google Alerts.

Exercise 3: Create your own personalized iGoogle

Exercise 4: Design your personal method of keeping updated.

References and additional readings

Abridged Index Medicus (AIM) http://www.nlm.nih.gov/bsd/aim.html

Amedeo http://www.amedeo.com/

Annals of Internal Medicine http://www.annals.org/

Ask A Biologist http://askabiologist.asu.edu/

BBC Focus http://www.bbcfocusmagazine.com

Bridges, J., Miller, C.J. and Kipnis, D.G. (2006) Librarians in the Woods Hole Biomedical Informatics Course. Medical Reference Services Quarterly, 25, 1.

Britannica http://www.britannica.com/

British Medical Journal (BMJ) http://www.bmj.com/

Chartered Institute of Library and Information Professionals (CILIP) http://www.cilip.org.uk/Pages/-default.aspx

Cochrane Collaboration http://lists.cochrane.org/mailman/listinfo/

Discover http://discovermagazine.com

Dunn, K. (2006) Mini-Medical School for Librarians: from needs assessment to educational outcomes Journal of the Medical *Librarians* Association, 94, 2.

EMBASE http://www.info.embase.com/

European Association for Health Information and Libraries (EAHIL) www.eahil.net

Free Medical Journals http://www.freemedicaljournals.com

International Society for the Promotion of Health Technology Assessment (HTAi) http://www.htai.org

Journal of the American Medical Association (JAMA) http://jama.ama-assn.org/

Kovic, I., Lulic, I. and Brumini, G. (2008) Examining the Medical Blogosphere: An Online Survey of Medical Bloggers. Journal of the Medical Internet Research, 10, 3, e28.

Lancet http://www.thelancet.com/

Lyon, J. (2004) A model for training the new bioinformationist. Journal of the Medical *Librarians* Association, 92, 2.

Manske, P.R. (2007) Medical journal writing, Journal of Hand Therapy, Jan-March, 108–112.

Martens, E. (2010) Twitter for Scientists. Editor's Letter, ACS Chemical Biology, 5, 2, 149. www.acschemicalbiology.org

Mayo Clinic www.mayoclinic.com

Medical Library Association (MLA) http://www.mlanet.org/

Medline http://www.nlm.nih.gov/pubs/factsheets/medline.html

Medscape http://www.medscape.com/

Medscape core medicaljournals http://www.medscape.com/viewarticle/457683?mpid=15261

Medworm http://www.medworm.com/rss/blogs.php

Microblogging.com http://microblogging.com/
My BioMedCentral http://www.biomedcentral.com/
National Institutes of Health (http://science-education.nih.gov/home2.nsf/feature/index.htm
National Library of Medicine — National Institutes of Health http://www.nlm.nih.gov
New England Journal of Medicine (NEJM) http://content.nejm.org/
New Scientist http://www.newscientist.com
NHS Evidence Health Information Resources [http://www.library.nhs.uk]
NLM Resources and Infrastructure for the 21st Century Contents http://www.nlm.nih.gov/pubs/-plan/lrp06/panel1report.doc
Popular Science (Magazine) http://www.popsci.com
PubMed: My NCBI http://healthlinks.washington.edu/howto/myncbi.html
PubMed Central http://www.pubmedcentral.nih.gov
PubSub http://www.pubsub.com/
Rouen University Hospital http://www.chu-rouen.fr/documed/lis.html
Scanfeld, D., Scanfeld, V. and Larson, E.L. (2010) Dissemination of health information through social networks: Twitter and antibiotics. American Journal of Infection Control, 38, 3, 182–188. www.ajicjournal.org
Science News http://www.sciencenews.org/
Scientific American http://www.scientificamerican.com
Social Networking http://www.whatissocialnetworking.com/
Special Libraries Association (SLA) http://units.sla.org/division/dbio/publications/resources/-dbio100.html
University of Illinois http://www2.uicomp.uic.edu/minimed/
WebMD http://www.webmd.com/
Wikipedia http://en.wikipedia.org
Wyman, B. (2005) The Power of Prospective Search, http://www.globalprblogweek.com/2005/09/-21/wyman-prospective-search/

3. Evidence based health care

Evidence based health care (EBHC) means using evidence from good quality and up to date research, together with the experience and knowledge of health professionals, and the values and preferences of clients of health services. EBHC is not about doing research it is about using research results in practice.

This module presents some basic concepts of evidence based health care, but also points to the role of teaching librarians, who are to support information users in formulating answerable search questions and in quality assessment of the retrieved literature. The module will also give an overview of research methods. This knowledge is helpful in formulating search questions and an absolute must in the critical appraisal of scientific papers.

To start reading and studying this module, we will recommend that our readers have at least some basic knowledge of the evidence based health care concept, of literature searching, of scientific publications' structure and of study design types.

CHAPTER 3.1.

Principles of evidence based health care

Regina Küfner Lein

Case

Nurses from a nearby hospital have asked the library to give them a course about evidence based health care (EBHC). The nurses do not know where to start. They know they have to search literature which seems difficult, and they assume there is something more to EBHC than just literature searching. What can the library offer them?

There are several possible starting points for developing a course for the nurses. The teaching librarian who was made responsible for developing this course has decided that she will suggest splitting the course into several parts: first she will give the nurses an overview of EBHC principles, and will then explain why the steps before and after literature searching are very important (3.1). The next steps in the course will be to introduce some knowledge about research methods (3.2.), teach how to ask answerable questions (3.3.) and finally give the nurses some guidance on what tools they can use to conduct critical appraisal of publications (3.4). The librarian also wants to make it clear in which steps of EBHC the library can support the nurses in their tasks.

Introduction

Health care professionals in various disciplines more and more follow evidence based health care concepts. Depending on the discipline this can be made more specific: evidence based medicine, evidence based nursing, etc. Librarians support professionals who want to comply with the rules of EBHC, mainly in actual searching for research literature or with instructions on how to conduct a search. But librarians may also teach users other skills necessary to practice evidence based concepts such as: how to differentiate and choose appropriate sources of evidence based information, and how to select and appraise the research studies. To teach all these skills well, teaching librarians themselves have to learn what evidence based health care is about.

This chapter focuses on the principles of evidence based health care, and the role of the teaching librarian within the EBHC concept.

3.1.1. General issues

A short history of evidence based practice is given by Brice and Hill (2004), who trace the ideas of evidence based health care back to the work by Archie Cochrane in 1972 about effectiveness in health services. It took almost 20 years before his ideas were further developed. The term "evidence-based medicine" was introduced by Guyatt (1991) in an editorial, describing the way of the future where new evidence should be included as soon as possible into clinical practice. But he did not give a precise definition of the new term.

Evidence based medicine (EBM) as a "new approach to teaching the practice of medicine" was further discussed by the Evidence-Based Medicine Working Group (1992). They called it a "new paradigm for medical practice", because using medical literature in a systematic manner is a profound change to the existing practice of medicine. They claimed that unsystematic clinical experience, and understanding of pathophysiology no longer was sufficient for clinical decision-making. They clearly stated that EBM will have beneficial consequences for teaching and for practice.

There were further attempts of descriptions of evidence based medicine. Sackett et al. (1996) expressed it as: "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients." The above sentence is often cited as the definition for EBM. They write further "The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research".

Summed up, evidence based medicine is about clinical decision making using evidence from reliable and up to date research together with clinical expertise, which is adapted to the individual patient. In 2005 the Sicily statement on evidence-based practice (Dawes, et al., 2005) presented a consensus on what evidence based practice means, what skills are required to provide best practice and how health personnel could be trained in these skills.

The evidence based concept started in medicine, but soon spread to other related disciplines and became adapted and further developed to fit their specificity, e.g. evidence based nursing, evidence based physiotherapy, evidence based public health. But also non-health disciplines, such as education, social work and even librarianship adopted this new concept.

In this module, we use the term "evidence based health care" (EBHC), which is applicable in a broad spectre of practice, covering both medicine and all other health care disciplines. Teaching librarians should rather use the more specific term e.g. evidence based nursing, or evidence based dentistry, according to the subject and the group they teach.

3.1.1.1. The components of evidence based health care

Good doctors and health professionals use both individual clinical expertise and the best available external evidence, and neither alone is enough

(Dawes, et al., 2005; University of Oxford, 2009)

In the beginning, there was a misunderstanding that evidence based medicine was only "research based" medicine. (Evidence-based medicine working group, 1992; Haynes, 2002; Straus and McAlister, 2000). Straus & McAlister (2000) who investigated results from literature search and feedback from seminars found that the most common misperceptions were: ignorance of clinical expertise and patient preferences, further that EBM seems to offer cookbook medicine, and that it only pertains to clinical practice. Others (DiCenso, et al., 1998; Malterud, 2001) criticized that too much emphasis was put on research, or that only quantitative research was regarded, and essential aspects of experience and qualitative research were not appreciated.

Traditionally a librarian deals with literature. When teaching EBHC the librarian again talks about literature, but she/he should not limit teaching to literature sources and searching. The teaching librarian should be cautious and check whether the group of course participants has some misconceptions on EBHC (e.g. too much focus on research, as mentioned above). If it really is so, it would be good to use a minute or two in the beginning of the course to present the proper understanding of the EBHC concept. The teaching librarian should make it clear that reliable research material, if existing, should always be seen together with clinical experience and practice, and with the individual patient/client perspective. Further, that knowledge from these three fields then must be put into a given context and adapted, according to e.g. economic situation, resources or regulations.

When looking closer at the evidence based health care concept, the process is divided in several steps. The steps are:

- **Reflexion** about a problem: e.g. the nurses wonder about bleeding after angiography, or: a decision maker has to decide which medication is most cost-effective
- **Formulating a question** based on the information needs:
  The question should be as specific as possible. This part may often be a challenge for health care professionals untrained to do so
- **Gathering relevant research information** from appropriate and reliable resources:
  The selected material may contain different document types, such as articles, books, reports, reliable web pages containing results of research
- **Critical appraisal** of the retrieved material for its validity and usability
- **Integrating** new knowledge into practice:
  New knowledge from retrieved research could as well confirm existing practice or be the start for changing practice
- **Evaluation** of practice which may result in new reflexion

The first step on reflexion and the second step on formulating a question are combined to one step according to the Sicily statement on evidence-based practice (Dawes, et al., 2005).

Librarians do not necessarily teach or support teaching in all these six steps. Definitely, the first and the last steps have to be done by health care personnel themselves. Librarians may concentrate on teaching how to formulate questions, how to search literature, how to evaluate information sources, and how to proceed with critical appraisal. Lack of skills in searching and appraisal was one of the main limitations of health professionals found by Straus & McAlister (2000).

3.1.1.2. EBHC concept compared to information literacy

A health science librarian who is not familiar with the concept of evidence based health care may have seen different definitions of Information literacy (IL). These two concepts have lots in common.

Information literacy standards, as defined by the Association of College and Research Libraries, say that:

„An information literate individual is able to:

- Determine the extent of information needed
- Access the needed information effectively and efficiently
- Evaluate information and its sources critically
- Incorporate selected information into one's knowledge base
- Use information effectively to accomplish a specific purpose
- Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally"

(http://www.ala.org/ala/mgrps/divs/acrl/standards/informationliteracycompetency.cfm#ildef)

If you look at the steps in evidence based health care and information literacy, as defined above, it is possible to point out several similarities, as shown in the table below, modified from Nortvedt and Nordheim (2007).

Information literacy	Evidence based health care
Determine the extent of information needed	In EBHC, reflexion will result in information needs which then should be formulated in an answerable question
Access the needed information effectively and efficiently	In EBHC, this step corresponds to searching for and gathering literature or data
Evaluate information and its sources critically	In EBHC, critical appraisal of the research findings is a clearly defined step
Incorporate selected information into one's knowledge base Use information effectively to accomplish a specific purpose Understand the economic, legal, and social issues surrounding the use of information, and access and use information ethically and legally	In EBHC, this means to incorporate relevant research results into own practice, and adapt them to an individual patient/client; considering the given context and limitations

Information literacy	Evidence based health care
	Continuing development in medical and health practice and new insights make it necessary to evaluate performance and start a new reflexion

3.1.1.3. EBHC — a new topic for library users?

Evidence based health care concept as described in the case opening this chapter, may be new for your course participants. A literature review investigating the information-seeking behaviour of doctors, Davies (2007) found that health personnel mostly consulted books and colleagues to make clinical decisions (see Table 5 in Davies 2007, referring articles published between 1997 and 2005). In the new paradigm of EBM the emphasis on experts and authority has decreased, and more focus is put, as it was said, on recent and good quality research findings. This requires new skills of the health care professionals (Evidence-based medicine working group, 1992).

A decade ago, Straus & McAlister (2000) reported lack of skills in searching and critical appraisal as the main barriers for practicing evidence based medicine. Another barrier was limited time and resources. The same reasons are still given some years later by Davies (2007). Time, cost and information seeking skills presented the main barriers to information seeking for primary care practitioners. Similar findings were also made for healthcare managers, when barriers to evidence based management were investigated (Niedzwiedzka, 2003). Librarians may help overcome some of these barriers.

Do you know that... librarians can be very skilful in looking for evidence and may provide high-quality information to primary care clinical questions in less than 15 minutes? Read the whole article by McGowan et al. (2010).

3.1.2. EBHC for various recipients of library courses

Knowing the evidence based paradigm and how to follow it may be useful for nearly everybody within medical and health disciplines. Different groups of library course participants may have slightly different needs in this respect, different EB sources may be appropriate for them, and they may have different views on hierarchy of evidence.

3.1.2.1. Medical and health personnel

To stay updated and use available knowledge in practice is obviously important for all medical and health care professionals. Not only because they should do things right, proven by research, but also because nowadays, patients are much better informed due to easy access to information on the web, and they expect good knowledge from health personnel. Even if health professionals have a good overview of their field of knowledge, a teaching librarian may teach them some "microskills of EBM" (Straus, et al., 2005), such as searching in a specific database, or careful selection of search terms appropriate for this database.

Do you know that... the key messages in Davies' review article (2007)) are

- Doctors can develop skills to undertake literature searching
- Librarians need to highlight pre-appraised resources such as the Cochrane Library
- Librarians need to provide information literacy training

Valuable tips for librarians who want to teach EBM to medical students are collected by Green (2000). Green presents some features of evidence based medicine curricula from American residency programs: course objectives, the characteristics of the course (format, implementation) and which sources were presented at the course. In table 1 in the article, Green (2000) lists a wide range of objectives, from more obvious ones which correspond to the four main steps of EBHC such as: perform critical appraisal of the literature, search for the evidence, articulate a focused question, apply and integrate the evidence in decision making. Further Green lists objectives not solely dealing with EBHC, but essential for understanding and practicing EBHC such as: understand principles of biostatistics, understand principles of clinical epidemiology, acquire a more positive attitude towards EBM, keep up with the medical literature, establish the habit of lifelong learning. This may be interesting for librarians; many librarians have taught some of these latter subjects in another context and may use this material also in EBHC-courses. Green found in the survey that sessions often were based on clinical scenarios or actual patients, where residents could actively contribute. Most of the EBM-courses were designed with a high amount of interactivity. Green concludes that course holders were well aware of pedagogical principles of adult learning, using relation to own experience, interactivity and responsiveness for own learning as important contributions for learning output.

3.1.2.2. Health policy makers

Health policy makers are a group of professionals who are especially interested in using hard research results before making decisions. Much of their work focuses on quality improvement of health care, which includes organizational improvements, planning, transforming and sharing of knowledge, but also deals with decisions on use of new technology, and optimised use and cost-effectiveness of treatments or measures. Therefore, they need accurate, relevant and updated information as a basis for their decisions.

Teaching librarians have an important role in continuously improving searching skills of relevant administrative staff, and give information for keeping up with new sources. Librarians should also emphasize sources beyond the medical ones, such as social sciences and economics, in EBHC courses for health policy makers and alike.

3.1.2.3. Students

The EBHC concept has become an essential component in education in many health related disciplines. More and more institutions have integrated EBHC well into the curricula, and students learn about research and do research during their studies. They also learn rules of evidence based practice and have courses on critical appraisal of literature and acquire some skills within information literacy. Often the library is responsible, together with faculty, for teaching students within different subjects how to search and use scientific literature (Read also Chapter 5.3).

3.1.2.4. Consumers

Librarians may teach groups other than staff and students in the health care system. Berger et al. (2010) for example, designed an EBM course and trained patients and consumer representatives. The course participants increased their understanding of medical research and its limitations, and became more confident through learning about EBM methodology in counselling and supporting others. A well prepared teaching librarian can manage to conduct such a course very well.

3.1.3. Teaching the steps of evidence based health care

The Sicily statement on evidence-based practice (Dawes, et al., 2005) presents a curriculum where the educational outcome for the five steps of EBHC is described. They also give examples of teaching methods, and how to assess teaching, both matters which teaching librarians may use in their courses.

Often several professions are involved in conducting EBHC courses. Librarians may cover the following parts of teaching: formulating questions, evaluating information sources and critical appraisal of literature. They may also give instruction on how to document and report searches.

3.1.3.1. Problem and search question formulation

Asking answerable questions is basically the responsibility of the users, but a teaching librarian may help them learn how to formulate the problem and translate it into search questions. It is not always obvious what the real question is, and users may need help in analyzing their problem. This might be done by using analysing tools such as PICO which divides the question into four parts: **P**roblem, **I**ntervention, **C**omparison and **O**utcome (See also Chapter 3.3). In addition, such a tool helps with combining the terms correctly when searching in databases. Librarians may teach users how to find the right search terms, synonyms, or subject headings for essential elements of their question. They may also give help in transforming the question into searchable terms suited for a particular database or/and adapting search terms to different databases (See also Chapter 2.1 and 2.2)

Another aspect of formulating questions is to make the connection between the search question and a suitable study design for answering this particular question. Each research question has its best method(s). Librarians may give some advice on appropriate method(s) or different study designs. The terms which describe the method or study design, can be used as additional search terms.

3.1.3.2. Literature searching

EBHC requires efficient and complete literature retrieval (not to omit any important study), and librarians may play a role in teaching library users how to do this task. Teaching librarians may let them know what databases are available, how to choose a suitable one, and how to search it efficiently (See also Chapter 2.1.).

It could be challenging to find the most **relevant sources** for a given question. For example, to solve a question on acute stroke management, valuable sources were found beyond clinical research databases (Parkhill and Hill, 2009). Parkhill and Hill also discuss the effort to find relevant results within limited time and budgets.

Teaching librarians are encouraged to unpack their literature search tool box, teaching different **search styles and tactics** adapted to the special requirements of the different tasks that the library course's participants are occupied with. These tasks can vary, from doing systematic reviews or health technology assessments, to treatment or developing clinical guidelines, and many others (Booth, 2008). For example, in regard to guidelines development, Deurenberg et al. (2008) discuss the different search methods and express the need for standardization of search filters. This paper gives useful suggestions for search strategies which can be used by teaching librarians and also may help them obtain deeper knowledge of this particular kind of work.

Participants of library courses are often unfamiliar with **documenting** and **reporting** literature searches. Documentation of searches has to be done for any structured literature search. It means to carefully note which search terms and databases are selected, and to record search histories and dates when they were performed. This information has to be included in the Methods part of any review paper or any work where searching for relevant literature is an important part of the study. Good documentation also helps to make an update on the same subject later.

In some EB fields e.g. **evidence based public health** the sources can be more difficult to find or are more likely to be of unknown or doubtful quality than in medicine. Teaching librarians will have to watch carefully because some of those databases may not be up to date, and they also have to be ready to present sources of grey literature or raw data in a particular field. This requires specific knowledge of various sources of evidence (Read Chapter 2.2.). Further, in the public health area it is important to be aware of the large diversity of research methods, and of the fact that a whole range of qualitative methods is being used. In clinical medicine, randomized clinical trials (RCT) are in many cases the most reliable research design. In public health research, RCT's are rare, and according to Victora (2004) they need to be replaced with other research designs, such as cross-sectional studies, quasi-experimental design, or time series analysis. For more about evidence based public health, see Brownson et al. (2009). Evidence based public health demands high information competency and this can be achieved through appropriate education provided by health librarians.

When teaching about evidence based health care, a teaching librarian has to adapt the content of the course to the particular subject, and find appropriate sources, methods and examples accordingly.

3.1.3.3. Critical appraisal

To some extent teaching librarians may educate users how to critically appraise the research study found, since they are familiar with general principles for scientific information quality assessment. Critical appraisal of research requires thorough knowledge of research methods and research subject, and this is not knowledge every librarian has. But certainly, teaching librarians can give guidelines and direct participants of their courses to appropriate aids and tools, for example to specific checklists for various types of research. (See Chapter 3.4.)

Another chance for librarians to foster critical appraisal is to give users advice on how to run journal clubs. How to organize a journal club is shortly described by Straus et al. (2005). But, as pointed out by Hatala et al. (2006), working evidence based is much more than running a journal club.

3.1.4. Limitations of EBHC

Already in 1992, the EBM working group wrote about limitations of EBM, such as financial limitations or limited access to literature or time constraints for critical appraisal (Evidence-based medicine working group, 1992). On the other hand, publication structure has become stricter and stronger focus on methodology makes evaluating easier. Stricter and more unified research methodology nowadays makes it also possible, to a larger extent than before, to do systematic reviews or meta-analyses of research. These secondary evidence sources are of growing importance. The evidence in the form of evidence based summaries and synopses, done by specialists are another fast growing type of EB sources of information.

In a teaching situation the librarian should turn the course participants' attention to sources of summarized research, but also make them aware of the limitations or possible faults of highly processed evidence.

Straus & McAlister (2000) talked about limitations specific to evidence based medicine such as: shortage of relevant evidence, and evidence which does not fit the individual patient. This is and will always be a challenge, that not every question may be answered by relevant evidence. Reasons may be that research results do not exist at all or are not published in the available sources. Sometimes, the user will have to be pleased with research findings of lower strength. Teaching librarians should remind the user that research findings are one of three major components in EB decision making, and in the case of lack of strong evidence they will have to base their decisions on weaker evidence or accept the fact that there are no research findings in a particular area.

However, even if there are insufficient research findings in some topics, Haynes (2002) pointed out that valid research already exists in many fields and that it is ready for use and should be applied and incorporated into practice.

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Malterud, K. (2001) The art and science of clinical knowledge: evidence beyond measures and numbers, *Lancet*, 358 (9279), 397–400.

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Suggestions for exercises

Exercise 1: A short exercise which fits in the beginning of your lesson: 5–10 minutes buzzing with the course neighbor: What do you think is the difference between traditional information skills teaching and teaching EBHC skills? Give and explain three differences.
Exercise 2: Group exercise, approx. 10 minutes, as a break in your lesson just before you introduce the steps of evidence based health care:

The teaching librarian writes 6 to 10 sentences on a piece of paper in arbitrary order (or may cut them into strips, which can be sorted), and the course participants has to sort sentences in increasing relevancy order so they correspond to the concepts of evidence based health care. A short discussion with whole group later can give a good start for working out the 5 steps of the evidence based conduct.

Examples of sentences:

The nurses wonder about a routine from their daily work

The nurses ask a colleague about his/her opinion

The nurses go to the library and borrow some books about the subject

The nurses write down a sound question expressing the problem

The nurses search in the nursing journals at the meeting room and find two relevant articles

The nurses check the quality of the articles

The nurses search in literature databases

The nurses ask the patients

The nurses discuss the findings from the research articles with their colleagues

The nurses suggest slight changes in their routines, and put it on the agenda for the next meeting

Exercise 3: A five minute discussion or individual written exercise: Think/write about possible barriers which make EBHC difficult to embrace, and how a teaching librarian can help course participants overcome these barriers.

Suggestions for assignments to assess students' learning

A self-test on evidence-based medicine is presented on the website "Introduction to evidence-based medicine", from Duke University Medical Center Library and Health Sciences Library, UNC-Chapel Hill http://www.hsl.unc.edu/services/tutorials/ebm/index.htm

Boston University medical center, 2009 offers an interactive tutorial where you write in your understanding of EBM, and get short answers; good for testing your basic knowledge in EBHC: http://medlib.bu.edu/tutorials/ebm/intro/

In Evidence Based Medicine Tutorial at the webpage of the University of Warvick, you find a quiz of the principles of EBHC, which is to be completed online, and with immediate access to the preferred answers: http://www2.warwick.ac.uk/services/library/main/tealea/sciences/medicine/evidence/quiz/

Teaching tips and recommended methods

- We suggest for the readers of this module and for the course participants to go through the following article first: Sackett, D. L., Rosenberg, W. M., Gray, J. A., Haynes, R. B., and Richardson, W. S. (1996) Evidence based medicine: what it is and what it isn't, BMJ, 312 (7023), 71–2.
- Know the library course participants' subject of interest and find appropriate examples of evidence based practice (or not evidence based practice) in their field. Often this is easily achieved by a phone call or a short meeting with the principals.
- Check the appropriate evidence based journals, relevant databases and web sites for the group of people you teach. In the case for this module the example would be the journal "Evidence-based nursing". You may use articles from such journal in the course.

- Recommended teaching method for teaching EBHC: short lectures interrupted by exercises.
- You may sign onto appropriate mailing lists of groups of, e.g. Cochrane or HTA librarians, to keep updated about new advances in search techniques. They have a unique and in depth expertise in this area. irmg@lists.cochrane.org or isg-informationresources@htai.org
- Many of health related or health system related journals are not indexed in Medline or in similar abstracts databases. This means you have to search several special databases or search each journal separately. A Public Health Section of MLA compiles a list of Core Public Health Journals.: Core public health journal project: http://publichealth.yale.edu/phlibrary/phjournals/
- To find grey literature, such as reports, theses, or papers presented at conferences on international and national level it is good to use the network of Public Health librarians. There is a public health special interest group at EAHIL.

Additional readings and links to teaching materials

Booth, A., and Brice, A. eds (2004) Evidence-based practice for information professionals: a handbook. Facet Publ. http://ebliptext.pbworks.com/f/Booth+%26+Brice+2004+EBP+for+Info+-Professionals+-+A+Handbook.pdf
The "first ever handbook on Evidence Based Library and Information Practice" freely available in PDF format

Bradley, P., Nordheim, L., De La Harpe, D., Innvær, S., and Thompson, C. (2005) A systematic review of qualitative literature on educational interventions for evidence based practice, Learning in Health and Social Care, 4 (2), 89-109.
Systematic review on qualitative studies which evaluate experiences from participants in education and courses in evidence based practice.

CEESTAHC (Central & Eastern European Society of Technology Assessment in Health Care) http://www.ceestahc.org/
Their main aim is development and progress of standards and methods of assessment of drug and non-drug health technologies in Central and Eastern Europe. The Society organizes training courses on evidence-based medicine and health technology assessment, and provides consultancy and technical support to all parties interested in these subjects.

Duke University Medical Center Library, and Health Sciences Library UNC-Chapel Hill (2004) Introduction to evidence-based medicine, http://www.hsl.unc.edu/services/tutorials/ebm/index.htm
This website gives a short introduction of evidence-based medicine, concentrating on clinical questions, EBM search strategies and key issues for validating studies. It contains a glossary and exercises.

HTA Consulting http://hta.pl/
Their main aim is assessment of technologies of drugs and medicinal products and diagnostic methods evaluation in Poland and all over the world.

Høgskolen i Bergen. Senter for kunnskapsbasert praksis [Bergen University College. Centre for Evidence Based Practice], and Nasjonalt kunnskapssenter for helsetjenesten [Norwegian Knowledge Centre for the Health Services] (2008) Kunnskapsbasert praksis [Evidence based practice], http://kunnskapsbasertpraksis.no/.
This webpage contains text, exercises, video casts of lectures and references covering all the steps in EBHC.

Nortvedt, M. W., and Norsk sykepleierforbund (2007) Å arbeide og undervise kunnskapsbasert: en arbeidsbok for sykepleiere [Working and teaching evidence based: a workbook for nurses].

Norsk sykepleierforbund.
The book is for teachers in EBHC, both to learn about EBHC and learn how to teach EBHC.

University of Oxford, Centre for Evidence Based Medicine: What is EBM? http://www.cebm.net/-index.aspx?o=1914
This site describes the steps in EBM, with detailed information and exercises on each. It includes a part about study design in the chapter Critical appraisal

Polski Instytut Evidence Based Medicine- PIEBM (Polish Institute for Evidence Based Medicine) http://ebm.org.pl/
Popularizes evidence-based medicine in Polish health care system

University of Illinois, Information Services Department of the Library of the Health Sciences, (2009) EBM Librarian, http://ebmlibrarian.wetpaint.com/.
Evidence-Based Practice (EBP) tutorials, which consist of five instructional modules: Introduction to evidence-based practice, structure of literature, research design, searching the literature, and evaluating the quality of research.

Medycyna Praktyczna (The Practical Medicine) http://www.mp.pl/

The primary Polish medical portal and publisher of journals and books. Publishes plenty of practical materials that can be used by teaching librarians during EBCH courses.

Literature regarding selected disciplines

Evidence based medicine

Straus, S. E., Richardson, W. S., Glasziou, P., and Haynes, R. B. (2005) Evidence based medicine: how to practice and teach EBM 3rd edn. Elsevier Churchill Livingstone.
The book is written for clinicians, but a teaching librarian will find a lot of ideas for teaching throughout the book, and a whole chapter on teaching methods.

Scherrer, C. S., and Dorsch, J. L. (1999) The evolving role of the librarian in evidence-based medicine, Bull Med Libr Assoc, 87 (3), 322-8.

Even if the article is from 1999 it gives some useful tips for librarians how to learn about EBHC.

Evidence based nursing

University of North Carolina at Chapel Hill, Health Sciences Library, (2005) Evidence based nursing, http://www.hsl.unc.edu/Services/Tutorials/EBN/articles.htm
A collection of definition and research articles especially within evidence-based nursing

Nortvedt, M. W., and Norsk sykepleierforbund (2007) Å arbeide og undervise kunnskapsbasert: en arbeidsbok for sykepleiere [Working and teaching evidence based: a workbook for nurses]. Norsk sykepleierforbund.

The book is written for nurses and has a lot of examples from a nurse's daily practice, which can be used in teaching sessions.

Evidence based physiotherapy

Jamtvedt, G., Hagen, K. B., and Bjørndal, A. (2003) Kunnskapsbasert fysioterapi: metoder og arbeidsmåter. Gyldendal akademisk.

The book is written for physiotherapists and uses examples from a nurse's daily practice, which can be used in teaching sessions.

Evidence based radiology

Hafslund, B., Tveit, H., and Strøm, B. (2006) Kunnskapsbasert radiografi — en investering for fremtiden?, Hold Pusten, (10), 24–26.

Strøm, B., Hafslund, B., and Tveit, H. (2007) Kunnskapsbasert radiografi 2 — Metodisk arbeidsmåte i kunnskapsbasert praksis, Hold Pusten, (1), 13–15.

Tveit, H., Strøm, B., and Hafslund, B. (2007) Kunnskapsbasert radiografi 3 av 3 — Utfordringer ved implementering, Hold Pusten, (2), 14–16.

These 3 articles give examples how radiologists can work evidence based.

van Beek, E. J., and Malone, D. E. (2007) Evidence-based practice in radiology education: why and how should we teach it?, Radiology, 243 (3), 633–40.

From the abstract: "This review aims to describe the essential components of EBR, to describe the educational theories that may be applied to developing EBR within the curriculum, and to give several models that have been shown to result in greater student and resident participation in the search and exploration of evidence-based practice."

Evidence based rehabilitation/occupational therapy

McMaster University (2008) Evidence-based Rehabilitation, http://www.srs-mcmaster.ca/ResearchResourcesnbsp/ CentreforEvidenceBasedRehabilitation/-EvidenceBased rehabilitation/tabid/544/Default.aspx

Jamtvedt, G., and Nortvedt, M. W. (2008) Kunnskapsbasert ergoterapi — et bidrag til bedre praksis!, Ergoterapeuten, (1), 10-18.

Nordheim, L. (2008) Hvordan finne forskningsbasert kunnskap: Kilder og søkestrategier, Ergoterapeuten, (1), 39-45.

These resources adapt evidence based concept to and use examples from occupational therapy.

Evidence based public health

University of Massachusetts Medical School, Lamar Soutter Library, (2010) Evidence-Based Practice for Public Health, http://library.umassmed.edu/ebpph/index.cfm

This website provides free access to evidence-based public health (EBPH) resources, to associated journals, to evidence-based guidelines, systematic reviews, filtered searches of the literature, and to best practices in public health

CHAPTER 3.2.

Research methods in health sciences

Irene Hunskår

Case, continued

After the library course about Principles of Evidence Based Health Care, the nurses have got a better understanding of what EBHC is about and what it means in practice. They are aware that they need to find and read relevant research articles. They also know that the methods used in research and described in the publications play a pivotal role in deciding whether the results are reliable.

Since they knew little about the research methods, the teaching librarian prepared a course to give the nurses a short overview about research methods, and supplied them with references for additional reading.

Introduction

Teaching different types of users across a wide spectrum of professions, the health librarians should always have at least basic knowledge and understanding of the different research methods used in health sciences. This will help them to communicate better with all kinds of users. Furthermore it will also make them more confident in the teaching situation and in preparing educational materials. When teaching or participating in teaching "research methods", a librarian obviously has to acquire much deeper knowledge. This part of the module will just introduce some typologies of research, the most commonly used methods in health research and give some basic research terminology. In Recommended readings you can find handbooks which will give you much deeper and detailed knowledge.

3.2.1. Main types of research

Research is systematic inquiry that uses disciplined methods to answer questions and solve problems. The ultimate goal of research is to develop, refine and expand a body of knowledge (Polit & Beck, 2010, p. 4). There are different ways of dividing and classifying research. A taxonomy, or taxonomic scheme, is a particular classification (”the taxonomy of ...”), arranged in a hierarchical structure. In medical and health sciences, there are many research taxonomies. We may talk about: basic and applied research, theoretical and practical research, quantitative and qualitative research, primary, secondary and tertiary research.

Basic research. Its objective is to gain fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications. The goal of basic research is to find out how things work. Basic research can be used to simplify and to clarify a clinical problem — sometimes, but not always under controlled conditions. Also, basic research can be used to test and to develop new approaches and new knowledge which cannot be tested on human for ethical reasons.

Basic research often takes place in a laboratory. While it does not involve human subjects, human tissue or fluids may be used. Basic research often relies on studies in “model organisms” such as yeast, fruit flies or mice. In medicine research animals or plants are often used to test new types of medicine or treatment. Basic research discoveries are needed for applied research.

Applied research. Its objective is to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met. Applied research has very specific goals or agendas, and is designed to find a solution to an immediate practical problem. The main aim of conducting applied research is to generate a solution to a clinical or other problem.

Applied research in medicine and health sciences is sometimes called clinical research. The elements in clinical research procedure are:

- to propose a solution
- to formulate a testable hypothesis
- to set up an experiment to test the hypothesis
- to analyze the data and
- to come up with a solution to solve the given problem

Theoretical research is another term that can be found in research classifications. Its objective is to prove/disprove a hypothesized truth and propose research that may be carried out in the future.

Further, we may divide types of research into:

- Exploratory
- Research which is looking for patterns, connections, factors, influences
- Descriptive
- Research which is looking for co-variation, distribution of unites and variables factor influence and dependency
- Hypothesis — testing
- Research which is testing measurable assumptions about reality

3.2.2. Inductive and deductive reasoning

Solutions to many problems are developed by logical reasoning, which combines experience, intellectual faculties and formal systems of thought. **Inductive reasoning** is the process of developing generalizations and theories from specific observations. In inductive reasoning, we begin with specific observations and measures, begin to detect patterns and regularities, formulate some tentative hypotheses that we can explore, and finally end up developing some general conclusions or theories. Inductive reasoning, by its very nature, is more open-ended and exploratory, especially at the beginning. Inductive reasoning is more often performed in qualitative research than in quantitative research.

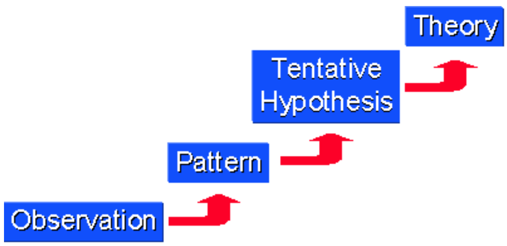

Figure 1: Inductive reasoning. (From: Research Methods Knowledge Base http://www.socialresearchmethods.net/kb/dedind.php)

Deductive reasoning is the process of developing specific predictions from general principles. Deductive reasoning is more narrow in nature and is concerned with testing or confirming hypotheses. Deductive reasoning works from the more general to the more specific. Sometimes this is informally called a "top-down" approach. The researcher begins with a *theory* about the topic of interest. Then the theory is narrowed down to specific *hypotheses* that we can test. We use models, concepts and categories that already exit to explain and distinguish between different phenomena. We narrow down even further when we collect *observations* to address the hypotheses. This ultimately leads us to be able to test the hypotheses with specific data — a *confirmation* (or not) of our original theories. This is the second step in knowledge development. It takes a known idea or theory and applies it to a particular situation.

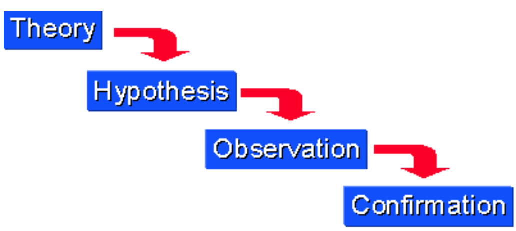

Figure 2: Deductive reasoning. (From: Research Methods Knowledge Base) http://www.socialresearchmethods.net/kb/dedind.php

3.2.3. Research methods as a toolbox

Methods are a kind of toolbox, and have both theoretical and empirical consequences and implications. You can think of methods in relation to the structure of a research project:

Is the structure more or less predetermined or is it more or less emergent or process related?

What is the type of the observation (researcher's interaction with the material/data: direct/indirect, first hand/second hand, etc.)

Polit & Beck (2008, p. 15) use the following approach to introduce research methods as a concept: "Broadly speaking, research methods are the techniques researchers use to structure a study and to gather and analyze information relevant to the research question. (...) The methodological distinction typically focuses on differences between quantitative research (...) and qualitative research."

3.2.3.1. Quantitative research methods

Quantitative research is investigation of phenomena that lend themselves to precise measurement and quantification, often involving a rigorous and controlled design (Polit & Beck, 2010). Quantitative research is often seen as a traditional, positivistic scientific approach which uses orderly, disciplined procedure to acquire information. Quantitative researchers use deductive reasoning to find evidence and generate predictions which are then tested in the real world. The traditional quantitative research approach deals with problems of measurement. To study a phenomenon, scientists attempt to measure it, to find numerical values to express quantity.

In clinical research the most commonly research designs are the following:

Research Design	Explanation	Examples from PubMed
Randomized controlled trials (RCT)	A controlled clinical trial in which the study groups are created through randomization	Desch, S., et al. (2010) Low vs. higher-dose dark chocolate and blood pressure in cardiovascular high-risk patients. Am J Hypertension. 23(6):694-700 Veerus, P., et al: (2007) Does hormone replacement therapy affect the use of prescription medicines in post-menopausal women: experience from the Estonian Postmenopausal Hormone Therapy Trial [ISRCTN35338757].BJOG 114(5):548-54
Controlled trials (see also 3.4.2.2)	A test of an intervention using a design that includes a control group, with or without randomization	Srikanth, R.K et al. (2008) Chocolate mouth rinse: Effect on plaque accumulation and mutans streptococci counts when used by children. Jun;26(2):67-70 Radin, E. et al. (2007) Effects of intentionally enhanced chocolate on mood. Explore (NY). 3(5):485-92

Research Design	Explanation	Examples from PubMed
Case-control studies (see also 3.4.2.4)	A non-experimental research method involving the comparison of "cases" and matched controls	Rein, D. et al. (2000) Cocoa and wine polyphenols modulate platelet activation and function. J Nutr. 130(8S Suppl):2120S-6S Janszky, I. et al. (2009) Chocolate consumption and mortality following a first acute myocardial infarction: the Stockholm Heart Epidemiology Program. J Intern Med. 266(3):248-57
Cohort studies (see also 3.4.2.3)	Also called a "prospective observational study", this design follows a group of patients, called a "cohort", over time to determine general outcome as well as the outcomes of different subgroups.	Triche, E.W. et al. (2008) Chocolate consumption in pregnancy and reduced likelihood of preeclampsia. Epidemiology. 19(3):459-64 Trandberg, T.E. et al. (2008) Chocolate, well-being and health among elderly men: chocolate and acute myocardial infarction in a case-control study from Italy. Eur J Clin Nutr. 62(2):247-53.
Before-after studies	An experimental design in which data are collected from subjects both before and after the introduction of an intervention	Vickers, A.J. et al. (2010)How do you tell whether a change in surgical technique leads to a change in outcome. J Urol 183(4):1510-4. Klaassen, B. et al. (1996) Does the dangerous dogs act protect against animal attacks: a prospective study of mammalian bites in the accident and emergency department. Injury 27(2):89-91
Cross sectional studies	A study in which data are collected at one point in time and involve observation of all of a population, or a representative subset. They are often used to assess the prevalence of acute or chronic conditions, or to answer questions about the causes of disease or the results of medical intervention	Nurk, E. et al. (2009) Intake of flavonoid-rich wine, tea, and chocolate by elderly men and women is associated with better cognitive test performance. J Nutr. 139(1):120-7. Salonia, A. et al. (2006) Chocolate and women's sexual health: An intriguing correlation. J Sex Med 3(3):476-82.
Epidemiological research	Examine factors that influence distributions of diseases in a whole population or in its parts	Hollman, PCH et al. (1999) Tea flavonols in cardiovascular disease and cancer epidemiology. Proc Soc Exp Biol Med 220:198-201. Shaikh, W. A. et al. (2008) Allergies in India: an analysis of 3389 patients attending an allergy clinic in Mumbai, India. J Indian Med Assoc. 106(4):220, 222, 224 passim.

Research Design	Explanation	Examples from PubMed
Evaluation research	Research aimed at learning how well a program, practice or policy is working	Rovers, R. (1986) The merging of participatory and analytical approaches to evaluation: implications for nurses in primary health care programs. Int J Nurs Stud. 23(3):211-9.

For further explanation and use of the research terminology in Evidence Based Practice, see also Chapter 3.3.2.3.

3.2.3.2. Qualitative research methods

Qualitative research is investigation of phenomena, typically in an in-depth and holistic fashion, through the collection of rich narrative materials and using a flexible research design (Polit & Beck, 2010). Researchers using qualitative research methods tend to emphasize the dynamic, holistic and individual aspects of phenomena and attempt to capture those aspects in their entirety, within the context of those who are experiencing them. Qualitative research methods are valuable in providing rich descriptions of complex phenomena. They track unique or unexpected events, illuminating the experience and interpretation of events by actors with widely differing stakes and roles; giving voice to those whose views are rarely heard; conducting initial explorations to develop theories; and to generate and test hypotheses; and moving toward explanations. Many qualitative research studies are rooted in research traditions that originated in the disciplines of anthropology, sociology and psychology.

Most commonly used methods in qualitative research:

Research design	Explanation	Examples from PubMed
Phenomenology	Obtaining data on subjective experience, analysing and presenting subjective experience. Focuses on the lived experience of humans and people's everyday life experiences. Main method of data collection is in-depth interviews	Kurth E. et al. (2010) Crying babies, tired mothers — challenges of the postnatal hospital stay: an interpretive phenomenological study. BMC Pregnancy Childbirth. 10:21. Scannell-Desch, E. et al. (2010) Experiences of U.S. military nurses in the Iraq and Afghanistan wars, 2003-2009. Nurs Scholarsh 42(1):3-12.

Grounded theory	Iterative processes of data collecting and analyzing that aim to develop theories grounded in the real-world observations; Main method of data collection is in-depth interviews and observations	Giske, T. et al (2009) The silent demand in the diagnostic phase Scandinavian Journal of Caring Sciences. 23(1):100-6.. Dahlen, H. et al. (2010) The novice birthing: theorising first-time mothers' experiences of birth at home and in hospital in Australia. Midwifery. 26(1):53-63.
Ethnography	Gathering empirical data on societies/cultures and aims to describe the nature of those who are studied. This type of study might be called a "field study" or a "case report," both of which are used as common synonyms for ethnographic method	Harrowing JN. et al. (2010) Moral distress among Ugandan nurses providing HIV care: a critical ethnography. Int J Nurs Stud. 47(6):723-31. Hessler KL. (2009) Physical activity behaviors of rural preschoolers. Pediatric Nursing. 35(4):246-53.

A wide range of tested qualitative research methods are available to address the complex nature of phenomena. The selection of method, or combination of methods, has to be tailored to the questions to be answered and the setting for research. Typical methods include:

Interviews — method that helps investigators understand how people perceive and interpret phenomena and their own experiences. Face-to-face-interviews or telephone-interviews are common

Focus groups — form of controlled group discussion that explores specific issues and bring together individuals chosen to meet a specific profile

Observation — is a way to illuminate complex situations. Types of observation can be the peer observation, video observation, participative observation, structured observation

Analysis of documents — this involves reviewing documents, memos or other pieces of written information for content and themes. By examining the written word, the researcher studies communication that occurs in the selected sample

Case study — a research method involving a thorough, in-depth analysis of an individual, a group, an event or social or organizational unit

Narrative analysis — focuses on the story told as the object of the inquiry

Participative observation — method in which the researcher tries to understand the contextual meanings of an event or events through participating and observing as one of the subjects in the research

Action research — an interactive inquiry process that balances problem solving actions implemented in a collaborative context with data-driven collaborative analysis or research to understand underlying causes enabling future predictions about, for example, personal or organizational change

3.2.4. Secondary or summarized research

So far, the emphasis has been on primary research. By primary research we mean individual and original studies based on empirical investigations.

In secondary or summarized research, researchers use already discovered and available data and research on a topic. The results from secondary research are often published as a review article. More and more often secondary research is done systematically to raise the quality and reliability of the research.

A systematic review attempts to identify, appraise and synthesize all the empirical evidence that meets pre-specified eligibility criteria to answer a given research question. Researchers conducting systematic reviews use explicit methods aimed at minimizing bias, in order to produce more reliable findings that can be used to inform decision making in health care. (Section 1.2 in the Cochrane Handbook for Systematic Reviews of Interventions.)(http://www.thecochranelibrary.com/view/0/AboutCochraneSystematicReviews.html)

Bias is defined as any influence that distorts the results of a study and undermines validity (Polit & Beck, 2008).

In studies of the effects of health care, the main types of bias arise from systematic differences in the groups that are compared (**selection bias**), the care that is provided, exposure to other factors apart from the **intervention** of interest (**performance bias**), withdrawals or exclusions of people entered into a study (**attrition bias**) or how outcomes are assessed (**detection bias**). Reviews of studies may also be particularly affected by **reporting bias**, where a biased subset of all the relevant data is available (Higgins, 2009). Bias might also arise if the researcher knows which patient received which treatment. Knowledge of which treatment the patient receives might also affect the patient's response. An example of this is using placebo in testing new medicine.

Meta-analysis is a statistical method that combines results from two or more studies to increase the strength of evidence. Meta-analysis is particularly useful in evaluating and comparing therapies and in assessing causes of disease. Systematic reviews and meta-analyses are also called "Syntheses". For more about secondary research see paragraph 3.3.3.1.

3.2.5. Tertiary research

Tertiary research is the collection, selection and analysis of primary and secondary evidence. In the field of health and medicine, guidelines are typical outcomes of tertiary research, but also manuals and textbooks may be seen as results of tertiary research.

For further explanation of how guidelines and other types of summarized research are being developed see: http://www.helsebiblioteket.no/Retningslinjer/Ord+og+begreper [Healthlibrary.no/Guidelines/Words+and+concepts]

And Marilyn J. Field and Kathleen N Lohr, "Clinical practice guidelines are systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances." National Academy Press, Washington D.C. 1990.

See also Chapter 3.3.3.

3.2.6. Hierarchy of evidence and strength of research methods

What research method to choose and use will depend upon what problem or question is investigated, and also depends on the time and resources at your disposal. But each problem has its own best method, and the quality of research depends on the right match between problem, method and study design. There are several lists about the strength of evidence depending upon the method used. Below is one such list, just to give an example of how a hierarchy of evidence can be perceived.

This hierarchy of evidence focuses on three dimensions; effectiveness, appropriateness and feasibility. Research that can contribute valid evidence to each dimension is listed. To address the varying strengths of different research designs, four levels of evidence are named: excellent, good, fair and poor. (Evans, 2003)

	Effectiveness	**Appropriateness**	**Feasibility**
Excellent	• Systematic review • Multi-centre studies	• Systematic review • Multi-centre studies	• Systematic review • Multi-centre studies
Good	• RCT • Observational studies	• RCT • Observational studies • Interpretive studies	• RCT • Observational studies • Interpretive studies
Fair	• Uncontrolled trials with dramatic results • Before and after studies • Non-randomized controlled trials	• Descriptive studies • Focus groups	• Descriptive studies • Action research • Before and after studies • Focus groups
Poor	• Descriptive studies • Case studies • Expert opinion • Studies of poor methodological quality	• Expert opinion • Case studies • Studies of poor methodological quality	• Expert opinion • Case studies • Studies of poor methodological quality

Figure 3: Hierarchy of evidence: ranking of research evidence evaluating health care interventions (Evans, 2003)

References

Evans, D. (2003) Hierarchy of evidence: a framework for ranking evidence evaluating healthcare interventions. Journal of clinical nursing, (12), p. 77–84.

Higgins, J.P.T., Green, S. (Eds) (2009) Cochrane handbook for systematic reviews of interventions. [S.l.]: The Cochrane Collaboration

Polit, D.F., Beck, C.T: (2010) Essential of nursing research. Appraising evidence for nursing practice. 7th ed. Philadelphia, Wolters Kluwer/Lippincott Williams & Wilkins. http://www.ebem.org/-definitions.html

Polit, D.F., Beck, C.T. (2008) Nursing research: generating and assessing evidence for nursing practice, 8th. Philadelphia, Pa., Wolters Kluwer/Lippincott Williams & Wilkins.

Trochim, W.M.(2006) Research Methods Knowledge Base. 2nd ed. http://www.socialresearch-methods.net/kb/dedind.php

Suggestion for an exercise

For the research question "What helps best against thirst; water or soda?" Choose (in pairs) the most appropriate, in your opinion, research procedure. Develop a draft of a research design (method, techniques of data collection, sequence of activities, etc) to answer this question. Discuss your choices for about 10 minutes. Afterwards give a short presentation and present your arguments to the whole class.

Teaching tips and recommended method

When teaching about research methods, remember that you are not a research methods specialist, so it will always be more of raising your students' (they might be) colleagues librarians or various categories of trainees) awareness rather then actual in depth teaching. But, knowing research methods even superficially will help them in searching and in preliminary selection of publications. More in depth knowledge, they will need to conduct critical appraisal of research studies. Here, your role as a teaching librarian is mainly to direct users to appropriate books, checklists or other sources if they need to learn more about methods.

Recommended method: lecture. Some exercises also can be done to sensitize course participants to various types of research.

Additional readings and links to teaching materials

Bowling, A (2009) Research methods in health: investigating health and health services. 3rd ed. Buckingham: Open University Press.

Creswell, J.W. (2003) Research design. Qualitative, quantitative, and mixed methods approaches, 2nd ed. Sage Publications, Thousand Oaks, Calif.

Drageset, S., Ellingsen, S. (2009) Forståelse av kvantitativ helseforskning — en introduksjon og oversikt [Understanding of quantitative health research — an introduction and overview] Nordisk Tidsskrift for Helseforskning, 5(2), s. 100-113. http://www.ub.uit.no/baser/septentrio/index.php/-helseforsk/article/viewFile/244/234

Field, M.J., Lohr, K.N (1990) Clinical practice guidelines: directions for a new program. Institute of Medicine (U.S.). Committee to Advise the Public Health Service on Clinical Practice Guidelines. United States. Dept. of Health and Human Services. Washington, D.C.: National Academy Press.

Forskningshåndboken: fra idé til publikasjon [Research Guide : from idea to publication] / [prosjektansvarlige og redaktører] Karin C. Lødrup Carlsen og Annetine Staff. 3. utg. Oslo] : Ullevål universitetssykehus. http://www.ulleval.no/modules/module_123/proxy.asp?D=2&C=694&I=7098-&mids=a278a504a

Jędrychowski, W. (2004). Zasady planowania i prowadzenie badań naukowych w medycynie (Planning and conducting research in medicine). Wydawnictwo Uniwersytetu Jagiellońskiego.

Lenartowicz, H., K[22F?]zka, M. (2010) Metodologia badań w pielęgniarstwie. Podręcznik dla studiów medycznych (Research methods in nursing). PZWL. Warszawa.

Malterud, K. (2003) Kvalitative metoder i medisinsk forsking. [Qualitative methods in medical research] 2.utg. Oslo, Universitetsforl.

Rossall, H., Boyes, C., Montacute, K., Doherty, P (2008). Developing research capacity in health librarians: a review of the evidence. Health Information and Libraries Journal 2008, 25, 3, 159-174.

Sofaer, S. (1999) Qualitative methods: what are they and why use them? Health Services Research 34(5 Pt 2): 1101–1118. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1089055/?tool=pubmed

http://www.slais.ubc.ca/resources/research_methods/index.htmOverview of research methods aimed

at librarians. The pages were originally created for the course ARST/LIBR 590: Research Methods in Libraries & Archives at The School of Library at University of British Colombia. The pages are not updated since June 2007 and contain some dead links.

You can find some reading materials on how to teach about qualitiative research methods for undergraduates from the Higher Education Academy. Psychology Network. http://www.psychology.heacademy.ac.uk/s.php?p=123

CHAPTER 3.3.

Asking answerable questions

Randi Bolstad

Case, continued

The group of nurses that had contacted you earlier asking to introduce them to EBHC, has decided to focus in their learning on a real life problem that occurred on their post:

Can pressure at the insertion site be as effective as bed rest when it comes to stopping the bleeding from the insertion site after diagnostic or interventional angiography?

The nurses have asked for a two hour course teaching them how to formulate good questions and find literature that can support different views of this particular problem. Prior to the class, they give the following additional information regarding the problem:

- The reason for the rest afterwards is to avoid bleeding from the insertion site, which is usually in the femoral artery
- The recommended rest afterwards varies from 4 hours to 24 hours
- The resting time occurs to be too long and annoying for the patients and leads to an unnecessary increase in health care costs

You, the teaching librarian, understand that you will have to learn a bit about angiography and bleeding. You will also have to develop some exercises which will illustrate the steps in question formulating using as an example the nurses' particular problem. Two hours is a very short time for such a course, but that is as long as you have. Therefore you will have to focus on question formulating techniques, and explain searching techniques only in a superfluous manner.

Introduction

Evidence based health care is very much about asking the right questions (or to translate challenges met in daily work into questions) that can be answered using research data. Most information users have problems in generating precise questions to which it is possible to find answers in scientific literature. A question like "how to stop bleeding," is definitely not precise enough.

This chapter includes:

- Teaching tips for the process of formulating questions to be used in searching different databases
- Examples of different EBHC sources with links to manuals or instructions for each source
- Overwiev of types of questions that can occur, and information on what kind of "evidence" one can expect to find in various evidence sources

3.3.1. General issues

In our case, the nurses have a clearly defined question that they want answered. If the course participants do not have a defined problem that they want to use as an example, the librarian-teacher will have to prepare a case. In such situations it is recommended that you use a case that you are familiar with. It is important that the examples and tasks are understandable and that they are suitable to illustrate the topic. If the persons that you teach all come from the same field or department, you may decide to use a problem/question from their daily work. The teaching will improve if the librarian-teacher takes time to search through the examples before starting the course.

3.3.2. Question formulation and specification

First, we will have to translate our problem into an answerable question. There are different tools to help us with this. Depending on the kind of questions and the available information sources, we may use different techniques to make sure that we later will retrieve relevant information.

The topics that we will focus on in this chapter are:

- Background and foreground questions
- PICO and other question formulation tools
- Core clinical questions and corresponding research designs

3.3.2.1. Background and foreground questions

Questions asked in clinical practice may be divided into background and foreground questions. The need for both background and foreground knowledge will vary by time and experience. Students and those who are new to a topic are likely to ask background questions, while experienced clinicians will have more foreground questions. (Straus, et al., 2005). Examples of background questions may be:

- What are the costs of having a patient in hospital for 24 hours?
- Which diseases can be discovered by use of angiography?

Background questions can usually be answered by the use of a subject handbook or an encyclopedia, and are not subject for EBHC-based questioning.

Evidence based health care is to find up-to-date, reliable research results that may support practical decisions. Such questions are often called foreground questions. Examples of foreground questions :

- Do smoking cessation campaigns in primary school decrease smoking?
- Does bed rest reduce the risk of complications after angiography?
- Is homecare less costly than hospital care for stroke patients?
- Is there a correlation between childhood asthma and dwellings near busy highways?
- Does vitamin C have an effect on the common cold?

3.3.2.2. PICO and other question formulation tools

In evidence based health care one of the main issues is to formulate focused and explicit questions. This may often seem complicated. For this reason, it may be helpful to use a framework to make the searcher aware of the different parts of the original problem, making it easier to build a good question. PICO is an example of such a framework, originally made for clinical questions (Richardson, et al., 1995). According to PICO, a clinical question has four major elements:

- Patient/Population/Problem
- Intervention
- Comparison
- Outcome

P is for Patient, Population or Problem

In the beginning, when the tool was mostly used within medicine, the P in PICO represented the word Patient. But as evidence based practice has developed and spread into more and more fields, the P can stand for Population or Problem as well. This part of the question must precisely identify a patient or patient group or a problem: Which people is the question about? What is the problem?

I is for Intervention

Which main intervention or exposure are you considering? It is important to make the intervention concept rather wide. Note everything the patient may be exposed to and what you want to investigate: a drug, a test, surgery, cold weather, co-existing problems, cigarette smoke. Sometimes the intervention may be: a policy, financial decisions or organizational changes.

C is for Comparison

Do you want to compare the intervention with something else? Sometimes the comparison will be with “no treatment” or placebo. Your question does not have to assume comparison.

O is for Outcome

What is the effect of the intervention? Which effect of the intervention do we want to investigate?

Let us take a look at the nurses' question again:

Can pressure at the insertion site be as effective as bed rest when it comes to stopping the bleeding from the insertion site after diagnostic or interventional angiography?

A PICO form for this question may look like this:

Patient/Population/ Problem	Intervention	Comparison	Outcome
Bleeding from insertion site after transfemoral angiography	Pressure	Bed rest	Stop bleeding

Figure 1: PICO form for a given question

To use the PICO framework, you will have to split your original question into different parts to fit the PICO form. This is done in order to make it easier to structure the questions which you will be using when searching different databases.

It is important to structure your question and find synonyms to each word in the columns to ensure you will find all the research in the field. We are looking for synonyms because we presume the authors have used different words in the articles. When you have structured and found all the words you want to use, you are prepared for searching.

The PICO-method is especially useful when searching huge international databases such as Medline or CINAHL because you have to specify your search question by limiting with several words to get relevant results. In the following paragraph you will get a presentation of how to use the method to "purge" out all the research about our question.

The next step will be to fill each column of PICO form with synonyms. The synonyms may be key words or subject headings used in different databases. The words have to be in English if you search databases which are international in scope. In national databases or sites you use the recommended language of the particular database.

Since the P in our case consists of more than one concept, it may be useful to separate the P column into two (or more) parts. Among the synonyms may also be MeSH terms:

Patient/Population/Problem		Intervention	Comparison	Outcome
Bleeding	Transfemoral angiography	Pressure	Bed rest	Stop bleeding
Hemorrhage	Femoral artery Angiography Insertion	Sandbag Pressure Compression	Bed rest Bedrest Rest	Blood coagulation Hemostasis Wound healing
MeSH: Hemorrhage	MeSH: Femoral artery Puncture Angiography	MeSH: Pressure Bandages	MeSH: Bed rest	MeSH: Hemostasis

When the PICO form is filled in properly, you will have a list of synonyms vertically in some or in all of the four basic elements of a question. Hopefully, you will get a good answer to your question if you combine all the synonyms with OR, and then combine the results from each column with AND. (See also 2.2)

A simplified search in PubMed for our question may then look like this:

#7	#3 AND #4 AND #5 AND #6
#6	Blood coagulation OR Hemostasis OR Wound
#5	Bed rest OR Bedrest
#4	Sandbag OR Compression OR Pressure Bandages
#3	#1 AND #2
#2	Transfemoral angiography OR Femoral artery OR Insertion OR Puncture
#1	Bleeding OR Hemorrhage

A similar way to specify the question is SPICE (Booth, 2006). SPICE is an abbreviation for Setting, Perspective, Intervention, Comparison, Outcomes. Spice may be more useful when splitting up questions that are not clinical, e.g. Do smoking cessation campaigns in primary school decrease smoking?

PICO and SPICE are two examples of available tools to 'translate' a problem to an answerable question. You may set up your own framework if you like. Whether you prefer PICO or SPICE or a 'homemade' form depends on what your problem is and how you approach it. The main purpose of such frameworks is to help identify appropriate key words and to structure a search strategy to retrieve high-quality and relevant research articles from the chosen databases.

3.3.2.3. Core clinical questions and corresponding research designs

If you teach clinicians, you will need some knowledge of questions specific to the particular clinical area. Clinical questions can also be separated into different groups. It may be useful to assign a question to one of the categories of core clinical questions to get a better perspective. When you and your students have decided which core category your question belongs to, it will be easier to decide which research design most likely answers it, and which database to use.

The table below illustrates core clinical questions, preferred research design, and examples of the databases were you can find corresponding articles.

Core question category	Preferred study design	Examples of Databases/resources
Etiology *Why does anyone get (...)?*	Cohort studies Case-control studies	1. Best Practice, DynaMed, UpToDate 2. 'Other reviews' from Cochrane Library, HTA 3. Medline, EMBASE and other general databases

Core question category	**Preferred study design**	**Examples of Databases/resources**
Diagnosis *How can we learn whether anyone has . . .)?*	Cross-sectional studies (with "gold standard")	1. Best Practice, DynaMed, UpToDate, 'Other reviews' from Cochrane Library, HTA 2. Medline, EMBASE and other general databases
Effect *How can (. . .) be prevented or treated*	Randomized controlled trials Controlled trials Cohort studies Case-control studies	1. Best Practice, DynaMed, UpToDate, Cochrane databases of systematic reviews, 'Other reviews' from Cochrane Library, HTA, Evidence Matters, Joanna Briggs, PEDro 2. Clinical trials in Cochrane 3. Medline, EMBASE and other general databases
Prognosis *What is the likely course and possible complications of(. . .)?*	Cohort studies	1. Best Practice, DynaMed, UpToDate 2.Medline, EMBASE and other general databases
Patients concerns *What is it like to have (. . .)?*	Qualitative studies	1. CINAHL, British nursing index, PsycINFO 2.Medline, EMBASE and other general databases
Prevalence *How many people suffers from (. . .)?*	Cross-sectional studies	1. Medline, EMBASE and other general databases 2. Statistics

Fig 2: Core clinical questions, corresponding research designs and preferred databases Modified after (Ullevål universitetssykehus, 2009) (Haraldstad and Christophersen, 2008)

Let's look again at our question from the case in light of the table above:

Can pressure at the insertion site be as effective as bed rest when it comes to stopping the bleeding from the insertion site after diagnostic or interventional angiography?

This will be a question regarding effect because we want to know if one intervention is as effective as another. The preferred study design to answer questions regarding effects is randomized controlled trial (RCT). You can find original single RCTs in general databases such as Medline or EMBASE. But as we will see later, databases that summarize single studies and computerized decision support systems, may offer an easier way to find evidence.

Questions other than clinical

If your trainees' questions are not clinical, you may have to find different research methods that are appropriate for a particular problem. You will have to teach them about searching databases within other subjects than medicine or health. Examples of databases from other subjects that are frequently used within medical and health sciences are:

- PsycINFO
  Professional and academic literature in psychology and related disciplines.

- EconLit
  Provides citations, with selected abstracts, to international publications on economics.
- Biological Abstracts
  A comprehensive database that directs you to information covered in life sciences journals.
- ISI Web of Knowledge
  Multidisciplinary information from scientific journals. Web of Science also presents the reference lists for each article
- ERIC
  Annotated references to journal articles in pedagogy and related disciplines

Read also Chapter 2.2. to find other examples.

3.3.3. Searching literature for evidence based health care

During the past decade, new sources supporting EBHC have emerged. Their main purpose is to deliver up-to-date, clinical information to busy clinicians. Also for other health professionals such sources are emerging. You will have to identify the best available sources according to who you teach. In this course, we will not list all the different sources, but rather provide links to sites were these sources are presented.

Do you know that... it is accepted to read summarized material for use in clinical practice? Read more in *DiCenso, et al (2009)*.

The websites mentioned below offer lists of evidence based sources in English. The lists include general databases, as well as smaller, more subject specific sources. The listings will link to databases, journals and websites with presentations and links to manuals.

- The Cochrane Collaboration. Resources:
  http://www.cochrane.org/about-us/evidence-based-health-care
- Centre for Evidence Based Medicine
  http://www.cebm.net/
- NHS Centre for Reviews and Dissemination
  http://www.york.ac.uk/inst/crd/revs.htm

As examples of subject specific sources for evidence based health care, we will mention these:

- Joanna Briggs Institute http://www.joannabriggs.edu.au/
  (nursing, midwifery, medicine, and allied health)
- PEDro http://www.pedro.org.au/
  (physiotherapy)
- The Campbell Collaboration http://www.campbellcollaboration.org/
  (education, crime and justice, and social welfare)

Some sources for evidence based health care are made to simultaneously search multiple databases, and also the Internet as such (including PubMed) and collect the results into one set. Examples of such meta-search engines are:

- Turning research into practice (TRIP)
  http://www.tripdatabase.com/
- SUMSearch
  http://sumsearch.uthscsa.edu/

3.3.3.1. The S-Model

Many practical resources have been developed to help people get access to high quality research without having to read all the published articles within their subject. There are evidence based journals that publish synopsis of single studies and databases that only contain systematic reviews, among others. In 2001, Brian Haynes introduced the 4S pyramid to facilitate the use of the different pre-appraised resources (Haynes, 2001). Haynes himself refined the 4S model into the 5S model in 2006 (Haynes, 2006). In 2009, a sixth level to the model was introduced to distinguish between synopsis of single studies and synopsis of systematic reviews. (DiCenso, et al., 2009)

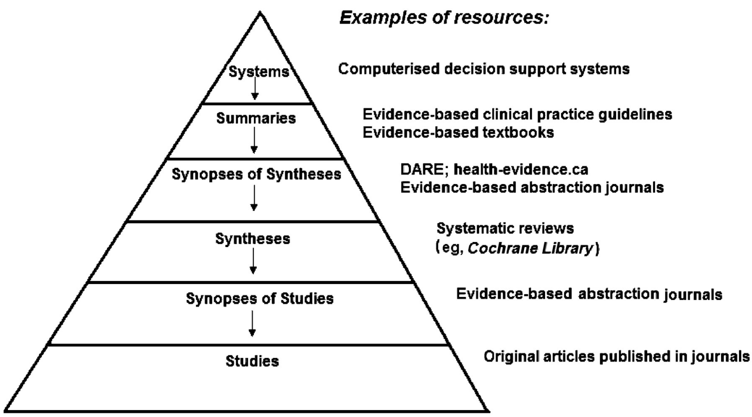

Figure 3: The 6S hierarchy of pre-appraised evidence (DiCenso, et al., 2009, p.100)

Single studies

The lowest level in the model is 'Studies'. Single studies are found in databases like PubMed, EMBASE, PsycINFO and others. Journals like ACPJC PLUS and Evidence-Updates have specialized in publishing single studies that meet certain quality criteria.

Synopses of studies

'Synopses of studies' give brief, but detailed summaries of single studies that were appraised to have high quality. You will find such synopsis in journals like Evidence Based Medicine and Evidence Based Nursing.

Syntheses

'Syntheses' are systematic reviews and meta analyses. Systematic reviews may be found in The Cochrane library and in Joanna Briggs, among others. The best source to find high quality meta analyses is The Cochrane database of systematic reviews.

Synopsis of syntheses

'Synopsis of syntheses' are sources that present summaries of systematic reviews and meta analyses. Often they will also include a comment on the methodology of the original synthesis and a reflection of the clinical utilization of the results. You can find synopsis of syntheses in 'Other reviews' which is a part of the Cochrane Library.

Summaries

The next level is 'Summaries'. At this level we place evidence based sources, such as BMJ Clinical evidence, UpToDate and Best Practice. Such reference works give answers to specific clinical questions. They will combine the latest research evidence with expert opinions and guidelines. At this level we will also find the best clinical guidelines.

Systems

At the very top of the pyramid you find 'Systems' which connect patients' records to reliable sources for summarized knowledge. Such systems are still very rare.

Teaching the S-Model

When clinicians follow the S-model in supporting clinical decision making, it is recommended to reach for the sources from the highest possible level. But, when explaining the pyramid, to library course participants, it is better to introduce the lowest levels first. The purpose of syntheses and summaries are more obvious when one has been introduced to single studies first.

Summarizing research is a time-consuming activity. Therefore, your students will often find that summarized research does not exist within the field of their interest. In such cases, they have to use information from the lower levels. Hopefully, they will be able to extract some support for their decisions even from single studies. For more details about the 6S-model, see (DiCenso, et al., 2009).

Suggestions for exercises

You will need exercises for each of the tools that we covered. Suggested exercises:

- Prepare a list of questions for the course participants to decide whether they are foreground or background questions
- Prepare a list of questions for the course participants to decide which type of core questions they belong to
- Prepare a list of selected questions for the course participants to find which sort of research design will best answer the question
- Prepare a list of different clinical questions for course participants to translate into the PICO scheme

The exercises above can be done by all the participants together after a collective discussion. Another way is to arrange the exercise as a 'game'. One example is what we call the envelope-game: Envelopes with questions written on them are circulated among the participants. Each person or each team gets small pieces of paper with possible answers. Each team places their chosen answer in the envelope, and at the end, the course leader opens the envelopes and discovers weather there is consensus in the audience for each question. Example: In the 'game' regarding core clinical questions on one of the envelopes is written: 'Does aspirin work against headache?' Probably, most of the participants will place the answer 'effect' in the envelope.

- Ask students to find synonyms using the PICO frame.

Suggestion for how to assess students' learning

In Evidence Based Medicine Tutorial at the webpage of the University of Warwick (University of Warwick, 2010), is found one quiz of the principles of EBHC and one of PICO. They both offer exercises that are completed online, and with immediate access to the preferred answers:

PICO: http://www2.warwick.ac.uk/services/library/main/tealea/sciences/medicine/-evidence/pico/

EBHC: http://www2.warwick.ac.uk/services/library/main/tealea/sciences/medicine/-evidence/quiz/

Teaching tips and recommended methods

- Use short lectures interrupted by exercises. The use of evidence based information resources is best learned by examples and practice.
- Check in advance that the questions you use as examples are easy to separate into parts, and that the keywords will retrieve answers when used in databases. The examples must be 'exemplary'.
- In a teaching situation, we recommend avoiding subjects like serious illness or other themes that can be embarrassing for the audience
- Use anecdotes to make your class more interesting. The book *How to Read a Paper* (Greenhalgh, 2006) has some nice anecdotes that illustrate why it is important to use research results to support clinical decisions
  - Decision making by anecdote
  - Decision making by GOBSAT (good old boys sat around a table)
- The story of the Cochrane logo, illustrates well how systematic reviews support clinical decisions. It is a success story that is nice to use in a teaching session (Cochrane Collaboration, 2004)
- To understand PICO, you will have to illustrate the use of operators AND and OR with examples or exercises. Many illustrations are available on Internet, like these from the University library at University of Surrey: http://bit.ly/c6Ikz8
- When you use 6S-Model in teaching and you make the examples yourself, it may be smart to check some of the higher levels and try to find a good example to use. Literature from the higher levels is best suited to illustrate the concept EBHC.

- As systematic reviews and meta analyses are frequently used terms within evidence based health care, you will need good definitions. One definition of the concepts is found at http://www.thecochranelibrary.com/view/0/AboutCochraneSystematic-Reviews.html
- One way to find questions suitable for exercises, is to look into advertisements for treatments of common illnesses.

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University of Warvick, The library, (2010) *Evidence based Medicine Tutorial*, http://www2.warwick.-ac.uk/services/library/main/tealea/sciences/medicine/evidence/.

Additional readings and links to educational materials

Boston university medical center, Alumni medical library, *EBM/EBD tutorials*, http://www.medlib.-bu.edu/tutorials/ebm/

A collective start page for different tutorials covering the principles of EBHC within medicine and dentistry. One of the tutorials is ‘Forming a clinical question’ — a five minutes tutorial about the impact of the clinical question in EBHC.

Booth, A., and Brice, A. eds. (2004) *Evidence-based practice for information professionals: a handbook*. Facet Publ.

This book brings the concept EBP from health science to library and information science. The book is also available on the net: http://preview.tinyurl.com/y8zjj4l

Duke University Medical Center Library, and Health Sciences Library UNC-Chapel Hill (2004) *Introduction to evidence-based medicine*, http://www.hsl.unc.edu/services/tutorials/ebm/.

A tutorial for health care practitioners or students who needs a basic introduction to the principles of Evidence-Based Medicine. It covers every step of EBHC, also those that are not usually performed in the library. The tutorial includes exercises, bibliography and glossary.

Høgskolen i Bergen. Senter for kunnskapsbasert praksis [Bergen University College. Centre for Evidence Based Practice], and Nasjonalt kunnskapssenter for helsetjenesten [Norwegian Knowledge Centre for the Health Services] (2008) *Kunnskapsbasert praksis [Evidence based practice]*,

http://kunnskapsbasertpraksis.no/.
This webpage contains text, exercises, videocasts of lectures and references covering all the steps in EBHC. One section covers question formulation.

Medical College of Georgia, Robert B. Greenblatt, M.D. Library (2007) *Responsible Literature Searching: P.I.C.O. Model*, http://www.lib.mcg.edu/guides/rls/ebp/pico.php. *A web-based tutorial in literature searching with different modules. One Module covers evidence based practice and another covers PICO. Each module is followed by a short quiz. The PICO module contains an interesting list of questions that has to be asked before putting words into a PICO form.*

Nortvedt, M. W., and Norsk sykepleierforbund (2007) *Å arbeide og undervise kunnskapsbasert: en arbeidsbok for sykepleiere [Working and teaching evidence based: a workbook for nurses]*. Norsk sykepleierforbund.
A very good Norwegian source for evidence based health care. Part 2 covers question formulation for EBHC.

University of Oxford, Centre for evidence based practice (2009) *Searching 'warm up' exercise*, http://www.cebm.net/index.aspx?o=2311.
This is a search exercise 'designed to walk you through the process of going from your "PICO" question to the steps of a rapid search (a few minutes) for the evidence'. The exercise is part of a larger course in evidence based medicine.

CHAPTER 3.4.

Critical appraisal and quality assessment tools

Małgorzata Sieradzka-Fleituch

Case, continued

A group of nurses attended a course on database searching, held in the library last week. After completing the course, they searched the CINAHL (Cumulative Index to Nursing and Allied Health Literature) database and found hundreds of articles relevant to their problems. This number seemed overwhelming at first, but on closer inspection most of the papers could be rejected as being off-topic. Some doubts also emerged about their quality. If all the papers could be found in a specialist database of nursing science, does that mean that they were of equal quality? If not, how can it be decided which of them were of little value and which contained reliable and valid conclusions? How can the best papers be selected? During the course the nurses knew that randomized controlled trials gave the best evidence, but not all their problems could be solved with the use of RCTs. Can someone who is not a specialist in a given field check the quality of a scientific paper? The librarian who was the teacher of the course was asked all these questions and many alike. He realized that the nurses needed another course on the publications' quality and about available assessment tools.

Introduction

Librarians should be familiar with the methods of quality assessment of information being disseminated on various media, printed and electronic, when teaching about retrieval and selection of publications for various purposes. Although health librarians are not experts in medical or health-related content, they are experts in finding information and can provide support in assessing the many markers that help indicate the quality of scientific literature. The number of scientific publications is permanently increasing, but both quantity and quality do not always go hand in hand, so the significance of critical appraisal and evaluation of information is growing. Librarians are increasingly expected to teach evaluation of sources and individual texts. Becoming familiar with critical appraisal and its applications, it will allow library and information professionals to develop the skills necessary to teach the evaluation methods. This should enable the user to categorize medical studies better and to assess their scientific quality and usefulness more accurately. This chapter is intended to give some guidance on evaluating medical and health-related articles, available aids, and their application in teaching.

3.4.1. General evaluation

Evaluation of scientific information can be divided into two steps: evaluation of the source (e.g. a journal, a book, a web site) and evaluation of a given article or piece of research work.

The nurses in the case could begin evaluating a source even before having it in hand, only on the basis of some technical quality indicators available elsewhere (e.g. Internet, catalogues, etc) [Critically Analyzing Information Sources, http://www.library.cornell.edu/olinuris/ref/research/skill26.htm].

Evaluation of the source

Publishers.

Reputable publishers usually publish valuable works. For example, if the source is published by a university press, it is likely to be scholarly. However, even with big-name publishing companies, it is becoming harder to see if the journals are legitimate or not [Grant, 2009]. Starting an evaluation one should always keep in mind that valuable articles can be published not only in the top journals and vice versa, top journals can contain worthless papers.

Date of publication

Is very important; areas of continuing and rapid development demand more current information. Even more important is the copyright date which informs about the last date of the author's revision whereas the date of publication may be misleading (this can be an old text published recently).

Edition or revision.

If a book has several (new) editions it indicates that it has been revised and updated to reflect changes in knowledge, includes omissions, and is harmonized with its intended reader's needs. Also, many printings or editions may indicate that the work has become a standard source in the area, and is reliable. (e.g. Harper's Illustrated Biochemistry, 28th edition in 2009).

Journal credentials.

Information about the scientific boards and editors, instructions for authors and indication if the articles are peer reviewed, should be easily available both in the printed version and on the journal's (or the editor's) web page. High-level journals will not allow: the same authors to appear again and again, citations to obscure web sites or other inaccessible sources, or to publications in not commonly known languages or repeatedly citing previous pieces written for the same journal.

Impact factor, h-index and other rankings.

Impact factor (ISI) is the most frequently used index to measure approximately the relative importance of a journal within its field. Journals with higher impact factors are deemed to be more important than those with lower ones. The impact factor is often misused to assess the importance of an individual publication, evaluate an individual researcher, or when comparing journals from different disciplines. The h-index attempts to indicate both the scientific productivity and the apparent scientific impact of a scientist reflecting both, the number of publications and the number of citations per publication.

The presence of a given journal in a **reputable database** may indicate that this journal is regarded as a good source of information since such databases usually index journals of established quality. Several scientific citation databases, covering thousands of academic journals are maintained by, among others, the Institute of Scientific Information (ISI) [http://thomsonreuters.com/products_services/science/science_products/a-z/].

A good source of journal quality information is Journal Citation Reports (only for subscribers), an annual publication of ISI. JRC offers tools to critically evaluate journals, with statistical information based on citation data and helps to measure research influence and impact at the journal. Free information on citations is also offered by Google Scholar.

Registration of publications.

Books should have their International Standard Book Numbers (ISBN) and journals — International Standard Serial Numbers (ISSN). These numbers are only identifiers and say nothing about scientific (or any other) quality of a publication, but if they are missing, such publication should be treated with extreme caution.

Web presence.

Modern journals and their publishers have websites. Lack of an Internet presence is unheard of and raises suspicions that a publisher is hiding something. The fact that a journal has a website, does not mean though, that it is credible.

If the technical indicators suggest that the paper trail is weak, maybe the evidence expected to glean from the article or a book is also weak, so it should be treated with caution.

Evaluation of a given article

Critical appraisal of publications is an integral part of evidence based practice, and its aim is to identify methodological flaws in research reported in scientific literature.

The structure of scientific articles is similar. The author(s) names, the title, the summary and key words are followed by the main text, which usually is divided into Introduction, Methods, Results and Discussion (IMRAD scheme), ending with Conclusions and References (for more details on IMRAD see paragraph 4.2). Certain types of publications (e.g. qualitative or descriptive studies, opinions pieces, overviews) have different structures.

In order to select and interpret scientific articles correctly, good knowledge of research methods used in particular field is required. Before application of highly specialized evaluation tools — checklists (see paragraph 3.4.2), the nurses from the case described above would be recommended to perform a general evaluation of retrieved publications, according to the rules listed below. One should bear in mind that some papers will not fit into this scheme, but if important aspects are left out or not described, the reader is advised to be wary.

Author.

It is very important to check the author's credentials, e.g. institutional affiliation, educational background, past writings, or experience. It can be useful to visit the affiliation website and check if the author is associated with a reputable institution or organization, what are the basic values or goals of this organization or institution. Respected authors' names are frequently cited by other scholars. For this reason, it is useful to check if the author(s) we have in mind are cited and appear in many different sources.

Summary.

Reading the abstract is no substitute for critically reading the whole article. But if the summary is not dense with information, readable and well organized, the reader should be cautious about the quality of the whole work.

Introduction.

The introduction should explain clearly what question the study is intended to answer and why the chosen design (the most important element of a scientific investigation) is appropriate for this study (Röhrig, et al. 2009a). If for some reason the design is unacceptable, then so is the article, regardless of how the data were analyzed. After reading this chapter one should also be able to say if this study poses scientifically interesting questions.

Methods.

The description of the research procedures used should be detailed enough to enable the study to be repeated. The Methods section should describe: all stages of planning, the sampling method, composition of the study sample (e.g. people, animals, cell lines, organizations, programmes), the execution of the study, and the methods of data analysis (e.g. statistical analysis). The reader must see on what kind of scale the variables are being measured (numeric-non numeric, continuous-discrete, nominal, ordinal, interval), because the type of scale determines what kind of analysis is possible. It should be stated in this section that the study was carried out with the approval of the ethics committee (if applicable).

The reader should consider, if the type of study design that was chosen permits the aims of the study to be addressed [Röhrig, et al. 2009a]. One should find information, whether the study protocol was written before the study commenced, and whether the investigation was preceded by a pilot study. The geographical area, the population, the study period (including duration of follow-up), and the intervals between investigations should be described in detail. The methods of measurement (e.g. laboratory examination, questionnaire, diagnostic test) should be suitable for determination of the target variable (with regard to scale, time of investigation, standardization, etc.).

Results.

In this section the findings should be presented clearly and objectively, i.e. without interpretation. A good description of results includes information on missing values or data loss (response rates, loss to follow-up). Maybe it was poorly or inadequately monitored (missing values, confounding, time infringements). Confidence intervals for the principal findings should be stated. If the authors give information about results that are nonsignificant it decreases the credibility of the study. "Nonsignificant" should not be confused with "not correlated".

Discussion.

This chapter is the proper place for interpretation of results. It should also contain a critical analysis of the study's limitations, sources of bias, an unexpectedly high rate of loss to follow-up and other possible disturbances. On the basis of these information the reader should be able to evaluate: if the correct statistical parameters and methods were selected, if they were clearly described, if the number of missing values was too large to permit meaningful analysis, if the statements and numerical data were supported by literature citations, etc. Possible distortion of the study results by missing values should also be discussed. Each statement must be supported by the author's data or a reference, unless it is a well-accepted scientific fact.

Conclusions.

A crucial question here is whether the conclusions follow logically from the results, and do they correspond to the study goals. All conclusions should be supported by the study's findings.

References.

The references should deal exactly with the subject they are cited for and be up to date. [du Prel, et al. 2009].

3.4.2. Critical appraisal of research with the use of checklists

Teaching librarians are not experts in medical content, but there are tools that help indicate the quality of research. Several organizations have developed easy-to-use, study design-specific checklists to guide the reader through a research article. These are called critical appraisal checklists. The majority of the critical appraisal tools were developed for a specific research design (87%) [Katrak, et al. 2004]. These checklists can be very useful in teaching critical appraisal skills. The nurses described in the beginning of this chapter should browse the main groups of checklists and select one or more of them to start practicing critical evaluation of the texts they had found.

Checklists usually include between ten to over twenty questions, sometimes grouped in sections, with three to seven possible answers. The reader is asked to consider a series of aspects of a given type of study and to make a judgment as to how well the current study meets the criteria.

The process of critical appraisal sometimes raises questions specific to the study being appraised that may not be addressed by the particular tool. In such a case one must consider what is more important: to look for answers to these questions or to stick to the particular checklist. As well, one must keep in mind that some questions may not be applicable to certain studies. Checklists are available on the Internet in various places, among them:

- CASP Critical Appraisal Skills Programme [http://www.phru.nhs.uk/pages/PHD/-resources.htm],
- SIGN Scottish Intercollegiate Guidelines Network [http://www.sign.ac.uk/methodology/checklists.html]
- Glasgow EBM Checklists [https://www.bridgeport.edu/pages/5347.asp].

Many of the tools are modifications of other published tools.

Specialist knowledge and some experience are needed to evaluate scientific articles correctly. If critical appraisal is a completely new task for someone (including teaching librarians), a useful starting point are checklists which are simple, with less detailed questions, like READER [MacAuley, 1994]. READER was developed for general practitioners and contains a sequence of steps in the assessment of general practice literature. This tool is dedicated to all those who has little time for an extensive review of the literature. It helps to focus only on those issues with direct influence on practice. One should though bear in mind that READER does not allow to critically assess every medical paper.

Critical appraisal of primary studies

In principle, medical research is classified into primary and secondary research [Röhrig, et al. 2009b]. (See also Chapter 3.2.1). The most actual results of research can be found in primary works, while secondary research summarizes available studies in the form of reviews or meta-analyses. It is extremely important so the primary research is assessed properly because wrong appraisal at this stage multiplies in secondary and tertiary works (See also Chapters 3.2 and 3.3).

The most frequently used study designs in medical research are case-control and cohort studies [Krämer, et al. 2009]. Some authors [Katrak, et al. 2004] regard randomized controlled trial (RCT) as the “gold standard” study design. For these reasons, the instruments intended to evaluate controlled trials were described in a more detailed manner. The description is based on SIGN recommendations [http://www.sign.ac.uk/methodology/checklists.html], but applies also to other tools from the same category.

Controlled trials (randomized and non-randomized)

Some examples of instruments used in critical appraisal of controlled trials:

- Glasgow EBM Checklist (Therapy) [https://www.bridgeport.edu/pages/5347.asp]
- SIGN: Randomized Controlled Trials [http://www.sign.ac.uk/methodology/checklists.html],
- CASP: Randomized Controlled Trial Appraisal Tool [http://www.phru.nhs.uk/-pages/PHD/resources.htm]
- PEDro scale [http://www.pedro.org.au/english/downloads/pedro-scale/]
- The CONSORT Statement (Consolidated Standards of Reporting Trials) [http://-www.consort-statement.org]

- McMaster Critical Review Form and Guidelines — Quantitative Studies (non-randomized) [http://www.srs-mcmaster.ca/Portals/20/pdf/ebp/quanreview.pdf].

A novice evaluator is recommended to start critical appraisal with the use of EBM, CASP or PEDro tool. They are relatively simple and much less detailed than e.g. the SIGN instrument. The CASP checklist includes some tips next to each question.

First of all, it must be decided if the study addresses **an appropriate and clearly focused question** and if **allocation of patients to treatment groups** was performed by randomization. This is absolutely fundamental to this type of study. One should keep in mind that processes such as alternate allocation, allocation by date of birth, or day of the week when patient was accepted to a hospital, are not true randomization and such studies should be treated as controlled clinical trials rather than randomized clinical trials. Adequate methods of assignment include centralized allocation, computerized allocation systems, or the use of coded identical containers. The proper method of allocation of the patients to the particular group assures that the researchers are unaware to which group patients are being allocated to at the time they enter the study. If **allocation concealment** is inadequate, investigators can overestimate the effect of interventions by up to 40%. The risk of bias in the study can be lowered by **blinding**: single (patients unaware of the treatment), double (patients and doctors) or even triple (patients, doctors, and persons conducting the analysis). The higher the level of blinding, the more objective are the results of the trial.

Patients selected for inclusion in a trial — **treatment and control groups** — must be as similar as possible (gender mix, age, stage of disease (if appropriate), social background, ethnic origin, and comorbid conditions). These factors are usually described in inclusion and exclusion criteria. During the trial, **the only difference between the groups should be the treatment under investigation**. An additional treatment received by some patients, even of a minor nature, is a potential confounding factor that may invalidate the results.

All relevant outcomes should be measured in a standard, valid and reliable way. The primary outcome measures used should be clearly stated in the study and the main conclusions should base on the primary outcomes.

An important problem is the number of patients that drop out before the study is completed. Conventionally, a 20% drop out rate is regarded as acceptable, but this may vary. Attention should be paid to why patients dropped out, as well as how many. It should be noted that the drop out rate may be expected to be higher in studies conducted over a long period of time. “Intention to treat” analysis is adequate to ensure a balanced distribution of confounding factors. In principle, all the subjects should be analyzed in the groups to which they were randomly allocated. In practice, it is rarely the case that all patients allocated to the intervention group receive the intervention throughout the trial, or that all those in the comparison group do not. Patients may refuse treatment, or contraindications arise that lead them to be switched to the other group. However, if the comparability of groups through randomization is to be maintained, patient outcomes must be analyzed according to the group to which they were originally allocated, irrespective of the treatment they actually received. In multi-site studies, confidence in the results should be increased, if it can be shown that similar results were obtained at the different participating centers [SIGN (http://www.sign.ac.uk/methodology/checklists.html)].

Cohort studies

The cohort studies are designed to answer questions like: “What are the effects of this intervention?” Such studies compare a group of people with a particular exposure with another group who either have not had the exposure, or have a different level of exposure. Cohort studies may be prospective (where the exposure is defined and subjects selected before outcomes occur), or retrospective (where exposure is assessed after the outcome is known, usually by the examination of medical records). Retrospective studies are generally regarded as a weaker design.

Some examples of instruments used in critical appraisal of cohort studies:

- Glasgow EBM Checklist (Harm or Causation) [https://www.bridgeport.edu/pages/-5347.asp],
- Glasgow EBM Checklist (Prognosis) [https://www.bridgeport.edu/pages/5347.asp],
- SIGN Cohort Studies [http://www.sign.ac.uk/methodology/checklists.html]
- CASP: Cohort Studies [http://www.phru.nhs.uk/pages/PHD/resources.htm].

The SIGN web page offers detailed commentary on how to apply the cohort studies checklists.

Case-control studies

The studies covered by this type of checklists are designed to answer questions like: “What are the factors that caused this phenomenon/symptom?”, and involve comparison of individuals with an outcome with other individuals from the same population who do not have the outcome. These studies start after the outcome of an event, and can be used to investigate multiple causes of a single symptom or phenomenon. They are generally used to assess the causes of a new problem, but may also be useful for the evaluation of population based interventions, such as screening.

Some examples of instruments used in critical appraisal of case-control studies:

- Glasgow EBM Checklist (Harm or Causation) [https://www.bridgeport.edu/pages/-5347.asp]
- SIGN Case-control Studies [http://www.sign.ac.uk/methodology/checklists.html],
- CASP: Case Control Studies [http://www.phru.nhs.uk/pages/PHD/resources.htm].

The SIGN web page contains a description of the case-control studies checklists application [http://www.sign.ac.uk/methodology/checklists.html].

Diagnostic studies

The majority of diagnostic studies are cohort trials, therefore they can be evaluated with the use of instruments designed for cohort studies (it is better to use those of more general application), but their quality can be better assessed with the use of more specific tools. Their usage is strongly recommended since diagnostic studies are very important for clinicians [Whiting, et al. 2005]. Below there are some examples of instruments used in critical appraisal of diagnostic studies:

- Glasgow EBM Checklist (Diagnosis) [https://www.bridgeport.edu/pages/5347.asp]
- SIGN Diagnostic Studies [http://www.sign.ac.uk/methodology/checklists.html]
- CASP: Diagnostic Test Studies [http://www.phru.nhs.uk/pages/PHD/resources.htm]
- EBM Diagnosis Worksheet [http://www.cebm.utoronto.ca]

Other types of quantitative and qualitative research

This group of research publication types is much more heterogeneous, than the types described above and so are the checklists. The tool should be thoroughly matched with a given publication to be assessed. The evaluator should keep in mind that even though critical appraisal tools are usually developed for a certain type of study design, it may happen that some of the criteria are irrelevant to a given study.

There are few qualitative research critical appraisal checklists available, and the use of them may not always be appropriate for the qualitative paradigm [Katrak, et al. 2004]. In individual cases, it may also be difficult to classify individual studies to a certain category. Below there is a list of some checklists that can be applied in qualitative and some other types of research:

- CASP: Economic Evaluation Studies [http://www.phru.nhs.uk/pages/PHD/-resources.htm]
- Evaluation Tool for Qualitative Studies [http://www.fhsc.salford.ac.uk/hcprdu/-quantitative.htm]
- EBM Therapy Worksheet, EBM Harm Worksheet, EBM Prognosis Worksheet [http://www.cebm.utoronto.ca]
- Evaluation Tool for Quantitative Research Studies [http://www.fmhs.auckland.ac.-nz/soph/depts/epi/epiq/]
- GATE (Graphic Appraisal Tool for Epidemiology) [http://www.fmhs.auckland.ac.nz/-soph/depts/epi/epiq/]
- CriSTAL Checklist [http://www.shef.ac.uk/scharr/eblib/use.htm]
- Glasgow EBM Checklist for Economic evaluation, Educational intervention, Qualitative research, Decision analysis [https://www.bridgeport.edu/pages/5347.asp]
- CASP: Qualitative Research [http://www.phru.nhs.uk/pages/PHD/resources.htm]
- Evaluation Tool for Mixed Method Studies [http://www.fhsc.salford.ac.uk/hcprdu/-mixed.htm].

Critical appraisal of reviews (summarized research)

A systematic review provides a summary of the data from the results of a number of individual studies. If the results of the individual studies are similar, a statistical method, called meta-analysis, can be used to combine the results from the individual studies, and an overall summary estimate is calculated. The meta-analysis gives weighted values to each of the individual studies according to their size. The individual results of the studies need to be expressed in a standard way, such as relative risk, odds ratio or mean difference between the groups.

The checklists developed for evaluation of systematic reviews often focus purely on key issues of internal validity of a particular systematic review. They are not meant to be used to provide a full critical appraisal of individual studies.

Checklists for reviews and meta-analyses

There are some instruments used to assess critically systematic reviews:

- Critical Appraisal Skills Program (CASP): Systematic Reviews [http://www.phru.nhs.uk/pages/PHD/resources.htm],
- Systematic Review (of therapy) Worksheet [http://www.cebm.utoronto.ca],
- EBM [http://www.docstoc.com],

meta-analyses:

- PRISMA Statement Checklist [http://www.prisma-statement.org/],

and both:

- SIGN Methodology Checklist 1: Systematic Reviews and Meta-analyses [http://www.sign.ac.uk/methodology/checklists.html].

The SIGN tool is most general.

Studies covered by a systematic review should be selected using clear inclusion criteria and there must be enough similarities between them to make the combining of results reasonable. It should be clearly ascertained that the populations covered by the studies are comparable, the methods used in the investigations are the same, the outcome measures are comparable, and the variability in effect sizes between studies is not greater than would be expected by chance alone [SIGN (http://www.sign.ac.uk/methodology/checklists.html)].

Critical appraisal of practice guidelines

Guidelines have been developed to bridge the gap between research and practice and to make research evidence available and applicable globally. Nevertheless, recommendations often differ in guidelines on the same topic. These differences may be due to insufficient evidence, differing interpretations of evidence, unsystematic guideline development methods, the influence of professional bodies, cultural factors such as differing expectations of apparent risks and benefits, socio-economic factors or characteristics of health care systems [AGREE, (http://www.agreecollaboration.org/)].

Checklists for practice guidelines

Over twenty different checklists of practice guidelines already exist; the Cluzeau instrument is the only one which scores all the guideline dimensions and has been validated. From the instruments based on the Cluzeau tool, AGREE is the only validated instrument that uses a numerical scale. It has the most potential to serve as the main appraisal tool for guidelines. However, it also has some important limitations. One should yet bear in mind that AGREE (and any other instrument) does not score the evidence of publications which form the base of the guidelines [Vlayen, et al. 2005].

The AGREE Instrument contains 23 key items categorized in six domains. Each domain is intended to capture a separate dimension of guideline quality. This tool includes a set of instructions on how to calculate the domain scores. It also contains an overall assessment as to whether the guideline should be recommended or not for use in practice. [AGREE, (http://www.agreecollaboration.org/)]

3.4.3. Final remarks

There is no "gold standard" critical appraisal tool for any study design, nor is there any widely accepted generic tool that can be applied equally well across study types. There is no checklist specific for some types of research, as for example qualitative or interdisciplinary studies. Thus, interpretation of the results of critical appraisal of research reports needs to be considered in light of the properties and intent of the critical appraisal tool chosen for the task.

Critical appraisal tools are generally used to evaluate a published study, but they can also act as a checklist for authors regarding what should be included in their upcoming publications.

It is important not to be seduced by checklists. They are the useful guides, particularly as aidememoiré, but they cannot substitute thinking. To read critically means actually reading and thinking at the same time [Glenny, 2005].

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Critical Appraisal Skills Programme (CASP), http://www.phru.nhs.uk/pages/PHD/resources.htm

CriSTAL Checklist, http://www.shef.ac.uk/scharr/eblib/use.htm

Critical Appraisal and Evidence-Based Practice (EPIQ), http://www.fmhs.auckland.ac.nz/soph/-depts/epi/epiq/

Critically Analyzing Information Sources, http://www.library.cornell.edu/olinuris/ref/research/skill-26.htm

Documents for Small Business and Professionals (DocStoc), http://www.docstoc.com

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EBM Diagnosis Worksheet, http://www.cebm.utoronto.ca

Evaluation Tool for Mixed Method Studies, http://www.fhsc.salford.ac.uk/hcprdu/mixed.htm

Evaluation Tool for Qualitative Studies, http://www.fhsc.salford.ac.uk/hcprdu/quantitative.htm

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MacAuley, D. (1994) READER: an acronym to aid critical reading by general practitioners, British Journal of General Practice, 44, 83–85. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1238789/-pdf/brjgenprac00035-0039.pdf

McMaster Critical Review Form and Guidelines- Quantitative Studies, http://www.srs-mcmaster.-ca/Portals/20/pdf/ebp/quanreview.pdf

PEDro scale, http://www.pedro.org.au/english/downloads/pedro-scale/

PRISMA Statement Checklist, http://www.prisma-statement.org/

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Whiting, J., Rutjes, A.W., Dinnes, J., Reitsma, J.B., Bossuyt, P.M. and Kleijnen, J. (2004) Development and validation of methods for assessing the quality of diagnostic accuracy studies, Health Technology Assessment, 8, 25.

Teaching tips and recommended methods

Lecture + classes. The course participants are asked to send some information about theirselves in advance. The information should include their educational background, place and type of work, needs and expectations concerning the course, narrower field of interest, and other useful details.

- A lecture should precede practical exercises. The content of this lecture should be related to the course participants — to their knowledge, skills, and needs. Each topic should be followed by an example displayed on a large screen. Only when the problems of general evaluation has been acquired, the checklists can be discussed.
- The interests of the course participants should be taken into account. If they form a homogeneous audience it is easier to select journals, books and articles from their discipline. When the group consists of specialists in various fields, it is recommended to focus on a general topic which will be of interest to everyone, e.g. common flu, vaccinations, lose weight diets, prophylaxis of common diseases.
- Illustrative anecdotes or stories can be told each 15-30 min to liven up the lecture. These may be examples of fake journals or science frauds that often resemble scientific publications but after thorough examination turn to be false. Publications that "first make people laugh, and then make them think" can be found on the website of Ig Nobel Prizes [Ig Nobel Prizes, http://improbable.com/ig/].

Suggestions for exercises

Teaching critical appraisal can be performed on different levels depending on the **education background, experience, needs of the participants and a particular course duration.** The following are some examples of exercises that may be used.

Exercise 1: Each course participant is asked to assess individually a scientific paper, the same for the entire group, with the use of a given checklist. The individual assessment is followed by comparison of results and discussion.

Exercise 2: The course participants are given some scientific papers and are asked to decide which tools can be applied to asses their quality. The individual assessment is followed by discussion.

Exercise 3: Evaluation of the source. Course participants evaluate quality of different journals and books brought by the librarian (may be suggested by the course participants). A fake journal, non-scientific books, and popular magazines can be included.

Exercise 4: For more advanced participants it is possible to evaluate a few different articles of the same type and on the same subject (e.g. guidelines on diabetes treatment) and prepare a ranking of these papers.

Additional readings and links to teaching materials

Critical Appraisal Skills Programme (CASP), http://www.phru.nhs.uk/pages/PHD/resources.htm

Dąbrowiecki, S, Janowicz, S, Malukiewicz-WiśniewskaG. (1996) *Jak wyszukiwać i krytycznie ocenić naukowe publikacje* medyczne (How to find and critically appraise scientific publications in medicine), Wydawnictwo Uczelniane AM, Bydgoszcz

Documents for Small Business and Professionals (DocStoc), http://www.docstoc.com

EBM Diagnosis Worksheet, http://www.cebm.utoronto.ca

Some general works on the quality of scientific information

Blenkinsopp, J. Bookmarks: Critical appraisal, http://hii.rsmjournals.com/cgi/reprint/49/1/3.pdf

Greenhalgh, T. (1997) How to read a paper. The basics of evidence based medicine. BMJ Pub. Group.

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Study Designs, http://www.cebm.net/index.aspx?o=1039

Study Design Tutorial, http://www.vet.cornell.edu/imaging/tutorial/

Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Manuscript Preparation and Submission: Preparing a Manuscript for Submission to a Biomedical Journal, http://www.icmje.org/manuscript_1prepare.html

Links

Users' Guides to the Medical Literature, http://www.senseaboutscience.org.uk/pdf/ShortPeerReviewGuide.pdf

Martin, E., Simpson, H., Alpi, K. and Allee, N. (2004) Evidence-Based Public Health: Finding and Appraising Relevant Resources — Medical Library Association Continuing Education Course, Lamar Soutter Library, University of Massachusetts Medical School, http://library.umassmed.edu/ebpph/class04_manual.pdf

Greenhalgh, T. (1997) How to read a paper. BMJ, 1997, v.315.

A series of articles published in British Medical Journal introducing non-experts to finding medical articles and assessing their value. Artykuły dostępne są też pod adresem: http://healtoronto.com/howto.html

An useful source in Polish is Medycyna Praktyczna where educational materials can be found (bookmark: Artykuły http://www.mp.pl/artykuly/) They can be of help in critical evaluation of medical publications. There was also published a special issue (1/1999) of the Medycyna Praktyczna journal, devoted to critical appraisal.

4. Publishing

In this module we try to establish a basic platform of knowledge about some aspects of publishing. Learning about the publishing process, types of publications and issues connected with the protection of intellectual property, will hopefully help the teaching librarian in guiding and teaching users of any kind. Both students and researchers need to know how to write and get published, but also how to use published information in an honest and legal way. After each chapter we give a few tips on how to teach about these issues. There are also rich references and additional readings which may be of help to widen the knowledge in these areas.

CHAPTER 4.1.

Scientific publishing and open access

Hege Sletsjøe

Once...

In May 2009 there was much fuss about a Norwegian scientist, Jørn Hurum and his discovery, the fossil Ida. The discovery was launched ostentatiously presenting at the same time a documentary, a book and a scientific article in PLoS ONE (Franzen et al. 2009). Hurum broke common "research behaviour" by declaring his discovery a world sensation and Ida as the "missing link". Generally one might think this sensation would have been published in journals like Nature or Science, but Hurum chose to publish in an open access journal. In an article in The Guardian 19th may 2009 he states: "I'm paid by the tax payers of Norway to do this research. I'm not paid by Nature or Science and still they charge money for other people to read my scientific results. This fossil really is part of our history, truly a fossil that's a world heritage. A find like this is something for all human kind."

Introduction

Scientific publishing is the publishing of scientific, theoretical or empirical, research findings. Publishing is crucial for the evolving of science, as the knowledge of scientific research results are essential for other researchers to build upon. The scientific publishing system is based on peer review through which researchers' work is judged by equal to them or better specialists (see 4.1.3 for more on peer review).

On the publishing stage there are various actors. The researchers, who do the research and write articles; the publishers who take care of the critical examination and evaluation of the research through peer review and also publish and distribute the research; the libraries who subscribe to the scientific journals; the bibliographic services, who take care of the indexing of scientific journals and make the bibliographic information available in databases; finally, the readers who search, retrieve and read the articles.

These different players or actors are connected. The research is usually performed by researchers in universities or other research institutions, and paid by the government or its agencies. The results of research are submitted to publishers, often private commercial companies, who arrange the assessment of the article through the peer review system. The reviewers are experienced scientists working in the same field. After reviews, the research, if deemed valuable, is published in scientific journals which are subscribed by the libraries at universities and research institutions and also by the individual scientists. It means that "the content of journals is provided, reviewed, edited and used by scholars themselves" (Björk, Hedlund and Gustafsson, 2002). The share of public funding is therefore quite extensive when it comes to producing, distributing and using the research results.

Commercial publishers have long profited on this division of labour, and access to research has suffered by escalating journal prices. Because of this, nowadays we have, apart from traditional publishing, a growing open access movement, which is gaining popularity and power and may change in a foreseen future the way researchers communicate and disseminate results of their work (more about open access in 4.1.4).

The changes in the scientific publication pattern require the teaching librarians to be updated about it and to keep their students, researchers and academic staff at the level of the latest developments. The librarians may educate scientific information users, often also authors, or authors to be, in regard to how the publishing process looks like. They can further explain the practical, technological and legal matters concerning traditional and open access publishing and about measures of quality of scientific journals.

4.1.1. Beginnings of scientific journals

The first scientific journal published was Philosophical Transactions (Phil Trans) of the Royal Society of London in 1665 (Guédon, 2001). The same year in France, Le Journal des Scavance was released. This journal was more news oriented compared with Phil Trans. In the United States scientific journals were conceived during the 1800s. By the end of the 17th century there were about 30–90 scientific and medical journals published worldwide and at the end of the 18th century about 750 (Tenopir and King, 2000). Today approximately 23 000–25 000 peer reviewed scholarly journals are being published worldwide (Harnad, 2009).

According to Tenopir and King (2000) two events led to the development of the scientific journal. One was the development of the newspaper, the other the formation of scientific societies. These societies needed better solutions for communicating research than individual letters and notes. To have the work copied was expensive and publishing in books was not timely (Tenopir and King, 2000). This led to the emerging of a "newspaper-like" communication. The increasing numbers of scientists in need of a public registry of intellectual property also played a role in the development of the first scientific journal — Phil Trans (Guédon, 2001).

The originator of the Phil Trans — Henry Oldenburg also started the process of sending manuscripts to experts for judgment of their quality and thus the practice of peer review was introduced (Committee on Science, Engineering and Public Policy, 1995, 10). From archival point of view, the Phil Trans represented important value, namely the recording of science.

The medical scientific journals came into being in the nineteenth century. Not many of them exist today, but some do. New England Journal of Medicine was published for the first time in 1812, and Lancet in 1823.

4.1.2. Scientific journals published after the II World War

After the II World War the scientific journals market changed for several reasons. Commercial publishers took a stronger grip of this market. They could offer a more rapid and refereed publication than the scientific societies (Leeuwen, 1980). In the following paragraphs I will mention some factors that influenced the way publishing of scientific journals evolved.

Technology. During the 1980s the personal computer, software packages, artificial intelligence and other innovations grew in both availability and capacity. This cleared the way for development of electronic publishing (Wang, 2003). By the early 1990s, the dissemination of peer-reviewed journals was changing from paper to electronic versions and the number of electronic journals was growing. At the same time, with the first research networks and the growing use of electronic mail, the exchange of preprints among researchers soon occurred. This development meant emergence of a new communication pattern among scientists and the possibility to share knowledge and research results instantly without waiting for the article to be published.

The Internet theoretically should mean easier scientific communication, cheap access to information and faster scientific publishing, but, instead of getting cheaper the journal prices increased, and access-rights to electronic journals became limited and often time-restricted. This situation was one of the reasons for the serial pricing crisis.

Serial pricing crisis. In the 1970s journal prices began to rise faster than inflation. According to Suber (2007b), prices have risen 4 times faster than inflation since 1986. Chemistry and physics journals average cost rose from $ 76.84 in 1975 to $1.879.56 in 2005 (Lewis, 2008). There are different explanations of the serial pricing crisis.

Ranking of journals. One reason started to evolve in the 1960s. Eugene Garfield, the founder of the Institute of Scientific Information (ISI), developed the Science Citation Index (SCI). This reference system was created to facilitate and connect scientific communication through citations. The system made it possible to measure the impact of a given article by counting how many times it was cited. In 1972 ISI started to publish Journal Citation Report which calculates the impact factor for journals indexed in SCI. Soon a core of journals with high impact factors emerged and these journals became "a must" in the collections of scientific libraries around the world, which had to purchase these journals to satisfy their customers.

Growing number of scientists. Some say that one of the important causes of changes in publishing was the growing number of scientists. According to Geiger (2005, 62), the 18-21 year old cohort grew from 9 million to 15 million during the 1960's. This led to the establishment of a large number of new colleges and universities in North America and Europe, and curriculas and academic programs grew more diversified. This meant an increase in the number of scientists and the growth in research, resulting in more articles submitted to scientific journals and pressure on publishers to increase the volume of publications. The results were both, more articles per issue but also growth in number and diversity of scientific journals. According to Tenopir and King (2000) an average number of articles per journal title increased from 85 in 1975 to 123 in 1995. This again resulted in higher costs of production and maintenance.

Mergers. Another phenomenon was the scientific publishing industry that bought each other up. Mergers have reduced competition and thus made it possible to raise journal prices. Numbers from 2005 showed total revenue for the SMT publishing industry close to ten billion dollars and a profit margin of 25% (Suber, 2006). Profit margin means the difference between sales generated and the cost of producing each of the units sold.

Further the publishers offer their electronic journals in packages or bundled up ("Big deal"), which means that libraries have to subscribe to more journals than they need, in order to get the titles they want. Publishers do this to sell off their weak titles and libraries have no choice but to agree to buy the packages. These inflexible deals could have influenced the survival rate of small publishers (Frazier, 2001) and hence lessened the competition even more.

The increase in number of scientists and libraries meant a growing market for core journals and commercial actors soon came to exploit these inelastic markets. With the serial pricing crisis and the way technology altered scientific communication new ways of disseminating scholarly information started to emerge.

4.1.3. Quality of scientific journals

The quality of a scientific journal depends directly on the quality of the peer review process, which is a kind of a quality assurance.

Peer Review is a method of content and form quality checking. This is being done in addition to the publishers own preliminary content and technical quality assessing, when certain preliminary criteria has to be met for the article to be taken into consideration. These publisher requirements, very important for authors who submit their work, are discussed in more detail in Chapter 4.2. After being accepted by the editorial office the manuscript is sent to, and assessed, by at least 2 specialists within the subject area. These specialists, called peer reviewers since they are experts in the same area as the author, are independent of the publishing office. The reviewers comment, criticize, point out mistakes and ask for amendments. Finally they recommend acceptance or rejection of the article. Authors have to correct their manuscript according to reviewer's remarks, and only after that, the article can be published. It may happen that author(s) know better then the reviewers or disagree with their comments. If this is the case they have to argue well, or sometimes the controversy is solved by the journal's scientific board.

Peer reviewing usually is anonymous, blinded or double blinded. In the second case the reviewers do not know the author's identity and the authors do not know the names of the reviewers. Open peer review is also possible. In this case the reviewers' names are made public and they are accountable for their comments. Today the peer review process is a prerequisite for a journal to be named a scientific journal.

There is criticism of the system of peer reviewing, saying that although it improves the quality of the articles there is no warranty for errors or misconduct and that the quality assessment always to some extent is subjective. The process of peer reviewing is also time-consuming. But despite these objections, there is no better way to evaluate scientific work than the opinion of equal or more experienced and knowledgeable peers. The better the reviewers are, the smaller the chance for research of bad quality to be published.

Within the biomedical area, Congress on Peer Review and Biomedical Publications is arranged every four years (http://www.ama-assn.org/public/peer/peerhome.htm).

Indicators of journal quality

Quality measurement methods can be both qualitative and quantitative. Qualitative methods can be some form of peer opinions, which is common in arts and humanities, where the number of citations is not as important as the opinion of some authorities. An example is the European Reference Index for the Humanities — ERIH (www.esf.org).

In medicine and related sciences quantitative methods are mostly used to measure impact of research. These bibliometric methods are based on citation analysis and statistics.

One reason why the quality of journals is interesting for libraries is to develop an appropriate, high quality library collection. Tight library budgets require careful evaluation of sources. For this purpose, knowledge of Bradford's Law can be useful. Bradford's law says that all journals in a given field can be divided into three parts, each with about one-third of all articles: 1) a core of a few journals, 2) a second zone, with more journals, and 3) a third zone, with the bulk of journals. The number of journals is $1{:}n{:}n^2$ (Black, 2004). This basically says that for each specialty it is sufficient to identify the "core journals" for that field and only stock those, because most of the valuable and important articles can be found in them. Very rarely will researchers need to go outside that set.

But more important for you as a teaching librarian is to be able to tell your course participants how to distinguish between journals of high and low quality. They need to know this for two reasons: one is because they want to read reliable articles, the other reason is that some of your trainees (scientists, academics) want to know where to publish. Scientific recognition is largely dependent on where they publish results of their research. The saying “publish or perish” should often be modified to “publish in good journals or perish”.

Impact Factor (IF). The quality of a journal can be expressed by various indicators, of which ISI Impact Factor is the most known and used. There are also other indicators like: h-index, Index Copernicus points, and other indicators of local/national application. These indicators also serve as measures of individual or institutional achievements (see Craig & Ferguson, 2009 for more about different metrics). Impact Factor and other indicators are imperfect, but currently, the best way to show the importance of a journal for the development of a given field of science.

IF shows the frequency with which the "average article" in a journal has been cited in a particular year or period. The annual impact factor is a ratio between citations and recent citable items published. Thus, the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two. The example below shows how IF of a journal for 1992 is calculated.

IF is being calculated only for journals indexed in the Thomson ISI Web of Science databases and is published annually in Journal Citation Report (JCR).

Calculation for journal's impact factor for 1992.

A= total cites in 1992

B= 1992 cites to articles published in 1990-91 (this is a subset of A)

C= number of articles published in 1990-91

D= B/C = 1992 impact factor

(Source: The Thomson Reuters Impact Factor, originally published in *Current Contents print editions June 20, 1994 (accessed May 2010), thomsonreuters.com/products)*

Impact factor was originally invented for comparing journals within the same field, but as it was mentioned earlier it can also be used to assess a "quality" of a particular researcher on the basis of where he/she is being published. IF can also be used to evaluate the achievements of a whole scientific institution. Publishing in journals with high impact factor gives prestige and counts when it comes to periodical evaluations of scientists and institutions. The financing which researchers get to do their work also depends to some extent on how good their publishing record is (See below — the Norwegian system).

There are mixed opinions about IF, and its defects are pointed out by many (See for instance Seglen, 1997). Some of the criticism is based on the fact that IF is calculated only for journals indexed by ISI, which means favoring journals in English. Another criticism is, that Impact Factor includes also self citations that increases the number of citations, if an author often cites himself. In addition, methodological and review articles usually are more cited than original research papers. This means that journals that contain or favor these types of articles receive a higher IF.

Impact factor can also be used in ways not intended for example to compare journals from different fields. Variations in citation patterns are so big, that such comparisons do not make sense. In life science an impact factor of 3 or 4 is considered typical, whereas in mathematics it is 0,4 (Brown, 2007). There are also some other limitations of IF. Remember the case in the beginning of this chapter? Nature's Impact Factor is very high — 34,480. It is one of the highest ranked journals in JCR. For PloS One it is — 4.351. Both are interdisciplinary journals. Both are peer reviewed. What gives them such different impact factors? Nature has been published since 1869, PLoS One is a newcomer, first published in 2006, and an open access journal. To be published in Nature an article has to be excellent and has to contain really important results. These articles make news, and are cited by many. PLoS One received its first IF in June 2010, so Hurum and his co-authors in 2009 did not know the IF of the journal, but they did not care. They had chosen to publish in PLoS One for idealistic reasons. Still, 4.351 is a respectable IF.

Despite these shortcomings, Impact Factor is the most current impact or quality indicator for both the researchers and the publishers. But other methods have emerged that focus more on ranking individuals by citation analysis of their published articles.

H-index. An indicator more suited to express the influence of individual researchers on progress in a given field of science is the h-index. It was developed by J. E. Hirsch and first published in 2005 (Hirsch, 2005). The definition of h-index is:

> A scientist has index h if h of (his/her) N_p papers have at least h citations each, and the other (N_p – h) papers have no more than h citations each (Hirsch, 2005).

This tells us that an h-index of 3 means that three papers have been cited three times or more. The h-index does not include documents with disproportionately many or very few citations (Mikki, 2009). The h-index was intended to cover both the quality of the scientific output as well as the sustainability. Both Scopus and ISI Web of Knowledge have built-in calculators that will estimate the h-index. There is also free software available (http://publish-or-perish.software.informer.com/).

It is important for course participants (especially young researchers) to understand how different methods of measuring research output or quality are used as a basis for research funding. Different countries have different systems for funding of research. In Norway, the Norwegian evaluation system — a publishing indicator locally known as "Tellekantsystemet" has been developed. The purpose of this indicator is to measure quality of research on an institutional level, as a basis for public funding at Norwegian universities, colleges and in health institutions.

This system is based on both quantification and weighting (quality assessment of publishing channel). Quantification means counting the number of publications where every article or book receives the value 1 with equal share of credits to the authors.

Weighting means that the article receives a weight number depending on whether it is published in a level 1 or a level 2 publication channel. A publication channel can be a journal or a publisher. Within science and medicine the journal ranking (level 1 or 2) is based on the impact factor that is adjusted for by national subject committees (Østerud, 2009). Level 2 gives the highest score. Level 2A is used only within the health institutions.

Level 2A: Six general and particularly significant journals /Weight: 10

Level 2: Leading journals which publish about 20% of the articles /Weight: 3

Level 1: Other journals in the publishing indicator system /Weight: 1

There is criticism and discussions about this system as well. It has been said that different fields of research are treated differently and also that it is being used as a quality measure on an individual level, which was not the intention (Østerud, 2009).

4.1.4. Open Access (OA)

For information users "open access" (OA) means better access to scientific literature and for some of them also alternative ways to publishing their research. Library courses' participants have to know that a growing number of resources can be accessible for free, and that publishing in OA journals counts. As a teaching librarian you should also be able to guide them through the process of publishing in OA journals.

There are several definitions of OA literature. According to Suber (2007b) "Open access literature is digital, online, free of charge, and free of most copyright and licensing restrictions". Even a shorter and to the point definition comes from PLoS, and says: "free availability and unrestricted use".

The first meeting where OA publishing became a main subject of discussion took place in Budapest in 2001. Until then there was not much talk of OA as a publishing movement, but it was mainly treated as a technological experiment with electronic publishing (Guédon, 2004). At the meeting in Budapest many current initiatives were identified and the Budapest Open Access Initiative (BOAI) was initiated (BOAI, 2001).

BOAI was followed by the Bethesda Statement (2003) and the Berlin Declaration (2003). These three documents are the most central and influential for the OA movement", also know as the BBB's (Suber, 2007b).

There are two main strategies to open access: OA journals and self-archiving. The former is often referred to as "gold OA", the latter as "green OA".

Gold OA

Gold open access publishing means that the journal is available free for readers. This is made possible, because the author or author's institution pay a service fee to the publisher at publication time and the publisher makes the article available 'free' at the point of access. Some OA journals are funded by professional societies or other organizations. In such case, no processing fee is required from the author(s).

Green OA

The green way to OA is about self-archiving of journal articles. There are more and more repositories which collect manuscripts and other materials within a particular subject or academic discipline. Some repositories are institutional, defined by Crow (2002) as "digital collections capturing and preserving the intellectual output of a single or multi-university community". Through repositories the institution is able: to make their research visible for the whole research community; has one single collection of all works (including: thesis, reports, dissertations and other grey literature); and gives immediate access to research already accepted for publication. The first digital repository was ArXiv in the field of high energy physics, opened in 1991 (http://arxiv.org/).

Today, about 63% of the publishers allow some form of self-archiving, i.e. they permit authors to archive a copy of their work in institutional archives or repositories (SHERPA-RoMEO Statistics, 2010). It can either be before peer review (preprint) or after peer review (post-print). Post-print archiving can mean two things, either that the journal permits to archive an article that has been peer reviewed but not copyedited, or an article that is both peer reviewed and copyedited. Some journals will not permit archiving of the latter (Suber, 2007b). To classify publishers in regard to their self-archiving status color codes have been developed: green, blue, yellow and white. Green, at one end, permits both pre-print, post-print and publisher versions whereas white, at the other end, does not permit archiving at all (http://www.sherpa.ac.uk/romeoinfo.html).

Table 1: Ten flavours of open access to journal articles

Type of open access	Economic Model	Journal or archive — examples
Home page	University department maintains home pages for individual faculty members on which they place their papers and make them freely available.[a]	http://www.econ.ucsb.edu/˜tedb/
E-print archive	An institution or academic subject area underwrites the hosting and maintenance of repository software, enabling members to self-archive published and unpublished materials.[a]	ArXiv.org
Author fee	Author fees support immediate and complete access to open access journals (or, in some cases to the individual articles for which fees where paid), with institutional and national memberships available to cover author fees.[a]	BioMed Central

Type of open access	Economic Model	Journal or archive — examples
Subsidized	Subsidy from scholarly society, institution and/or government/foundation enables immediate and complete access to open access journal.[a]	First Monday
Dual-mode	Subscriptions are collected for print edition and used to sustain both print edition and online open access edition.[a]	Journal of Postgraduate Medicine
Delayed	Subscription fees are collected for print edition and immediate access to online edition, with open access provided to content after a period of time (e.g. six to twelve months)	New England Journal of Medicine
Partial	Open access is provided to a small selection of articles in each issue – serving as a marketing tool — whereas access to the rest of the issue requires subscription.	Lancet
Per capita	Open access is offered to scholars and students in developing countries as charitable contribution, with expense limited to registering institutions in an access management system	HINARI
fIndexing	Open access to bibliographic information and abstracts is provided as a government service, or for publishers, a marketing tool, often with link to pay per view for the full text of articles	ScienceDirect
Cooperative	Member institutions (e.g. libraries, scholarly associations) contribute to support of open access journals and development of publishing resources.[a]	German Academic Publishers

[a]. Supports "open access" as defined by the Budapest Open Access Initiative (2002) and Bethesda Statement of Open Access Publishing (2003), although some users may impose restrictions that fall outside these definitions (e.g. Bethesda Statement: "Grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use").

(Source: Willinsky J. The access principle: the case for open access to research and scholarship, 2006. pp 211-216).

Willinsky (2006) groups different OA models into "ten flavours" according to the type of financing and to what extent they are providing free access (see Table 1.). This table briefly shows some of the models.

Since the BBB, open access publishing has become a common reality and is constantly developing. But, there are many barriers to this process. Some of the barriers will be presented below.

Financing

OA publishing is not without cost even though it is less expensive than conventional publishing (Houghton, de Jonge, van Oploo, 2009; Houghton et al. 2009; Houghton 2009; Suber 2007b). Different business or economic models are presented. The most frequently used method is the "author pay" model. This means that the authors or their institution pay for publishing, including the peer-review process. E.g. BioMed Central is charging USD 1700 per article and PLoS — between USD 1250 and 2500 (European Commission, 2008). This model is also "adopted" by some commercial publishers who offer the choice of publishing the article: OA or the traditional way. An example is Springer "Open Choice" (www.springer.com/openchoice). If the authors choose open publishing they pay a fee of USD 3000 and make their article online free of charge to anyone. Otherwise their article is not available without purchasing the journal or the article itself. This is known as a hybrid model.

Another model of financing OA is to establish a central fund within an organization or institution to support publishing (Open access and central funds, 2010).

One of the main objections against OA publishing is the lack of a sustainable business model. Will the "author pay" model be able to fully finance the cost of publication? Will lack of funding for researchers lead to difficulties in communicating their results? These questions are very important for the scientists who want to disseminate their results. Still the OA movement advocates stress the main issue, that open access for all, with no hindrance is going to maximise the value of the outcome of research. The PLoS proves that the "OA -author pay" economic model can be a sustainable model (Public Library of Science, 2009).

Copyright issue

In publishing, traditionally exploitation rights have been transferred in full from author to the publisher. This means restrictions on the reuse, i.e. republication or redistribution of the original article by someone other than publisher or licensee. OA changes this balance of rights because OA is about "free availability and unrestricted use" as says PLoS definition. Because of this different copyright models have emerged in OA journals. Hoorn and van der Graaf (2006) identified the following models:

- The author keeps the copyright
- The author shares the copyright with Creative Commons (See 4.3.3)
- The author transfers only the exploitation rights, e.g. commercial rights, to the journal publisher

These models were presented in a web survey conducted among authors of OA journals. Half of the respondents wanted to keep the copyright themselves (all kinds of use allowed, except for commercial purposes), a third of the respondents wanted to share copyright with Creative Commons licences, and only 16% wanted to transfer the exploitation rights to the publisher (Hoorn and van der Graaf, 2006). Read more about copyright in chapter 4.3.

Quality issue (peer-review)

Some of the commercial publishers claim that OA will result in cancelling of journal subscriptions, and hence undermine the economics of the scientific publishing. This will again lead to the ruin of the peer-review system (European Commission, 2007). The commercial publishers are drawing an intimidating image where scientific articles are published on the Internet without any quality control or independent assessment.

But OA does not mean that the peer-review process is omitted. So far, the traditionally peer-review process is still in action in OA journals, but it is true that the publishers are experimenting with other approaches. In 2006, Nature did an open peer review trial which concluded that "despite the significant interest in the trial, only a small proportion of authors opted to participate" (Nature's peer review trial, 2006). Still Nature claims to continue to explore the participative uses of the web. Another example is PLoS ONE, an OA and interactive journal in science, the one mentioned in the introductory case, which, in addition to peer review, let the readers decide about the importance of the article through open review after publication. For an overview of other methods of quality assurance, see the EU-document about Open Access (European Commission, 2008, 54).

The issue of scientific recognition

Scholars write journal articles not only because they want to share their knowledge with peers but also, as said above, because publishing, especially publishing in journals with high Impact Factor, advances their careers. Traditionally, OA journals were considered of lower quality and impact by many sceptics, but according to Harnad and Brody (2004) this is changing and "awareness and visibility of OA articles are increasing year by year". OA journals have not yet managed to create themselves a brand image, so many researchers are still in the "wait and see"- phase (European Commission, 2008).

OA in the developing countries

Between the researchers from the industrialized world and from the developing countries there exists an imbalance when it comes both to chances to get published in the journals of international reach, and in access to scientific publication. Most of the developing nations have small or no tradition of scientific research and they do not have enough resources to establish a research culture (Salager-Meyer, 2008). Research is costly and demands a well developed infrastructure, human resources and sufficient funding.

Open Access to scientific publications can facilitate the developing countries' participation in research and in publishing. It can help scientists from these countries to keep up to date within their field of science and increase their opportunities to contribute to the research community. It may also mean increased visibility of research done in developing countries. This of course depends on affordable and flexible charges in OA journals.

Several initiatives have been taken in the area of facilitating access to research. The Access to Research Initiative (HINARI) provides free, or at very low cost, online access to the major journals in biomedical and related sciences to local, not-for-profit institutions in developing countries (http://www.who.int/hinari/en/). The same does Access To Global Online Research in Agriculture (AGORA) in the fields of food, agriculture, environmental science and related sciences (http://www.aginternetwork.org/en/index.jsp). Suber and Arunachalam (2005) are critical of these initiatives. They claim that they delay the development of an optimal solution for an open access system of scientific communication and that HINARI and AGORA "mitigate the access crisis but do not solve it".

There are some initiatives coming from developing countries themselves. Among these is Bioline International, a not-for-profit scholarly publishing cooperative committed to providing open access to quality research journals published in developing countries (http://www.bioline.org.br/). Others are: SciELO — a model for cooperative electronic publishing of scientific journals from developing countries, particularly from Latin America and the Caribbean countries (http://www.scielo.br/), and African Journals Online — an online service and non-profit organization to provide access to African-published research (http://ajol.info/).

To be able to fully exploit OA, the proper technology must be available. Internet connection is improving, but there is still need of investments in wireless and satellite connections (Salager-Meyer, 2008). It is also important to inform scientists in the developing countries about OA and constantly inform universities, libraries, funding-agencies and governments about the benefits of OA.

4.1.5. Selected directories of OA scientific journals and repositories

Directory of Open Access Journals (DOAJ) — lists all OA journals within all fields and languages (http://www.doaj.org/).

OpenDOAR — is an authoritative directory of academic open access repositories, both institutional and subject-based (http://www.opendoar.org/).

The SHERPA-RoMEO site — lists the publisher's permissions that are normally given as part of each publisher's copyright transfer agreement (http://www.sherpa.ac.uk-/romeo/).

In Norway there is **NORA** (http://www.ub.uio.no/nora/search.html) — a national gateway for institutional repositories. NORA harvests metadata from all Norwegian institutional repositories. For content to be harvested to the repository, it has to be OAI-compliant and follow the common metadata model.

PubMedCentral. In 1998 E-biomed was initiated by Harold Varmus, at that time director of National Institute of Health (NIH). He posed a call for comments regarding the proposal "E-biomed: a proposal for electronic publications in the biomedical sciences" (Varmus, 1999). The initiative, a federally funded freely accessible Internet-based archive of biomedical publications, both preprint (not peer-reviewed) and post-print (peer-reviewed), made waves in the scientific and publishing communities. E-biomed was launched the year after, in 1999, as PubMed Central and without the pre-print server. Kling, King and Fortuna (2004) give an interesting and detailed overview of this event. A tough start, nevertheless, today PMC is hosting several hundred journals and all NIH-funded research are obliged to archive their work in PMC.

PubMed Central must not be confused with **BioMed Central** — a commercial publisher of OA journals. They currently publish 206 OA journals (www.biomedcentral.com).

PLoS — Public Library of Science was funded in 2000 by Harold E. Varmus, Patrick O. Brown and Michael B. Eisen as an initiative directed to scientific publishers to make their literature available for distribution through free online public archives (www.plos.-org). The PLoS funders did not succeed in making the publishers convert their journals to OA, and decided to become publishers themselves (European Commission, 2008, 124). In 2003 they launched PLoS Biology and currently publish 6 OA journals. PLoS is based on author pays model and by late 2009 this funding model covered approximately 90% of the operating expenses. By 2010 they reckon they will be 100% self-sufficient (Public Library of Science, 2009).

Important to mention is also **SPARC — Scholarly Publishing and Academic Resources Coalition**, which was launched in 1997 by the Association of Research Libraries and is an alliance of academic and research libraries working to correct imbalances in the scholarly publishing system (http://www.arl.org/sparc/).

4.1.6. Scientific publishing — where are we heading?

When it comes to the future of scientific publishing, it is difficult to predict how it will evolve, but there are some signals pointing in the direction of Open Access.

OA is growing, although in many opinions, it is growing too slowly. Björk and Hedlund (2009) state that only 5% of all peer-reviewed articles are published in open access journals. Still too few established publishers are willing to change their business models and convert to OA. The established peer-review system attached to the traditional subscription model is too well incorporated. But the OA movement seems to be in constant evolvement, and will have great effect on the future of scientific publishing.

There are also statements from some funding institutions that all research they fund are to be published OA. For example, in 2004 The National Institute of Health (USA), the world's largest medical research funder and part of the U.S federal government, developed a policy requesting that all research funded from public resources be submitted to PubMed Central upon acceptance for publication and made accessible to the public. A major research funder in UK, The Wellcome Trust, also claims their funded research to be published in PubMed Central no later than six months after publication. And, on September 15th 2009 "Berkeley, Cornell, Dartmouth, Harvard and the Massachusetts Institute of Technology announced a joint commitment to provide their researchers with central financial assistance to cover open access publication fees, and encouraged other academic institutions to join them"(Cockerill, 2009).

Several other statements have been made, both by institutions, countries and coalitions. European Union committed to an Open Access policy research funded through Seventh Framework Programme (Suber, 2007a). The Research Council of Norway recently changed their general terms of contract and now has a passage about self-archiving of post-print articles in suitable repositories (Schjølberg, 2009). These kinds of actions are important arguments for all research to be published and disseminated in OA.

Another reason why OA **will** probably begin to gradually dominate scientific publishing is lower **costs** than that of traditional publishing. Recent reports from UK, the Netherlands and Denmark indicate that the open access publishing means reduced cost compared with publishing based on the subscription model (Houghton, de Jonge, and van Oploo, 2009; Houghton, et al. 2009; Houghton 2009). In UK the estimated savings from subscription model to OA model is $ 80 million (Houghton et al. 2009). In a comment to the Danish report Petersen (Petersen, 2009) states that much of the profit with an OA model is of social value, due to better access to research information. The cost-benefit analyses also show that money saved by the change from the traditional subscription model to OA will finance the transition cost.

For now, we still have the green and gold OA — two routes that will thrive together for a while with changes resulting in variations and hybrids of existing models. A system or several co-existing systems that can solve the problem of access, the impact, the archival functions and the finance are likely to emerge, but there will most certainly not be just one model dominating. One of the reasons for the slow process of transforming journals into OA is of course the strong position the commercial publishers have. They are earning big money and will not lose their profit. This also applies to some of the learned societies which now have a substantial income from selling their journals (Guédon, 2004).

At the same time new technology such as metadata and electronic new devices affect the way researchers communicate. Seringhaus and Gerstein (2006, 2007) point out the shortcomings of the article and foresee a centralized, digital index, and adding on-line information to the manuscripts. All are peer reviewed and inter-connected. Vitek Tracz, founder of BMC believes in a transformation of scientific publishing moving in the direction of research data that is visible and open for all to interpret, thus leaving the issue of peer-review superfluous (Poynder, 2005).

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Suggestions for exercises

Exercise 1: Find out whether your institution has policies regarding publishing of research (OA repositories or similar). Discuss in group the advantages and problems OA may cause.

Exercise 2: Discuss in small groups the shortcomings of the journal article in a contemporary technological perspective. Is it still suitable for publishing scientific research?

Exercise 3: Discuss librarians' role in development and organization of scientific publishing and OA? How can they contribute?

Suggestions for assignment to assess student's learning

Ask students to prepare a short ppt. presentations on certain aspects of publishing, e.g.: peer reviewing, Bradford's law, Impact Factor, multi-authorship, etc.

Teaching tips

In this chapter we have not discussed the process of publishing a paper from the researchers standpoint. This could still be something you will be asked to teach and Ann M Körner's book Guide to publishing a scientific paper gives a quick and perspicuous overview of the theme. Last edition is from 2008 and is published by Routledge. This book is dealing with every aspect of the process of publishing; how to prepare and submit for publication and how to revise a scientific paper.

In Magne Nylennas book Publisere & Presentere: medisinsk fagformidling i teori og praksis (Gyldendal, 2008) you will also find a comprehensive coverage of most aspects of writing and publishing medical scientific research. It covers also theory of information and knowledge. This book is in Norwegian but includes a chapter (in English) on writing in English by Stephen B Lock.

Additional readings and links to teaching materials

Brown, H. How impact factors changed medical publishing — and science. BMJ 334, 561–564.
There are different views regarding impact factor. This article discusses gives a lot of interesting aspects.

Development of science publishing in Europe (1980). Ed. A. J. Meadows. Elsevier.
If you want to deepen you knowledge about the history of scientific publishing this is a good reading.

The future of the academic journal (2009). Ed. Bill Cope and Angus Philips. Chandos Publishing.
An interesting book about the future of scientific publishing.

Guédon, J-C. In Oldenburg's long shadow: librarians, research scientist, publishers, and the control of scientific publishing, www.arl.org/resources/pubs/mmproceedings/138guedon.shtml
For a thorough discussion on the development of scientific publishing you should read this position.

NIH Public Access Policy (ppt. presentations). Public Access Communications and training (http://publicaccess.nih.gov/communications.htm).

Useful presentations for teaching about OA

Peter Subers' timeline. www.earlham.edu/˜peters/fos/timeline.htm and overview, www.earlham.edu-/˜peters/fos/overview.htm
An excellent source to keep updated about the development of OA.

CHAPTER 4.2.

Publication types, structure of scientific publications and editorial requirements

Karin Bakkemo

Once...

One afternoon at the library reference desk a librarian got the following question from a student doing a master's degree in nursing having passed her bachelor degree 20 years ago: "Could you help me find some references about pediatrics? I had already finished my assignment about hygiene of children in hospitals, but my supervisor tells me that I must have references. I have cited our textbook "Pediatric nursing" and an article that I found in "Good Housekeeping Magazine". The teacher says that I need scientific articles. How can I know if an article is scientific?"

As the librarian had gotten two similar questions earlier on the same day, she realized that it would be useful to include something about different publication types in the library course that she was just preparing for students.

Introduction

In this chapter we want a teaching librarian to become familiar with the different publication types and structure of research publications. The problems connected with publishing will only briefly be touched. The librarians who want to teach users about how to write publications, have to acquire much more in depth knowledge of these issues. They will find more about this in recommended readings.

4.2.1. Publication types

There are different definitions and classifications of scientific publication types. Below are listed some of them, of current interest in a medical and health related context. The definitions are mostly based on the definitions of the National Library of Medicine (NLM). For a complete list and full definitions go to: www.nlm.nih.gov/mesh/-pubtypes.html

When teaching about publication types, you can start with the type that is probably the most familiar to your students — a book.

Books

In a scientific context this will often be a monograph (from Greek monos: alone and grafein: write). A monograph is a scientific book written by a specialist for other specialists usually critically reviewed and edited by the publishing house consultants. According to the National Library of Medicine, a monograph is a publication that is not a serial or integrating resource. It is usually on a single subject or related subjects and is complete in itself and constructed of chapters, sections, and parts.

Some academic publishers issue monographic series — scientific books published in successive volumes, but structured as separate monographs. Discipline, type, focus or type of work is connecting the volumes of the series.

Textbooks

A textbook is a book intended for use in the study of specific subjects, pedagogically constructed, containing a systematic presentation of the principles and essential knowledge of the subjects. It is designed to serve a broader and less specialized audience. An example is a students' textbook. It might also be a guide, a compendium, an encyclopedia or a dictionary, etc. According to Oxfords Advanced Learner's Dictionary it is a book giving instructions on how to use something or information about a particular subject. It contains the basics on a subject expressed in short articles and announcements arranged for ready reference and consultation rather than for continuous reading and study.

Conference proceedings

Often manuscripts or power points presentation at a conference are published by the conference organizers. Conference papers have traditionally been a premature announcement of new research discoveries. In about 50% of the cases, conference papers will result in an article in a peer reviewed journal (Pearson, 2004, von Elm, 2003). These proceedings or conference materials belong to an area of the so called "grey literature" The same applies to research reports, unpublished dataset and internal institutional works.

Dissertations

The word dissertation comes from the Latin dissertātiō, meaning "discourse". A dissertation is a document submitted in support of candidature for a degree or professional qualification, presenting the author's research and findings.

Reports

Reports may have many forms — a detailed description of work done, a statement, note, message (about an event, occurrence, fulfilled/effectuated assignment). Reports can be divided into: scientific reports, workplace reports, recommendation reports, white papers, annual reports, auditor's reports, trip reports, investigative reports, budget reports, policy reports, demographic reports, appraisal reports, inspection reports, etc.

Statistics reports

Works consisting of presentations of numerical data on a particular subject.

Practice guidelines

Practice guidelines are documents with the aim of guiding decisions regarding diagnosis, treatment etc. in various areas of healthcare. They contain statements, directions, or principles presenting current or future rules of doing things or policy (NLM definition). Guidelines may be developed by government agencies at any level, institutions, organizations such as professional societies or governing boards, or by the convening of expert panels.

Clinical guidelines briefly identify, summarize and evaluate the highest quality evidence and most current data about the core questions in the health care field (prevention, diagnosis, prognosis, therapy). The most important questions related to clinical practice are defined and all possible decision options are stated.

The Norwegian Health Library (Helsebiblioteket) has a database consisting of Norwegian clinical guidelines and treatment alternatives. www.helsebiblioteket.no/Retningslinjer.

Guidelines International Network (GIN) has the largest library of international guidelines www.g-i-n.net/.

The latest results of knowledge and research are not published in books. The publishing process of a book is time consuming, and by the time the book is ready to be published new findings are already announced in other channels like journal articles. We may differentiate between a journal article and a research article although both are published in scientific periodicals.

Journal article

A journal article gives a person's point of view on a particular subject, e.g. nutrition of the elderly in a nursing home — not being directly based on research, but written by an academic based on his/her knowledge and experience. Sometimes databases differentiate between journal articles and research articles.

Research article

A research article presents results of research conducted by scientists. The original research article presents results of an original study and the authors make conclusions on the findings only from this particular study.

Review article

A review article provides an examination of literature on a particular topic. The range of material reviewed and evaluated may be broad or very specific. A review article can be systematic or non-systematic depending on the method for data collection. Remember that the review article never gets better than the independent studies included in it.

Literature Review

A literature review is a compilation of the research that has been done on a particular topic. The purpose is to present a summary of what is and what is not known, identify gaps or areas of controversy, and to identify the strengths and weaknesses of the currently published works in the subject that is investigated.

The NLM definition says: “It may be comprehensive to various degrees and the time range of material scrutinized may be broad or narrow. The textual material examined may be equally broad and can encompass, in medicine specifically, clinical material as well as experimental research or case reports. State-of-the-art reviews tend to address more current matters. A review of the literature must be differentiated from the historical article on the same subject, but a review of historical literature is also within the scope of this publication type”.

Meta-analysis

Work in which the results of independent studies are combined. Meta-analysis uses a statistical method that analyses results from 2 or more studies as if they were one. Making a meta-analysis demands comparable study design and data.

Systematic review

What differs a systematic review from a “regular” one is the method of conducting and reporting the review. A systematic review tries to identify, appraise, select and synthesize all high-quality research evidence relevant to a research question. The seven steps for preparing a systematic review, as outlined by the *Cochrane Handbook* are: formulating the problem, locating and selecting studies according to predefined criteria, critical appraisal of the studies, collecting data, analyzing and presenting results, interpreting the results, improving and updating the systematic review. The method of doing a systematic review has to be carefully reported in a final report or publication.

4.2.2. The Structure of scientific publications

In addition to the description of the most relevant publication types, the students also will need to know what the proper structure of a scientific publication looks like if they are going to become familiar with the academic sphere.

Throughout the years the collaboration between researchers-authors, editors and readers has accumulated in norms for structuring scientific articles both in the abstract and the main body of the article. The most well known format used in medical journals is IMRAD (Introduction, Method, Results and Discussion). This structure applies mainly to quantitative research, but is also used in qualitative studies.

The focus of any scientific investigation is to try to provide an answer to a specific research question. Though there are four more general questions to be answered in any research and these questions are reflected in the IMRAD formula.

IMRAD

IMRAD is short for:	
I = introduction	(why did you do it/what question was asked?)
M = methods	(how did you do it)
R = results	(what was found?)
And	
D = Discussion	(what do the findings mean?)

IMRAD as a way of structuring scientific publications has been known for a while, but has not really been in use since just after of the Second World War. The use of it became popular in the 60s and the 70s. Today it prevails in research publications in medicine (Sollaci, 2004), and are believed to improve the quality of the publication (Nakayama, 2005, Des Jarlais, 2004). Most of editorial boards require authors to follow the IMRAD, or other similar structure, when writing a paper.

Another way of structuring a scientific publication is The 8-heading format: Objective, Design, Setting, Patients, Interventions, Main outcome measures, Results, Conclusions. This design will be often used in qualitative research. The 8-heading format may be compared to IMRAD in the following way (Nakayama, 2005):

IMRAD	8-heading format
Introduction	Objective (the exact question)
Method	Design, Setting, Patients, Interventions and Main outcome measures
Results	Results
Discussion	Conclusions

4.2.3. Editorial requirements, instructions for authors

Participants of information literacy courses do not rarely face the problems of preparing an article which they want to publish. Such an article has not only to be trustworthy and interesting, but the manuscript has to follow a very strict format to be preliminary accepted by the publisher. Later the article will go through the peer review process (See more in Chapter 4.1.), but at the very beginning certain technical and formal requirements of the publisher have to be met.

Editorial requirements differ from one journal to another. Every scientific journal has its own specific requirements. Normally the requirements are published on the journals web pages or/and somewhere in the journal itself.

A scientific medical or health sciences article usually consists of the following parts, although there may be some differences, e.g. in case of qualitative research or descriptive articles.

Title

The title should contain information about the aim of the article and study design. Reading only the title is supposed to convey a concise, accurate message about its content. The title should neither be too short nor too long. It should not contain professional slang words or abbreviations, and has to match strictly the content of the article.

Abstract

The key issue of an abstract is to give a precise short summary of the content of the article. The abstract must not be misconcepted with the introduction. Each journal indicates the maximal length of the abstract. Accuracy of information is demanded for quickly understanding of the content of the paper.

There are structured and unstructured (narrative) abstracts. A structured abstract will be more detailed than traditional ones, thus it (often) contains more information and appears easier to read (Nylenna, 2009). In qualitative research the unstructured abstract, in its narrative form, is more common, although Des Jarlais (2004) recommends that also in qualitative papers "An article should be provided with a structured abstract (as a minimum: background, aims, sample, methods, results"). Nowadays, accepting the fact that the abstract is often the only part of the article read, most journals demand that scientific articles contain a structured abstract, the structured abstract in short reflects the IMRAD or similar structure of publication.

Abstracts should be written as the last part of the writing to cover all changes that were done during the writing process.

Keywords

Authors are requested to provide their articles with key words that best describe their content. In health related journals these keywords often are taken from the MeSH vocabulary, or other appropriate controlled vocabulary.

The title, abstract and keywords are all important for retrieving the article later on from the databases. Even though skilled database indexers read through the articles and add appropriate Mesh, or other headings, to the record of the publication, precise title and author's keywords can help them do this right. This extra information is also very important for effective retrieval, especially in free text mode of searching. (Read more in Chapters 2.1 and 2.2)

Introduction

The introduction should be short and specific and give the reasons why the scientific question was asked (or a hypothesis posed), and why the study was undertaken. The important role of the introduction is to convince the reader to continue reading. According to Cook (2009) the introduction should:

- explain the significance of the topic
- describe the information gap associated with the topic, showing how this research is filling this gap in knowledge
- give literature reviews in support of the key question
- state the main objective(s) of the paper

Method

Comprehensive reporting on the method and techniques used in a study and on analyses of data is important and obvious. It should be written thoroughly and clearly so that the study could be repeated by other researchers. The writer should demonstrate complete transparency when describing procedures and statistical analyses. Inadequate reporting in the "Method" part is the main reason for rejection of articles by the reviewers (Cook, 2009). And as a result of this, the journal editors do not accept articles for publication.

Results

This part should contain "non-opinionated non-emotional presentation of the result of the study" (Cook, 2009). The meaning of the results should be clearly presented. And in the most adequate form, there would be both text, figures and tables. Analysis of results should not be presented and discussed in this chapter. This is to be done in the part called "Discussion". It is advised to use figures and tables to simplify and shorten the presentation and to avoid unnecessary words. Tables and figures must give adequate information and should not be used for small amounts of data. In such case it is better to use text explanations. When sending the manuscript to the publisher, it is wise to mark in the manuscript where tables and figures are to be inserted, and to attach them in separate files to avoid problems with formatting.

Discussion

The discussion is often considered the as most difficult chapter to write, structuring the text in this part of the paper will help a lot. According to Cook the "Discussion" may be divided into four paragraphs (Cook, 2009):.

The first paragraph starts with summing up the main results of the research. It also gives information on what is the strength and weakness of the study; does it support or alter knowledge in this particular field; does it create new knowledge; if yes — how? In this part authors can explain why the study gives unique information compared with other similar studies. The author(s) can also point at the shortcoming of the study and give alternative explanations of the results.

The second paragraph may tell how the findings correspond with former relevant studies.

In the third paragraph the reasons for the study are reminded, ideas for future investigations can be expressed, and the author can reflect upon the importance of the study.

In the fourth paragraph the author should state what was done to overcome the limitations of the study and turn the reader's attention to its weak points.

Conclusions

In this part the conclusion based on the main findings should be stated refraining from repeating the abstract or facts from other parts of the article.

The most important findings and the study's weakness are taken into consideration. This will most certainly contribute to the study's credibility.

Note: English seems to be the common language of scientific publishing in the health related field nowadays, contributing to the better dissemination of research results. For non-native English writers it will be a good idea to use a professional proofreader (Cook 2009). In additional readings you will find some good articles on how to improve your academic writing and how to increase chances of getting your article published.

References

First and foremost all authors should be advised to take great care in referring to all publications and other documents used in the article. All cited references should be indicated in the text and listed at the end of the article. The goal is to secure, that contribution of ideas and findings from other sources is stated. This is very important for the authors' academic reputation because accusations of plagiarism the will be averted. (Read more in 4.4)

Sometimes, an additional bibliography list can give the reader information about extended readings on the topic. In "Instruction for authors" in the different journals the preferred reference style is stated. Within medicine and health two major reference styles dominate.

Vancouver style. In this style the references are numbered in order of appearance in the text, and in this order written down in the reference list. In the text the reference number is given in a bracket like this (17). The Vancouver style was developed by the International Committee of Medical Journal Editors — www.icmje.org and agreed upon on a meeting in Vancouver in 1978, and that it the reason for its name. Vancouver style is dominant in the biomedical journals.

Harvard style. In this format the author and year of publication is cited in the text in brackets (Nylenna, 2009), and the reference list is ordered alphabetically. This style is most commonly used in social and other sciences. The Harvard style has very many variations, depending on the publisher. One of the most well known is the APA style developed by The American Psychological Association. Used in psychology, pedagogy and health studies.

Defining and implementing a style required by a particular journal, can easily be done by using a reference managing software (like e.g. Ref Works or Reference Manager). Read also paragraph 4.2.5. The authors are usually allowed to cite as many references as they need, but some journals have a limit here.

Acknowledgements

In the "Acknowledgements" authors include some important statements, like for example: a declaration of lack of conflict of interest, information about the research funding, give thanks to the contributors.

A conflict of interest ties to activities that could inappropriately influence the authors judgment, regardless of whether or not it is affected" (Medical Journal Editor's 2003). All possible conflict of interests, financial or ethical (acquaintances, relations, etc.) should be stated, meaning the study was fulfilled in a responsible and ethical manner.

In this paragraph author(s) also can thank those who made a substantial contribution to doing the study or writing the article, and explain how and what the contributions were about.

Tables & figures

Each journal has its own guidelines to be closely followed in regard to format of the tables and figures, as it was in regard to citations or reference style. Most journals print only in black/white when making tables, that is why colour coding of columns is not advisable. Tables and figures should be understandable on their own, without having to read the article. This is why the tables and figures have to carry clear descriptive titles.

There are many more technicalities about tables, figures, cover letter, corresponding author, etc., which are omitted in this short overview. Each time the authors want to submit an article for publication they have to carefully read the "Instructions for authors" to be in compliance with editors requirements.

4.2.4. Guidelines for health research reporting

In recent years a lot of work has been done to develop standardized checklists to use when different types of reports are to be published.. These checklists offer a standard way for authors to prepare reports of research findings. They facilitate complete and transparent reporting, and help in critical appraisal and interpretation of research results. These standards assist the authors in structuring the material and they are functioning as a memory-list in the writing process. Standards are shown to improve the quality of articles (Nylenna, 2009; Plint ,2006; Des Jarlais, 2004)) and also to make it easier for the readers to find their way through the articles.

One of these standards is the CONSORT (Consolidated standards of reporting trials www.consort-statement.org). According to the Consort homepage, more than 400 journals now endorse the CONSORT statement, including: The Lancet, BMJ, JAMA and New England Journal of Medicine. There are other standards, e.g.: STARD (Standards for the Reporting of Diagnostic accuracy studies www.stard-statement.org) — a checklist for diagnostic accuracy trials, and PRISMA (Transparent reporting of systematic reviews and meta-analyses www.prisma-statement.org) — for systematic reviews and meta-analysis (former name — QUOROM).

All standards are collected on a website called EQUATOR (Enhancing the Quality and Transparency of Health Research www.equator-network.org). The most important medical journals demand that authors follow guidelines, to the benefit of all, the publisher, the authors and the readers. For a further overview of the different checklists see Johnson (2009). More about critical appraisal read in Chapter 3.4.

4.2.5. Tools for bibliographic management

The purpose of this section is to draw the teaching librarians' attention to some frequently used reference managing systems. These systems are used by researchers and academics to keep track of their own publications and for making indexes of books, scientific articles and other publications collected for research or educational purposes (e.g. to prepare reading lists for students).

Teaching librarians can be asked to give instruction on how to use these systems. Generally these programs are licensed, but one may find some Open-Source Software as well, e.g. I, librarian, BibDesk or Refbase. All systems listed below are licensed.

Using such a bibliographic management tool, one can easily import, save and organize items found in databases or in papers or books, and build one's own searchable database of references. This can be: bibliographic addresses, images, or full text articles. All major bibliographic databases have an exporting function, which co-operates with this software. Bibliography management programs may also be used to link references to full text articles. Additionally they allow formatting reference lists while writing a paper, a function called "cite while you write". All major styles, as demanded by the various journal publishers, are supported by this software. The most frequently used licensed software is presented below.

EndNote — Developed by Thomson Scientific (later reorganized as Thompson Reuter). All citations are created into an "Endnote library" either on one's own computer or on a common server which makes it easy to share the references and collaborate with others.

Reference manager — a reference management program distributed by Thompson Reuters. Developed by Ernest Beutler in the early eighties. Often used when the most important aim is sharing and commenting reference records.

RefWorks — from Proquest. Your "library" of references is stored in a Proquest server which allows users to share data with other users. Then "your library" is accessible from anywhere.

ProCite — also distributed by Thompson Reuters. What seems to differentiate it from other management software (according to its homepage) is that it allows to **share references in a network,** capture references from a web page, and also search database with numerous operators which cannot be found in other programs, such as: *equal, not equal, greater than, less than, greater than or equal to, less than or equal to, begins with, ends with, exactly, contains..*

CITAVI — recently developed by Swiss Academic Software program which supports users through the entire process of scholarly work, not just creating bibliographies.

There is a lot of reference management software in use not mentioned here — both commercial and Open Source. For more information, follow this link to Wikipedia which gives an overview: http://en.wikipedia.org/wiki/Bibliography_manager

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Cochrane handbook. http://www.cochrane.org/training/cochrane-handbook.

CONSORT — http://www.consort-statement.org/now-published-consort-2010-statement

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Des Jarlais, Don C, Lyles,C„ Crepaz, N. (2004). Improving the Reporting Quality of Nonrandomized Evaluations of Behavioral and Public Health Interventions: The Trend Statement. *American Journal of Public Health*, 3(94), 361-66.

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Johnson, C., Green, B. (2009). Submitting manuscripts to biomedical journals: common errors and helpful solutions. *Journal of manipulative and physiological therapeutics*, 32(1), 1–12.

Knight, K. L., Ingersoll, C. (1996) Structure of a Scholarly Manuscript: 66 tips for What Goes Where. *Journal of Athletic Training*, 31(3), 201–206.

Mathieu, S. (2009). Comparison of registered and published primary outcomes of randomized controlled trials *JAMA*, 302(9), 977–84. Downloaded from www.jama.com via Helsebiblioteket 14.01.2010.

Medical Journal Editor's uniform requirements for manuscripts submitted to biomedical journals (2003. *Journal of Wound Care*, 12(5), 171–76.

Nakayama, T., Hirai N., Yamazaki, S., Naito, M. (2005). Adoption of structured abstracts by general medical journals and format for a structured abstract. Journal of the Medical Library Association, 93(2), 237–242

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Pierson, D.J. (2004) The top 10 reasons why manuscripts are not accepted for publication. *Respiratory care*, 49(10), 1246–1252.

Röhrig, B., du Prel, J-B., Wachtlin, D., Blettner, M. (2009). Types of Study in Medical Research — Part 3 of a Series on Evaluation of Scientific Publications. *Deutsches Ärzteblatt International*, 106(15), 262–68.

Sollaci, L., Pereira, M.G.. (2004). The introduction, methods, results and discussion (IMRAD) structure: a fifty-year survey. *Journal of the Medical Library Association*, 92(3), 364–367.

Von Elm, E., Constanza, M.C., Walder, B., Tramèr, M.R. (2003). More insight into the fate of biomedical meetings abstracts: a systematic review. BMC Medical Research Methodology, 3:12. Downloaded at www.biomedcentral.com/1471–2288/3/12

Suggestions for exercises

Exercise 1: Hand out examples of different types of articles to your students. Ask them to discuss in small groups what kind of articles these are. Ask them to write down and present the short characteristics of each.
Exercise 2: Find a research article and point out the IMRAD structure. Organize a discussion on: what are the advantages and disadvantages of using the IMRAD structure when writing an article.

Teaching tips

When teaching about publications structure of publications and editors' requirements bring with you some copies of the different journals, and different types of articles to exemplify to your students what are the differences and possible soulutions.

To make the student reflect on their learning, ask them 10 min before the end of the class: "What was the most important item you learned from today's lesson".

Additional readings and links to teaching materials

Brumbach, R. A. (2009) Success at publishing in biomedical journals: hints from a journal editor, *Journal of Child Neurology*, 24 (3), 370–78.

Von Elm, E., Costanza, M.C., Walder, B., Tramèr, M.R. (2003) More insight into the fate of biomedical meeting abstracts: a systematic review. *BMC Medical Research Methodology*, 3(1), 12–22. Downloaded from PubMed 29.01.10 at http://www.biomedcentral.com/content/pdf/1471-2288-3-12.pdf

Gustavii, B. (2005). *How to Write and Illustrate a Scientific Paper*. Cambridge, Cambridge University Press.

Nylenna, Magne (2008) *Publisere & presentere. Medisinsk fagformidling i teori og praksis*. Oslo, Gyldendal Includes chapter by Lock, S. P. (2008) Writing in English. In Nylenna, M. Publisere

& presentere. Medisinsk fagformidling i teori og praksis. Oslo, Gyldendal, which gives very good advice on how to improve your English writing ability

Reid, N. (2010). *Getting Published in international journals: writing strategies for European Social Scientist*. NOVA.

Contains also a chapter on how to improve your English writing ability

Thompson, A. (2006) How to write an English Medical Manuscript that will be published and have impact. *Surgery today*, 36, 407–409.

Stenius K, Mäkelä K, Miovsky M, Gabrhelik R (2008). *How to Write Publishable Qualitative research In* Publishing addiction science: a guide for the perplexed.

Babor, Kerstin Stenius, Susan Savva and Jean O'Reilly. London]: *International Society of Addiction Journal Editors*. Downloaded 14. 09. 2010 available at: http://www.parint.org/isajewebsite-/isajebook2.htm

Watała, C. (2005) How to publish (more) effectively? Commentary to hints and tricks in the scientific publication, *Archives of Medical Science*, 1 (4), 201–204.

The paper presents a plan of preparing an outline of a final manuscript. It is addressed to young researchers.

Wojnarowska, B. (2008) Zasady przygotowywania artykułów do czasopism naukowych. (Principles of preparing articles for scientific journals)) *Medycyna Wieku Rozwojowego*, 12 (3), 804–808.

In this paper stages of manuscript development, practical rules concerning preparing of its sections and writing paragraphs are described.

Zejda, JE. (2006) Medyczny artykuł naukowy. Zasady dobrej praktyki publikacyjnej. (Scientific article in medicine. Principles of good practice). *Annales Academiae Medicae Silesiensis*, 60 (4), 323–329.

The paper discusses the role of publication style, informative title and the structure of abstract. Author reviews basic determinants of good quality of conventional sections of an article.

Links to reference management software tutorials

http://endnote.com/support/ensupport.asp
http://www.refman.com
http://www.refworks.com/
http://www.procite.com/
http://www.citavi.com/en/index.html
http://www.refbase.net/index.php/Web_Reference_Database
http://bibdesk.sourceforge.net/
http://www.bioinformatics.org/librarian

APA short guide — with examples and some EndNote help: http://library.curtin.edu.au/local/docs/-referencing/apa.pdf

Vancouver referencing — with examples and some EndNote help: http://library.curtin.edu.au/-local/docs/referencing/Vancouver.pdf

Comparisons of reference management software can be found at the following web addresses:

"Bibliographic Software Comparison Chart for Endnote, Reference manager and Procite": www.Adeptscience.co.uk/products/refman/endnote/chart.html
http://en.wikipedia.org/wiki/Comparison_of_reference_management_software#Export_file_format
http://ask.metafilter.com/58092/Which-reference-management-software-should-I-use
http://library.fiu.edu/LinkClick.aspx?fileticket=Od%2FLIvt8tpQ%3D&tabid=468
http://openwetware.org/wiki/Software_for_reference_management_and_bibliographies
http://www.burioni.it/forum/ors-bfs/grid/index.html

CHAPTER 4.3.

Copyright — introduction and international framework

Anne Stenhammer

Once...

A lecturer in nursing at the university college was troubled by the restrictions that copyright law placed upon her ability to assemble and distribute course materials. She was considering writing a short newspaper article, arguing that her nation's copyright law should be reformed to give teachers and students more latitude. However, she had heard that international agreements may restrict the freedom that each country enjoys in defining its own copyright laws. Before drafting her article, she asked one of the librarians in the university college library for help in determining which, if any, international agreements were applicable in their own country.

Introduction

Being a teaching librarian you probably get copyright questions at the reference desk, from students, faculty teachers and colleagues. To answer these questions you will have to know the specific legislation in your country, but as a background you'll need general understanding on copyright. In spite of the fact that acts and regulations are territorial, no country's copyright regulations live in a juridical vacuum. Due to increasing trade of intellectual property across borders, each country is obliged to follow any bilateral or multilateral convention that the country has acceded to.

In this chapter we will introduce copyright, the international framework of copyright, and also point out some initiatives taken to harmonize laws and regulations.

A library's main mission is to facilitate information access. Traditionally this has been accomplished by lending out physical documents. This will in all likelihood continue to be the case, but to meet their users' requirements libraries and teaching librarians also need to keep up with new technologies in making documents available. Copyright is a challenging topic, and a juridical field where legislators are criticized for not being able to keep up with the rapid changes in digital publishing. Students can quite easily plagiarize texts (see chapter 4.5) or publish documents illegally. The role of a teaching librarian is to contribute to making an impact (together with other teachers) when it comes to increasing students' awareness of what plagiarism is, and changing attitudes on plagiarism. The backdrop will be knowledge of national regulations of copyright and citation rights.

4.3.1. Copyright — definition

Copyright legislation is part of the wider body of law known as intellectual property. The term intellectual property refers broadly to the creations of the human mind. Intellectual property rights protect the interests of creators by giving them property rights over their creations. There are two branches of intellectual property: Industrial Property and Copyright (Understanding copyright and related rights. WIPO).

Industrial property includes patents to protect inventions, industrial designs and trademarks, whereas copyright relates to artistic creations such as books, music, paintings and also technology-based works such as computer programs and electronic databases.

This chapter will focus on copyright, and a short definition of it may be:

> Copyright is a legal concept that grants authors and artists control over certain uses of their creations for a defined period of time. It limits who may copy, change, perform, or share those creations.

In most languages copyright is known as an author's rights. Most laws recognize that the author has certain or specific rights to his creation, which only he can decide on, such as the right to prevent a distorted reproduction. Other rights, such as the right to make copies can be exercised by others, for example a publisher, who has obtained a license from the author (Understanding copyright and related rights WIPO).

For a work to be considered intellectual property, it must be characterised by independent and personal effort on the part of the author, i.e. it must meet the requirement for being a creative endeavour. Copyright laws only protect the form of expression of ideas and not the ideas themselves. No requirements apply to the quality of the work. Protection arises upon the creation of the work, and it requires no marking (e.g. the copyright mark) or other registration (Forvaltning av opphavsrettigheter i Norge. — Clara / Information Centre for Copyright and Clearance in Norway — Clara).

4.3.2. Rights protected

The rights granted under national laws to the owner of copyright in a protected work are normally exclusive rights to authorize a third party to use the work.

Most copyright laws state that the author of a work has the right to authorize or prevent the following:

- Reproduction in various forms

- Distribution of copies
- Public performance
- Broadcasting
- Translation into other languages
- Adaptation, such as, in example, a novel into a screenplay

The most basic right is the right to prevent others from making copies of your copyright protected work.

The right of distribution usually terminates upon first sale or transfer of ownership of a particular copy. This means, for example, that when the author of a book sells or otherwise transfers ownership of a copy of the book, the owner of that copy may give the book away or resell it without the authors' further permission (Understanding copyright and related rights. WIPO)

Economic and moral rights

There are two types of rights under the copyright umbrella : economic and moral rights. The Berne Convention for the Protection of Literary and Artistic Works (further defined under 4.3.4) requires its member countries to grant authors the rights of integrity and the right to paternity (Børde 2008). These are known as the moral rights of authors and are independent of the authors' economic rights, as they remain even if the author has transferred his economic rights.

The economic rights give the author the exclusive right to dispose of his/her work. The exclusive right gives the right to collect compensation for usage. The moral rights of the creator give the creator the right to be referenced/referred when using the work and the property owner has the right to take action against misuse (Copyright for librarians: Copyright and the Public domain. Module 1: http://cyber.law.harvard.edu/copyrightforlibrarians/Main_Page)

Duration of copyright

In general, one may say that the period of duration of copyright is from when the work has been created until sometime after the death of the author. In countries party to the Berne Convention the duration of copyright is the life of the author and not less than 50 years after his/her death. There is a trend in a number of countries towards lengthening the duration of copyright. The European Union has for example extended the termination of copyright to 70 years after the death of the author (Understanding copyright and related rights. WIPO)

Limitations on rights

Some works are excluded from protection. For example works of choreography would only be protected once the movements were written down or recorded (Understanding copyright and related rights. WIPO)

The so called 'free use' carries no obligation to compensate the rights owner for the use of his work without authorization. An example of free use is quoting from a protected work, provided the source and the authors' name is referred to, and that the extent of the quotation is compatible with fair practice, or the use of works when used to illustrate something, for example in teaching situations.

Many laws allow individuals to reproduce works of others for their personal, private and non-commercial use.

Ownership and transfer of copyright

As stated before the copyright owner is in the first instance the person who created the work. Nevertheless, some laws determine that work created by an author employed for the purpose of creating that work is to be owned by the employer. In these cases it is important to hold on to the fact that the moral rights remain to the individual author, even though the employer has economic rights to his/her work.

Authors may sell their work to companies best suited to market their works in return for payment. Payment is usually based on the use of the works and is called "royalties".

Under collective administration of rights authors and other rights owners grant exclusive licences to a unit which can act on their behalf. These organisations work to prevent and detect infringement of rights and collect and distribute payments. Countries have several units protecting different professional groups, like musicians and authors, and also units to take care of the rights of broadcasted programs etc.

The rights management organizations are run by the rights holders directly or through their associations, and are as such non-commercial.

4.3.3. Creative Commons

If the right owner decides to give free access to his works without being paid, he is of course free to do so.

Creative Commons (CC) is one of several systems made to meet the needs of authors who want to share their work. It is a **non-profit** corporation dedicated to making it easier for people to share and build upon the work of others, consistent with the rules of copyright (Børde 2006) .

According to www.creativecommons.no the idea of Creative Commons is to create a flexible framework which makes it possible for the right owner to share, in whole or partly, his copyright. It contains sets of free licences to regulate accessibility, use and reuse/reutilization of works.

The six different licenses have different logos and are all grounded on one absolute demand: Protection of the right owners' moral rights or attribution:

The six licenses reflect different demands from the author:

1. Attribution alone
2. Attribution + noncommercial (only noncommercial use allowed)
3. Attribution + NoDerivs (no further development or change allowed)
4. Attribution + ShareAlike (further development and change allowed)
5. Attribution + Noncommercial + NoDerivs (
6. Attribution + Noncommercial + ShareAlike (further development allowed, but only noncommercial use)

The most frequently used CC-license is the one allowing free copying if it is noncommercial. For librarians (and also for users themselves) this means that if they find documents on the Internet with this kind of license they may publish them on their website, send them to end-users by for example e-mail or they may print them out and hand them out to the user, as long as the institutional use is noncommercial. The reason, of course, being that the right owner has given his permission in advance.

Authors may tag several different CC-licences to their document. A document here is widely defined, encompassing all kinds of printed text or multimedia.

A search for documents tagged with CC-licences in Google and Yahoo! displays many blogs and wikis, but also some respectable research articles published in Open Access journals (Read more about OA in 4.1) Both, Biomed Central and Cochrane Library contain CC-licensed documents (Flood, 2006).

The critics against Creative Commons claim that the system does not represent anything new, beyond what international laws already wouldn't cover. Additionally, breaking the 'rules' of CC will not give any consequences, unless you did not break a rule already covered in international law (Dvorak, Creative Commons Humbug)

An answer to the critics of Creative Commons is summed up in the Even Floods article (2006) and states that CC is based on the possibilities in existing laws, possibilities which are not followed up otherwise. CC is not meant to replace laws, but comes in addition to them. A Creative Commons license clearly communicates how the author wants his work to be treated, i.e. that a photo from an accident taken with a mobile phone can be used without asking the rights owner for the use of each copy. Flood states, that even though CC-licenses held no legal power many professionals groups recognize CC to be an important factor for communicating information on the web.

4.3.4. International conventions and regulations

If copyright legislation were only valid within the borders of one country, the legislation would be of relatively small value. It would imply that works from one country would not be protected in another country. International conventions guarantee copyright protection internationally.

The most significant international convention is the Berne Convention for the Protection of Literary and artistic Works (http://www.wipo.int/treaties/en/ip/berne/trtdocs_wo001.html). This convention regulates how other countries' rights owners and foreign works are to be treated. In other words: the Berne Convention does not say anything about how each and every member state should behave towards their rights owners or national works. No matter how poorly a particular country may treat its own copyright holders, all foreign copyright holders and foreign works are protected according to the standards of the Berne Convention.

The World Intellectual Property Organization (www.wipo.int) is an International organisation, and an agency of the United Nations, dedicated to ensuring that the rights of creators and property owners are protected worldwide, and that the inventors and authors are recognized and rewarded for their work. WIPO is also involved in the debate on making new standards for copyright protection in cyberspace.

WIPO now administers 23 international treaties on copyright and related rights (links to all treaties can be found at: http://www.wipo.int/treaties/en/). These are the most important aspects of copyright protection:

- Berne Convention for the Protection of Literary and artistic Works
- Brussels Convention Relating to the Distribution of Program-Carrying signals transmitted by satellite
- Geneva Convention for the protection of Producers of Phonograms against Unauthorized Duplication of their Phonograms
- Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting organizations
- WIPO Copyright Treaty (WCT)
- WIPO Performances and Phonograms Treaty (WPPT)

WIPO exists as a forum for its member states to create and harmonize rules and practices in the copyright field (Understanding copyright and related rights. WIPO).

Each member country is obliged to follow any bilateral and multilateral convention which the country has acceded to (Rognstad, Lassen, 2009)

The field of copyright has expanded dramatically with technological development. Creations are now easily spread worldwide through new means and channels of communications, such as satellite broadcasting, CDs and DVDs, and of course the Internet. This draws the background for the dramatic evolution of new national and international enforcement standards in recent years.

It's interesting, that computer programs are not included in the Berne Convention. Nevertheless computer programs are protected under both the WIPO Copyright Treaty, as well as under the copyright laws of a number of countries (Understanding copyright and related rights. WIPO)

The EU system has carried out several directives to protect immaterial rights, and EU and EEC countries are obliged to harmonize their national regulations according to EU directives (Børde, 2008). The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) also shows the link between trade and Intellectual Property. The TRIPS-agreement is defined below.

The Trade Related aspects of Intellectual Property Rights Agreement (TRIPS) http://www.wto.org/english/tratop_e/trips_e/intel2_e.htm - industrialdesigns (1995) is a central agreement carried out by The World Trade Organization (WTO). The agreement covers copyright and related rights (i.e. the rights of performers, producers of sound recordings and broadcasting organizations); industrial design, patents including the protection of new varieties of plants; the layout-designs of integrated circuits and undisclosed information including trade secrets and test data. The TRIPs agreement refers to WIPO administered Conventions (Børde 2008). The Agreement states a minimum-standard for protection of immaterial rights, which all member countries must follow.

The EU system has also carried out a range of directives for the protection of immaterial rights on the digital area, such as The Directive on the legal protection of databases (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0009:DA:HTML).

In 2001 the so called 'Infosoc directive' was carried out. The main goal for the directive was to harmonize regulations to avoid unnecessary juridical obstructions in trading.

Another focus was to create juridical unambiguousness on how to use copyright protected work in a digital form (Børde, 2008).

As copyright represents important framework on trade within the EU-market, member countries are committed to harmonize their National regulations to EU-regulation on copyright.

4.3.5. Subscriptions and consortia agreements

The electronic market of valuable information is dominated by licence agreements, and to some extent free Internet sources. You often need to purchase the information (pay per view). The market/sale is based on subscriptions with license agreements that vary from subscription to subscription.

To ensure access to vital research journals many universities and research institutes join consortia. The consortia-agreement gives the institution access to a 'package' of journals accessible later to students and to faculty members. The main advantage of joining a consortium is that the institution will not need to negotiate themselves and often one will get better prices compared to those negotiated on their own terms.

The principle for these institutional agreements is that the access to information sources is limited to these institutions that have acceded to the consortium agreement regarding i.e. certain packages of journals.

Most agreements permit so called 'walk-in-use', meaning that people entering the institution without being a member of it may access the journal in the 'packages' when they are in the building and/or use this institution's network.

As a librarian you are, however, not allowed to send files from purchased e-journals to other libraries or to end-users outside of the institution, but instead you have to make a printed copy and then send it. Giving digital access to a work instead of a physical document also challenges the library environment when it comes to inter-library loans and access to documents that you no longer subscribe to.

Librarians are often challenged with questions of digital document delivery and access to the information after the license period ends.

Information on the Internet is fugitive." Publishers may go bankrupt or they may just lose interest", the Norwegian researcher Gisle Hannemyr says (2008), and he claims that libraries should be engaged in keeping accesses to digital information resources stable, by working on changing copyright laws, so that libraries are allowed to access valuable information resources that are no longer on the Internet. This could, he says, be done by allowing digital escrow (deponies).

Debates on the importance of ownership of documents or access only are getting more and more important in library communities, and initiatives are taken in several countries to negotiate national licenses for improving access to information.

National licenses

National licenses are considered the means to promote production and distribution in a particular language, or a way to equalize unequal access to substantial information for specific groups of researchers and students (Abelsnes, 2008)

National licenses are licenses which give free access to copyright protected digital information for either all inhabitants of a particular country or to all institutions in need of specific important information resources. The justifications for establishing national licenses are generally of political character.

One very successful initiative is the Norwegian Electronic Health Library (www.helse-biblioteket.no). The library was established in 2006, as a non-commercial portal on digital high-quality information. The national initiative came from The Norwegian Directorate of Health, and today it is organized under the Norwegian Knowledge Centre for the Health Services. The vision of Norwegian Electronic Health Library is to improve the quality of health services by offering health personnel free access to useful and reliable knowledge.

The justification is:

Equality — equal access to good health services requires equal access to the best knowledge.

Quality — Reliable information resources gives reliable health services.

Economy — National licenses save both time and money!

IFLA Committee on Copyright

One important driving force and a voice of the International library community in copyright is The Committee on Copyright and other Legal matters (CLM) (http://www.ifla.org/en/clm). The CLM was created to advise The International Federation of Library Associations (IFLA) in these matters.

According to information on their website CLM is active in issues relating to:

- Disputed claims of ownership of library materials
- Economic and trade barriers to the acquisition and use of library resources and effective library services
- Subscription and licence agreements
- A wide range of other legal matters of international significance to libraries and librarianship

CLM also watches the activities of WIPO, and represents IFLA at key WIPO-meetings.

The Committee aims at changing copyright regulations to ensure that libraries may continue to facilitate access to digital resources, and at maintaining the role of libraries as valuable wells of information for everybody.

References

Abelsnes, K. (2008) Nasjonale lisenser: en utredning om nasjonale lisenser for Informasjonsressurser. [National licences: a report about national licenses for information resources] ABM-Utvikling http://www.abm-utvikling.no/publisert/rapporter/utredning-om-nasjonale-lisenser

Børde, C. and Vebjørn S. (2008) På rett hylle med åndsverkloven : en veiledning i opphavsrett for arkiv, bibliotek og museum. [On the right shelf: a guidance in intellectual property rights for archives, libraries and museums] ABM-utvikling (ABM-skrift; #45)

Copyright for librarians. Module 1: Copyright and the Public domain http://cyber.law.harvard.edu/copyrightforlibrarians/Main_Page

Dvorak, J. Creative Commons Humbug. http://www.pcmag.com/article2/0,1895,1838244.asp

Flood, E. (2006) Creative Commons. Bok og bibliotek 73 (7),. 58–59.

Forvaltning av opphavsrettigheter i Norge. — Clara. [Information Centre for Copyright and Clearance in Norway — Clara] http://www.clara.no/dokumenter/clara_opphavsrettigheter.pdf

Hannemyr, G. (2008) Farvel, Gutenberg. [Goodbye, Gutenberg]. *Bok og bibliotek* 75(3), 34–37

Rognstad, O-A. and Lassen, B. S. (2009). *Opphavsrett* [Intellectual property rights] Universitetesforlaget ISBN 978-82-15-00729-8

Understanding copyright and related rights. WIPO http://www.wipo.int/freepublications/en/intproperty/909/wipo_pub_909.html

Suggestions for exercises

Exercise 1: Discuss the differences between the two types of rights under the copyright umbrella: economic and moral rights. What is the purpose of each type? Group discussion.
Exercise 2: What is the main role of international Conventions and why are conventions on intellectual property important? Write a short reflective note.
Exercise 3: Prepare a short presentation (3 minutes) about:

1. The Creative Commons system. Present your opinion on why the system was initiated?
2. What may be the advantages of the CC-system when working in a library?

Exercise 4: Write a short assignment (or make a ppt. presentation) on one of the following topics:

1. What are the purposes of the so called 'Infosoc directive' ?
2. Why do you think the Berne Convention is considered important for the protection of right holders when every country has their own legislation?

Exercise 5: (this exercise requires knowledge of your country's legislation on copyright) — Ask your course participants to find regulations which will answer the following questions:

1. Can a librarian order copies of articles which the library do not subscribe to, collect the articles and put them in a plastic folder — and then hand out the folder to the students for them to copy the articles in it?
2. As a teaching librarian you would like to show a video from YouTube to enlighten one of the topics that you teach. You wonder if the video is legally published and who is responsible — YouTube or you — the teacher showing the movie to your class?
3. You are asked by a concerned student about who has the copyright to students' work? The College/University or the student?
4. A lecturer in nursing asks at the library counter if she can legally publish PDFs of articles which the institution subscribes to on the University's LMS (Black Board, Alfresco etc).

Additional readings and links to teaching materials

Copyright law and regulations differ from one country to another. Teaching librarians will have to keep current with both the international harmonization processes, and with national regulations, to be able to teach this topic. Below you will find additional readings on copyright in two different lists, according to National laws and regulations in both Poland and in Norway.

Copyright Crash course: http://www.lib.utsystem.edu/copyright/

Copyright for librarians: http://cyber.law.harvard.edu/copyrightforlibrarians/Main_Page

Creative Commons: http://creativecommons.org/about/

Del Rett Opphavsrett og Undervisning. Veiledningstjeneste for bruk og deling av digitale læringsressurser. Norgesuniversitetet http://norgesuniversitetet.no/delrett/

WIPO Portal: http://www.wipo.int/portal/index.html.en

Publications and materials covering copyright issues in a Norwegian context

Børde, C. and Vebjørn S. (2008) *På rett hylle med åndsverkloven : en veiledning i opphavsrett for arkiv, bibliotek og museum*. [On the right shelf: a guidance in intellectual property rights for archives, libraries and museums] ABM-utvikling (ABM-skrift; #45)

http://www.abm-utvikling.no/publisert/abm-skrift/pa-rett-hylle-med-andsverkloven

Forvaltning av opphavsrettigheter i Norge. — Clara. [Information Centre for Copyright and Clearance in Norway — Clara] http://www.clara.no/dokumenter/clara_opphavsrettigheter.pdf

Rieber-Mohn, T (2010) *Digital privatkopiering*: Gyldendal Akademisk ISBN: 978-82-05-40016-0, ib.

Rognstad, O-A. and Lassen, B. S. (2009). *Opphavsrett* [Intellectual property rights] Universitetesforlaget ISBN 978-82-15-00729-8

Søk og skriv — Om opphavsrett [Search and write — Intellectual property rights] http://www.sokogskriv.no/index.php?action=static&id=84

Åndsverksloven [Norwegian Copyright Act]: http://www.lovdata.no/cgi-wift/wiftldles?doc=/app/-gratis/www/docroot/all/nl-19610512-002.html&emne=åndsverklov*&

Publications and materials covering copyright issues in a Polish context

Barta J., Markiewicz R. Wirtualne biblioteki a prawo autorskie. [Virtual libararies and copyright] In: Kocójowa M. (ed.) *Przestrzeń informacji i komunikacji społecznej. Księga pamiątkowa ku czci prof. Wandy Pindlowej*. ZN UJ PzBiIN, z. 10., 2004.

Biliński L. (ed.) (2000) Informacja elektroniczna a prawo autorskie: materiały z warsztatów, Warszawa, 30 września – 1 października 1999, [Electronic information an copyright: materials from workshop, Warsaw. Sept. 30 – Oct. 1, 1999]

Biliński L. (2006) *Prawo biblioteczne na co dzień*, Warszawa [Libary law daily]

Howorka B. (2010), *Bibliotekarz i prawo: podstawowe informacje o prawie dla pracowników bibliotek*, Warszawa [Librarian and law: Fundamentals of law for libraries' employees]

Howorka B. (1997), *Prawo autorskie w działalności bibliotekarskiej* Bolesław Howorka, Warszawa [Copyright in librarian's work]

Howorka B. (1990), *Elementy prawa dla bibliotekarzy i dokumentalistów*, Warszawa [Elements of law for librarians and documentalists]

Rogucka-Mojsik E. (2004), *Wybrane aspekty prawnego otoczenia współczesnej biblioteki*, Warszawa [Choosen legal aspects of contemporary library]

Sybilla Stanisławska-Kloc, Prawo autorskie a biblioteka cyfrowa:http://www.ebib.info/publikacje-/matkonf/iwb3/artykul.php?e [Copyright and digital library]

eIFL-IP Rzecznictwo w sprawie dostępu do wiedzy: prawo autorskie a biblioteki (2007): http://www.wbc.poznan.pl/dlibra/docmetadata?id=61553&dirds=1&tab=1, Warszawa-Krakow [Copyright and libraries]

CHAPTER 4.4.

Plagiarism

Frøydis Løken

Once...

The leading teaching librarian got a request from the Department of Optometry and Vision Science of the University College. The Department teachers noticed an increase in the “copy and paste” practice in their students assignments. Since they were also aware of a general lack of knowledge about referencing among their students and recognized this to be a serious problem, they decided to look for a librarian with appropriate knowledge who would be willing to teach about these issues. From earlier experience they knew that the library staff was well orientated in copyright and related issues. Their request to the library was to give a lesson explaining what plagiarism is, explaining its legal consequences.

The teaching librarians saw this as a perfect opportunity to position themselves as experts in plagiarism, especially that the problem was strictly connected with other information skills, which they were teaching on an everyday basis. They agreed to undertake this task, but then they started to worry about how they would make this subject interesting and their teaching convincing.

Introduction

Searching for ”plagiarism” in well-known databases such as ISI, OVID Medline or Google Scholar on the date of 27th march 2010, gives an overwhelming amount of hits, even if the search is limited to 2007–2010 (ISI 476 hits, OVID Medline 208 and Google Scholar 14 000 hits).

In journal editorials nowadays we can find lots of examples and stories of how plagiarism has influenced the publishing of a work, and how the editors try to detect and cope with this problem (Nakamura and Christensen, 2009). Universities and colleges all over the world struggle to control student cheating and plagiarizing. Students accused of plagiarism are being expelled or punished in different ways. Not only students plagiarize, among researchers this is also a growing problem.

In the last few years librarians have been more and more involved in the effort to educate, mainly students, about plagiarism, its ethical aspects and legal consequences.

The teaching librarians, from the case at the beginning, were asked to cover plagiarism as a part of their teaching. To do such teaching well, it is essential that librarians are well oriented in general regulations regarding plagiarism and they also have to know well the internal regulations of their institution. According to the literature cited in this chapter, the main goal of this education should be prevention. For the teaching librarians it may be a relatively new task, and to be carried out properly, it may be useful to get a better understanding of "why people plagiarize "and "how do they feel about it".

Problems of plagiarism are related to copyright issues, meaning that if a person plagiarizes he/she most likely breaks the copyright law. To learn more about the legal aspects of copyright, please see additional readings at the end of this chapter and also read Chapter 4.3.

4.4.1. Plagiarism — definitions and general issues

Webster's dictionary (1994) defines plagiarism as: "The appropriation or imitation of the language, ideas, and thoughts of another author, and representation of them as one's original work." This definition will most likely not be useful enough to decide whether a student's or a researcher's work is a piece of plagiarism or not. Is there for example, a difference between cheating and plagiarism? And should "self plagiarism" be seen as plagiarism in every context? For example, PhD students are supposed to build upon their own previous work and this is seen as a signal of their professional development (Mitchell and Carroll, 2008, 223)

In his contribution to the "Conference on plagiarism and theft of ideas" in 1993, Lafollette (1993) goes deeper, and according to him, the following elements occur in most definitions of plagiarism: "(1)The use of another's words, text, ideas, or illustrations, (2) failure to credit original ("real") author; (3) the implication that the plagiarist is the author; and (4) failure to seek the original author's consent." Further Lafollette says "I believe that all four elements must be present (in proportions that may differ among research fields) for plagiarism to have taken place in the context of research communication in the sciences and social sciences".

Sometimes it is difficult to see the difference between cheating and plagiarism. In this chapter, plagiarism is seen as a form of cheating. Students' cheating can also include other behaviour, such as, for example, the use of aids (such as books, phones, etc.) which are not allowed during exams.

Each institution has to work out their own detailed rules and guidelines to explain what is considered plagiarism within that institution.

4.4.2. Students and plagiarism

Many students claim that their plagiarism is not a problem, and what they do is the only way to survive, to cope with too much work, to tackle stress or it is a shortcut to the results which they need to obtain. They often do not see their plagiarism as having a serious impact on academic or social life, and in all likelihood they do not intend to go on cheating when they finish their studies and start working. But, looking at the many cases of plagiarism detected among researchers and writers, we see that this will not always be the case.

Research in most cases is built on earlier research. Where will we end if the basics were not true, if we could not trust the cornerstone of research on which the next generation of physicians, engineers, educationalists, psychiatrist and all other professions rely? For the society as a whole, for you and me, this would result in serious insecurity. It would become impossible to know who and what to trust. It will be more difficult to claim that something is scientific, and to know, for example, if data are stolen from others or are fabricated. The outcome of research becomes worthless when the sources are not valid. This, in long run, may be the result of plagiarism and not citing earlier research.

In regard to students, there are several problems connected with plagiarism. The most obvious is that when they cheat their learning outcomes decrease. If their cheating is detected they are usually confronted with their institution's regulations and in proportion to the severity of the plagiarism, the reactions differ, but their work is usually rejected. In the worst case, they may be excluded from higher education for some time.

The "Norwegian association of higher education institutions" categorizes plagiarism among students as following (Benestad et al., 2009, 27) [own translation]:

- Plagiarism of materials published on the Internet
- Plagiarism of assignments done by other students, which were earlier submitted
- Plagiarism of assignments or drafts that students have accessed from other students
- Cooperation between several students when it is assumed that all work must be individual

Students generally worry more about cheating than about plagiarism. Ashworth and Bannister (1997) found that plagiarism was low ranked in the students' systems of value, and that they had no idea of research and academic work being an activity to which each member of the community contributes. "The student ethic is one of fellow-feeling and peer loyalty, and it is in this context that cheating is mainly evaluated."(Ashworth and Bannister, 1997, 11) Their ethics is focused on friendship and interpersonal trust, they do not think cheating is fair in relation to other students. This is the same finding as Boger et al. (2010) found in their survey. Student loyalty towards friends and fellow students is very strong. They feel worse about copying fellow student's work than for example books or a text they found on the Internet. This issue is well documented by Hutton (2006). Her main findings are:

- Student peer groups have a strong impact on their attitude towards cheating, although they are also influenced by the state of ethics in society as a whole
- Only a small part of students would report a classmate who cheated
- Learning environment created by instructors and their attitudes towards cheating would have impact on students.
- Faculty members often fail to recognize cheating as a serious problem in their own institution

Ashworth and Bannister (1997) found that it is often unclear for the students where the line is drawn, and where plagiarism starts, and therefore they are afraid of cheating by accident. The result of this confusion might be a gap between what the students consider cheating and the regulations of the particular institution.

Cheating sometimes may be a strategy for coping with stress and a result of pressure to succeed. Students themselves claim it is not necessarily habitual. In the framework of problem-based learning, students are encouraged to work together and help each other. In such situations it can sometimes be difficult to judge to which extent they may copy each other ideas or work.

The survey conducted by the Center for Academic Integrity is less favorable for students. According to this survey, 32 percent of the students said that laziness was their primary reason for cheating (Hutton, 2006). Other answers were even more revealing: 50 percent of the surveyed students did not think cheating was wrong!

4.4.3. Researchers and plagiarism

For scientists and researchers there may be other reasons for cheating than timesaving and lack of interest in the subject. We also must assume this group to be more conscious about what they are doing and about the consequences than students, especially students in their first years of studies.

When researchers plagiarize, in spite of their expected knowledge about how to act in academic research and writing, it must mean that the motivation behind this kind of academic misconduct is strong. Although the possibility to be discovered is always present, this perhaps has little deterring effect, if the final outcome seems to be worth the risk. The reasons behind researchers' plagiarism may be the following:

- Pressure upon the researchers to publish more. Norway, as an example, has a system which motivates publishing more by economical incentives. More publishing and more articles mean better income for both, researcher and their institution.
- Increased self-esteem and respect of peers resulting from a long CV with many articles published, may be a strong motivation.
- It may also be tempting for researchers to plagiarize, only because it has become so easy to find information on the Internet. The unbelievable amounts of information available online give the impression that the chances of being discovered are small.

What happens to researchers who are detected as plagiarists?

- Their published work could be withdrawn from journals and databases.
- They may be punished within their own institution, according to the institutions guidelines on academic ethics and writing, and dismissal could be one consequence.
- If their misconduct is serious and in conflict with legislation they may be reported to the police and sued. See more about legal aspects in Chapter 4.3
- Information to the public is given and disapproval within their own scientific circle occurs.

Of course, if all this happens to a researcher, it will be the end of his career, and a very embarrassing process both to him, his co-authors, his employer and his family.

Thus if someone is being accused of plagiarism a very thorough investigation has to be conducted to prove that this is true.

In addition to plagiarism, there are also other ways to fail in academic conduct, such as: fabrication or falsification of data, duplication of own publications, work with conflicts of interest, and authorship problems like use of ghostwriting and guest writers.

All these questions are part of the large area of academic ethics, which is not the focus of this chapter. You may learn more about these problems at the web site of Committee of Publication Ethics (COPE) http://publicationethics.org/, or UKRIO (http://www.ukrio.org/home/) — an independent organization, which aims to give guidance on how to conduct research. This organization has developed a guide for researchers which is applicable to all subject areas (UKRIO, 2009).

4.4.4. How to detect plagiarism

Within the publishing domain detecting plagiarism is a matter for reviewers and editors. To detect that someone copies somebody else's text, is easier, especially with software which is available nowadays, but to detect plagiarism of ideas, it is necessary to know the field and previous literature very well.

Although it seems to be consensus that software detection tools are not enough to prevent various kinds of plagiarism, such software may help, and should be used within education institutions. It can be a tool within e-learning platforms, such as "Fronter" or an independent system, for example Ephorus. These computer programs will compare texts from submitted works with texts already published. They might use a database of their own, such as Ephorus and/or also compare with texts found on the Internet. However, these tools have certain weaknesses. They do not see the distinction between correct citations and copying. Furthermore, they cannot be used to detect plagiarism of ideas, in translations to another languages or they cannot cope with such problems as falsification and fabrication of data. Below are some examples of available software.

Examples of plagiarism prevention software

- Ephorus(http://www.ephorus.no/start). Ephorus is the most used program within higher education in Norway (Smokvina and Slettevold, 2009).
- Hill (2009) describes the efficacy of two software tools used in USA:
  - Turnitin (http://www.turnitin.com/static/index.html)
  - SafeAssign (http://www.safeassign.com/).
- CrossCheck powered by iThenticate (http://www.crossref.org/crosscheck.html) Crosscheck is based on membership and their screeningtool iThenticate compares new work with works already in a database created, growing and maintained by Crosscheck. Their list of members has a lot of well-known names on it, such as BMJ Publishing group, Elsevier, IEEE etc.

4.4.5. Isn't it better to prevent? How to change the attitudes towards plagiarism

J. Carroll (2008) emphasizes that the whole institution has to work to change the attitude of its employees or students towards plagiarism.

S.D. Blum(2009) indicates three aspects of plagiarism. Plagiarism according to her has to be treated as:

- A moral issue
- A law and regulation issue
- An educational issue

Blum gives some interesting insight into students' sense of morality and their honor codes. As mentioned earlier students might affirm their institution's honor codes, but their loyalty towards friends and other students is much higher in their system of values. According to Blum (2009), we also cannot expect students to have the same understanding of institutional regulations and of copyright laws as the administrative staff or the researchers have. Students live in a world where copying music and films is an everyday-thing to do. Why should it be any different with a text? They are also more concerned about success and achievement than about learning.

Blum's conclusion is that the practicing of writing and referencing over and over again throughout the course of studies, is the way to teach students not only academic writing but also academic ethics codes. That implies that plagiarism has to be an issue for almost everybody in the institution: for its authorities, for each teacher, including the teaching librarian, and also for administration and other library staff.

Why is it important to avoid plagiarism?

- First of all it is not ethical
- Copying means no learning for the students.
- Some studies indicate also that students who have an understanding of academic ethic already in high school achieve better results in college (Smith and Zhang, 2009).
- The reputation of the institutions and universities suffers if students do not take these matters seriously.

How to avoid plagiarism?

Because of the Internet and the Open Access movement it has become easy to access all kinds of documents and the opportunity to copy, plagiarize and cheat will only increase in time. A study done in Norway in 2009 (Boger et al., 2010) supports the assumption that the students are confused about what plagiarism is, how to avoid it and what is legal and what is illegal. This is also supported by Carroll (2004). It is clear that we will never completely get rid of all kinds of plagiarism (Johnston, 2003), but the work must be done to educate people and raise ethical standards in academia and in research.

Roberts (2008) introduces a four-based model for addressing plagiarism: education, prevention, detection and consequence. Jude Carroll has written a lot of articles and speeches about this problem, and during the workshop with DTU in 2008 (Denmark) she proposed a similar model, to be followed by the institution:

- A shared understanding of what student plagiarism means
- Designing programs and tasks that discourage copying
- Ensuring your students have the skills they need
- Using a range of detection strategies
- Appropriate policies and procedures

Regarding the second measure, she proposes new kinds of assignments and exercises, for example "Make an answer" rather then "Find an answer" (Carroll, 2009). She also argues that the tests should be perceived as fair by the students, and that the guidelines to group work must be clear. Teachers should not repeat the same assignments and they should have multiple versions of exams. All this together can discourage plagiarism and copying.

Institutions should also work out a clear academic honor code. Hutton (2006) emphasizes the institutions responsibility to communicate their guidelines and policy on these issues to the students in a clear way. In the article's conclusion Hutton summarizes what role the faculty can play in reducing dishonesty. The teaching librarians also should take into consideration her advice to the faculty:

- Faculty should reduce the opportunity to cheat and increase the probability of being caught
- Faculty should overcome their hesitation to report cheaters
- Faculty should establish and promote academic integrity through their relationships with students, and they should provide support for students who disapprove of cheating

The University's regulations on cheating should be very easily accessible to the students, on websites, on their learning resource platforms and in brochures. However, it seems that this is not enough. Therefore, information has to be passed on at every appropriate occasion, with the aim of making it a part of the students ethical principles.

The role of the library and the librarian

The library is in a unique position and can play a significant role in the institutional work against plagiarism. Daily work with students gives a very good understanding of their problems with finding and referring to literature. The information skills courses are a very appropriate occasion for raising awareness of what plagiarism is and what it is not, and for teaching about ethical aspects and consequences of such misconduct. These problems can be introduced by a librarian and discussed among other topics or can be a subject of separate lectures. The list below summarizes some ideas of what could be a teaching librarian's contribution to the work against plagiarism in an institution:

- Take initiative to build cooperation against plagiarism. Work to get teachers to see plagiarism as their issue (Carroll, 2009)
- Take part in educating about plagiarism. The teaching librarians can for example teach how to cite, how to make a bibliography and lists of references, they can teach about the institutions regulations on plagiarism, about copyright, etc.

- Assure a good communication between the library and the faculty about the librarian's capabilities in the area of teaching academic skills
- Teaching librarians must educate themselves on the issue of plagiarism
- Contribute to building stronger personal relationships between students and the institution. For example, according to Hutton (2006), discussing academic integrity with students, and making them understand the institution's policy, is a way to establish deeper relationships.

In some colleges and universities it has become a task of the teaching librarians to inform students about plagiarism. According to J. Carroll (2009) this is good, but not enough. The work to avoid plagiarism must not be a library's work alone. J. Carroll (2009) recommends seeing plagiarism as a complex pedagogic issue. This means that both teachers and students must be involved, and work on raising ethical standards must be continuous.

The university library may, for example, try to involve the department of academic affairs. Such a department has real impact on teaching and on academic staff, and may encourage teachers to introduce problems of plagiarism into their teaching. The job of the librarians can be more supportive. They may take initiative to bring the issue to the surface, but then they have to be aware that perhaps other teachers are closer to bringing it up to the students in their everyday teaching.

Still, if the librarians are updated and interested, the library can give a lot of support to both students and teachers.

Looking at Carroll's model, it is within these three steps, that the teaching librarian can contribute.

- Building shared understanding of what student plagiarism means.
  Teaching librarians should be discussion partners and should share their ideas and knowledge about the issue with others. They might take initiative to start processes of designing and planning various anti-plagiarism actions, which has to involve teachers, and appropriate departments of the institution. They also should use every opportunity to talk with students about plagiarism issues and thus promote the institution's values.
- Designing programs and tasks that discourage copying.
  The teaching librarians should take effort to make sure plagiarism issues are taken into consideration in all educational programs. This means always to be awake to check and give suggestions when a new curriculum is being developed. When it comes to concrete exercises, tasks and assignments, this has to be the responsibility for the teaching staff including teaching librarians.
- Ensuring your students have the skills they need.
  The teaching librarians may give by themselves (or take part) in courses teaching academic skills.

An example:

Let's go to a University in Norway in spring 2008. 228 students got a letter from their university informing them that they were suspected of cheating. The letter was a consequence of the introduction of the software detection tool Ephorus at the university, which revealed unwanted co-operation on mandatory assignments or copying from earlier students' assignments. Surprisingly, all the cases were dropped without any sanction. The reason was that the Board at the university found that the students had not enough information about the university's regulations on these matters. What should the institution do to avoid situations like this in the future? As a teaching librarian you should also ask yourself what should be your and the library's contribution.

4.4.6. Plagiarism in future

The important question is how will the Open Access movement influence plagiarism. Must we expect even more plagiarism as a consequence of Open Access, or is it on the contrary?

Ever since the time of Gutenberg, when publishing and authorship became an economical issue, plagiarism has been a problem to some extent. The Internet and the Open Access movement have facilitated the access to information and literature on any topic, and make plagiarism even harder to fight.

The only way for society as a whole, both scientific and public, is to educate and build consciousness about plagiarism. Here the teaching librarians can play a significant role and can contribute to their institutions' activities. This, together with clear regulations and good tools to discover scientific cheating and theft, may minimize the problem.

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Ukrio. (2009) *Code of practice for research: promoting good practice and preventing misconduct* [Online], London: Uk research integrity office. Available: http://www.ukrio.org/resources-/UKRIO%20Code%20of%20Practice%20for%20Research.pdf [Accessed 12.01 2010].

Webster's Encyclopedic Unabridged Dictionary of the English Language (1994) New York, Gramercy books.

Suggestions for exercises

Exercise 1. Discuss in small groups which part of your institution you think is most appropriate to take the responsibility for bringing the question about plagiarism to the surface. Is there a role for a library in this task?
Exercise 2. Discuss in small groups how students and researchers attitude to plagiarism can be changed. Present your conclusions in a form of written recommendations.

Suggestions for assignment to assess student's learning

Write a reflective note about what you learned in this topic. How has the learning influenced upon your own attitude?

Teaching tips

It is easy to find examples of plagiarism in real life. Find an article in a newspaper or a magazine and tell the class about a case where a plagiarism has been revealed.

Write down some examples of plagiarism, from real life or make your own. Let your student discuss the examples in small groups. The book: "Gilmore B. Plagiarism: A how-not-to guide for students. Portsmouth: Heinemann; 2009", gives a lot of examples and exercises that might be useful

Additional readings and links to teaching materials

Carroll, J. (2009) Designing in and designing out: strategies for deterring student plagiarism through course and task design [Online]. The Norwegian association of higher education institutions. Available: http://www.uhr.no/documents/norway_conference_Day_Two.ppt [Accessed 12.01 2010].

A presentation which gives practical advice on how to make students plagiarize less.

Carroll, J. (2009) Student plagiarism in Norwegian universities and university colleges: what works, what doesnt work, what still needs to be done [Online]. The Norwegian association of higher education institutions. Available: http://www.uhr.no/documents/Norway_conference_main -_09.ppt

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This presentation gives a good and short overview on student plagiarism, why, and how to deter.

Carroll, J. & Zetterling, C.-M. (2009) Guiding students away from plagiarism [Online]. Stockholm: KTH Learning lab, authors. Available: http://people.kth.se/˜ambe/KTH/Guidingstudents.pdf [Accessed].
A good and practical guide from one of the gurus. Suitable for both teachers and students.

Gilmore, B. (2009) Plagiarism: A how-not-to guide for students, Portsmouth, Heinemann.
Gives a lot of examples of plagiarism, and also exercises that might be useful.

Plagiarism resource site (2003) [Online]. Center for educational technology.
Available: http://abacus.bates.edu/cbb/index.html. Under "Resources" you will find both a self-test and citation examples.

Roberts, T. S. (2008) Student plagiarism in an online world: problems and solutions, Hershey, Penn., Information Science Reference.
A very comprehensive work. It covers most of the topics related to plagiarism.

Universitetet i Bergen. (2010) A plagiarism carol = et plagieringseventyr [Online]. Available: http://www.youtube.com/watch?v=Mwbw9KF-ACY [Accessed 21.09 2010].
A small video suitable for students, humorous and motivating.

Ukrio. (2007) UKRIO [Online]. The UK research integrity office. Available: http://www.ukrio.org/-home/ [Accessed 12.01 2010].
This is the website of The UK Research Integrity Office (UKRIO), an independent body which offers expert advice and guidance to universities, NHS bodies, other research organisations, individual researchers and members of the public about the conduct of research.

Ukrio. (2009) Code of practice for research : promoting good practice and preventing misconduct [Online]. London: Uk research integrity office. Available: http://www.ukrio.org/resources/UKRIO-%20Code%20of%20Practice%20for%20Research.pdf [Accessed 12.01 2010].
This website gives guidance to researchers on academic ethics. The guide is applicable to all subject areas.

Additional material in Nordic languages

Arbeidsgruppen Etikk I Utdanning. (2007) *Etikk i utdanning — arbeidsgruppens innstilling* [Online]. Bergen: Universitetet i Bergen. Available:
http://www.uib.no/ua/etikk/UiB_etikkutv_innstilling.pdf [Accessed 21.09 2010].
A paper about ethical questions in education, from the University of Bergen.

Børde, C., Søndersrød, V. (2008) *På rett hylle med åndsverkloven: en veiledning i opphavsrett for arkiv, bibliotek og museum*[Online]. Oslo: ABM-utvikling. Available: http://www.abm-utvikling.no/publisert/abm-skrift/pa-rett-hylle-med-andsverkloven [Accessed 21.09 2010]
An authoritative, practical oriented guide about copyright in Norway.

Foreningen C. (2009) Clara [Online]. Available: http://www.clara.no/ [Accessed 27.01 2010].
An authoritative website, and an Online Information Centre for Copyright and Clearance. Clara is a website featuring information about rights clearance for copyright-protected material in Norway.

Gullbekk, E., Theie, S. (2009) *Akademisk integritet — erfaringer med et undervisningstilbud* [Online]. Available: http://www.uhr.no/documents/Foredrag_Gullbekk_Theie_21_april_2009.pdf [Accessed 21.09 2010].
A presentation showing experiences with teaching about plagiarism as a part of information literacy.

Åndsverkloven. (2009) LOV 1961-05-12 nr 02: *Lov om opphavsrett til åndsverk m.v. (åndsverkloven)* [Online]. Kulturdepartementet. Available: http://www.lovdata.no/all/hl-19610512-002.html [Accessed 21.09 2010].
The Norwegian Copyright act.

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Exercises on academic ethics and plagiarism.

Plagiering i UH-sektoren — felles problem, felles ansvar. (2009) [Online]. The Norwegian association of higher education institutions. Available: http://www.uhr.no/aktuelt_fra_uhr/plagiering_i_-uh-sektoren_-_felles_problem_felles_ansvar [Accessed 12.01 2010].

Website with links to several presentations from an important conference on plagiarism in Norway in April 2009.

Blekinge Tekniska Høgskola. Biblioteket & Linnéuniversitetet. Universitetsbiblioteket. (2010) *Välkommen till Refero — antiplagieringsguiden* [Online]. Available: http://www.bi.hik.se/Refero/-1intro.php [Accessed 21.09 2010].

Refero is a web based tutorial which shows how you can use other people's texts in your own text and how to avoid plagiarism. Swedish and English text.

Syddansk Universitet, Københavns Universitet & Aarhus Universitet. *Stop plagiat nu* [Online]. Available: http://www.stopplagiat.nu/ [Accessed 21.09 2010].

A tutorial for students about plagiarism and how to avoid it.

5. Marketing and organization of information literacy courses

It is not enough to be an information specialist and a good teacher to effectively attract library users to participate in the teaching offered by a library. Subject curricula are overloaded, doctors, nurses, scientists are always very busy with their tasks, and on top of that, everybody is convinced, that after all it is not so difficult to find information. There is Google, and one can always somehow cope with searching in a database. In addition, librarians are not necessarily perceived as competent teachers. How can these obstacles be overcome and information literacy courses effectively implemented? How can the unique competency of health librarians be shown? How can giving away this area of teaching to other specialists and subject teachers be avoided? This is vital "know how" for a teaching librarian. Some valuable tips can be obtained from the general theory of marketing, some from social marketing. In this module the principles of marketing activities will be presented as well as issues connected with organization of information skills teaching by the libraries, especially integrating them with subject teaching. A problem of advocacy and promotion of information literacy courses, as an important element of contemporary health professionals' education will also be discussed.

CHAPTER 5.1.

Marketing of information literacy courses

Barbara Niedźwiedzka

Once...

Doctor H., a cardiologist, searched the Medical Library website for a publication that was indispensable in the preparation of an application for a research grant. He could not find his way around the library's homepage unable to find the right link. He was becoming increasingly more irritated as he opened various web pages which often presented terms that told him very little and gave convoluted instructions. Though he recognized some of the keywords, tired of the constant intellectual strain, the library jargon prevented him from digging deeper into the meanings of the commands to check where they would lead. In the end, by accident, he stumbled upon a link with information about a training course on searching information sources. Well, he thought, perhaps I do need to go through such training at least once. It was becoming increasingly difficult to move about in the jungle of scientific literature, and he needed to undertake a systematic review of the studies conducted to date. So let them take me through this training, he thought. He called the library to find out where the training would take place and what it dealt with specifically. The answer was uncertain and rather ambiguous: no one knew precisely when the training was to take place or if there would even be enough people interested, perhaps it would be better if the training was conducted on an individual basis? As to the content– that would depend on individual needs. Doctor H. immediately sensed a lack of professionalism, and since he neither had the time to wait nor did he want to participate in vague training sessions, he gave up on the idea. He did the literature search with the help of a colleague, who had more experience in searching library resources. He never again sought help or training from the library.

Topic introduction

The situation described above is one of many, which probably occur in everyday work of numerous libraries. The doctor's experiences and his thoughts most likely never reached the librarians, but perhaps he shared them with his colleagues?

Information users are often lost among the multiplying sources of scientific information, stopping at those they know best, and not necessarily at the ones that are the most appropriate. They often do not know that librarians conduct trainings, that they can do this professionally, that they can teach very specific skills. Various subject teachers undertake the task of information skills instruction. They probably do so superficially, "on the side" while teaching their own subjects or as part of teaching research methods. It can be assumed that this teaching is conducted briefly and at a cursory level. In turn, librarians often do not know what users need certain information skills for, and they get only a vague idea about the work or tasks of their potential trainees. Teaching librarians also often do not know how to effectively incorporate library training in the curricula, or how to promote the idea of improving information literacy or encourage information users to participate in library courses. Knowing even the basic principles of marketing can be very useful here. Training, conducting courses and coaching are just like providing any other services in the library. Courses constructed according to needs, well embedded in a given organization, and adequately promoted have a better chance of attracting users. Information literacy courses are conducted on a large scale by big medical or health libraries which have many users. But, also smaller, hospital or specialized libraries offer trainings and may use marketing theory to better adjust their teaching to their users and their needs.

Well conducted marketing can help both of them

- define the principles, goals and objectives of training
- understand problems and risks associated with developing/widening this kind of activity
- adapt content and form of teaching to needs of their information users
- prepare for possible changes in the library environment
- provide and schedule appropriate measures, including staff
- communicate and advertise their courses appropriately

However, information literacy training is not a commercial activity, and therefore the principles of marketing which are followed must be slightly modified and adapted to the realities of the public sector and specific properties of this "product" have to be taken into consideration.

This chapter will present the basic principles of marketing and the main assumptions of social marketing. The general overview of the marketing theory will be accompanied by practical tips, examples and references to professional literature. These rules should be taken into account by a person engaged in planning and organizing library courses.

5.1.1. General assumptions of marketing

Marketing activities are a series of actions, whose ultimate goal is to sell a product. Adcock, et al. (2001) argues that this goal is achieved by offering the right product at the right time and for the right price. Philip Kotler, the marketing guru, says, "It is a social process, and managing, by which individuals and groups meet their wants and needs, by creating, proposing and sharing among them valuable products" (Kotler, 1991).

To sell our product/service we must clearly identify the market: the recipients or customers, their needs and preferences, similar products or services, potential competitors and the allies. This is called "product" positioning. We must also determine how the product is seen in light of the goals pursued by the institution, whether it can afford to manufacture the product and meet the challenges associated with the production and sales requirements. Finally, we need to inform potential recipients about the product or service, encourage the purchase, advertise, at times we also need to persuade the public that they need it. It is said that a perfectly "positioned" product may do without advertising, as it will find recipients/customers without any special effort, while all other marketing activities, including the spreading of information about a new product, are necessary. If marketing is to be conducted rationally and consequently, it is first necessary to develop a detailed plan and timetable of activities. The marketing activities will be described in more detail in paragraph 5.1.4, but it is worth mentioning here that they have to include:

- a clearly defined goal and plan of marketing activities (what we want to achieve and when; schedule of actions; modes of communication between people; distribution of tasks and the allocation of resources needed to perform them)
- internal marketing analysis (to determine how the product/service is to the strategic objectives of the institution and its financial, human resources, strengths and weaknesses)
- analysis of the external environment (definition of opportunities and threats, identifying to whom do we want to sell the product/service, getting to know potential recipients and their needs, identifying competitors, identifying allies and the relations between them)
- "positioning" of a product/service, adaptation of the product/service to the needs of recipients, calculating the costs
- product/service promotion. Designing and conducting information campaigns and advertising

5.1.2. Marketing of library courses

How can we refer marketing activities listed above to information literacy courses?

The product is the information literacy course (or a range of courses of various types), which can be offered by a library. This product can be "sold".To do so library managers and those responsible for the training must first clearly identify who may be interested in such training, and so they have to identify all its **potential recipients** (various kinds of professionals, researchers, students, etc.). Further one must become well acquainted with them, that is find out what and how they study, what they are working on, what is the mode and conditions of their work. To be attractive and effective, library training must precisely **meet expectations, needs and interests** of target participants. The courses must also be conducted in a **manner and in ways** that are most appropriate for particular groups of participants. The marketing activities are also very important in establishing who will be responsible for whether or not the training will take place at all (**decision makers, stakeholders**). Information literacy courses can be created on the initiative of the library itself, but it is even better if the courses are in accordance with the goals of the mother institution. A library, which can conduct information literacy courses on a larger scale, is usually part of a medical school or other scientific institution, and is dependent when it comes to decision-making and financing. Therefore the library's educational plans and actions have to comply with the plans of the superior institution, sometimes also with the regulations and guidelines of state institutions. Therefore it is useful to find out what are the strategic goals of the mother institution, usually stated in its program documents. Teaching must also be consistent with the **relevant legal regulations** (e.g. the standards of teaching in the field of nursing or the requirements of the medical profession). Adequate knowledge of regulations can help promote the information literacy trainings. Helpers in this can be various **supporters and stakeholders in the library sphere,** people who are interested in raising information literacy in target groups, e.g. diploma papers' supervisors, EBM teachers, people responsible for the quality of teaching, nurses with responsibility for the weekly education sessions on a ward, nurses/doctors with responsibility for students during their training periods. It is good to identify these supporters. It is also necessary to check whether similar training is being conducted elsewhere, by whom and for what purposes. In other words, who are the librarians' **competitors**? (See also Chapter 5.2). Another element of marketing is to determine the **cost** which may incur for the organizers and the price that course participants have to pay for the training. The last can be expressed not only in monetary values. The price on the side of the participants may be, for example, time to participate in the course, effort to overcome difficulties in getting to the site of teaching, reducing the duration of other activities, etc. Only when this cost is justified by the value of the product, potential trainees and decision makers will be willing to cover this cost.

As already mentioned, from the standpoint of marketing, library training is not exactly the same kind of service, as say, training in cosmetics. Courses in cosmetic services are a product that is geared at bringing profit to the company that conducts the training, and in the future, at bringing profit to individuals participating in the course. Profit occurs on both sides and is expressed in material values. The training conducted by a library in the health sector does not generate a profit for the library, nor does it bring immediate tangible benefits to its participants. Profit here is measured as an intangible asset, such as the level of knowledge, ability to independently use information resources or the preparation of individuals to function in an information society. There is also the slightly more distant, but very important profit, namely, an improved quality of care or quality of medical research. The focus is therefore the public good — to prepare health and medical information users for good and efficient use of resources and knowledge, and creating and shaping their needs in this area. Society finances indirectly this kind of education, and is interested whether this education is useful and of proper quality. An institution which offers services financed from public resources, has a responsibility to deliver services which are sensible and of good quality. In such cases, the principles of commercial marketing need to be slightly modified and supplemented with social marketing considerations.

5.1.3. Social marketing

The theory of social marketing has its origins in the early 70s. The book, "Creating Social Change," (Zaltman, Kotler, Kaufman, 1972) initiated a new approach to marketing activities, adapting its activities to the realities of the public sector to spread the ideas and behavior which are beneficial to society. The societal marketing concept holds that the organization's task is to determine the needs, wants, and interests of target markets and to deliver the desired products more effectively and efficiently than competitors, in a way that preserves or enhances the consumer's and the society's well-being (Kotler, 1994).

This social good, the good of the group or collectivity, is the goal of social marketing. Profit for the one who sells or offers the product is not the goal here. By using appropriate marketing tools, one can try to modify negative behavior or habits of the community, for example, to persuade people to maintain a healthy diet, to quit smoking, or start biking instead of taking the car. Organizations which employ social marketing to provide or increase the welfare of society, have to provide a means to sustain the change, and have to take into account also the ethical aspects of their marketing activities (Kotler, Lee, 2008). Social marketing theorists also argue that in the public sphere we do not always deal with the obvious conscious need of our customers. In some areas the objective of marketing activities, among others, is to awaken this need, for the good of society as a whole. The product is therefore offered with a sense of fulfillment of a mission for social good, giving an increased value, and not expecting instantaneous, corresponding to the value of the product, return in the form of payment.

Social marketing in its actions specifies 4 stages of making people or entire social groups cooperate. The marketing Model AIDA (Attention, Interest, Desire and Action) (Ferrell, Hartline, 2005), originally used in commercial advertising, is used to explain the stages.

> **Stage 1. ATTENTION** — by spreading attractive announcements/messages you catch the public's attention.
>
> **Stage 2. INTEREST** — you stir up people's interest in the organization and/or product or service offered.
>
> **Stage 3. DESIRE** — demonstrate the usefulness of the product service, the benefits that can arise from it, thereby causing those interested to assign value to it, they then want the product or service, and start believing that it is important, valuable, useful.
>
> **Stage 4. ACTION** — the awakened interest and desire make the concerned willing to put in particular effort in acquiring the product or service.

Some good examples of the AIDA model commercial applications provided by *Louis Lazaris can be found at:* http://www.noupe.com/design/the-aida-marketing-model-in--web-design.html

As a tool, social marketing uses primarily education, procuring, showing beneficial effects of products, behaviors, actions. It takes into account, as with commercial marketing, relationships, interrelations, interests, governing a given society in which the action is carried out.

Some marketing specialists add to these phases other steps such as CONVICTION and SATISFACTION, so people become repeated customers and give referrals and recommendations to the service (Ferrell, Hartline, 2005)

In social marketing the perception of success differs from that in commercial marketing, where success is measured by an increase in sales or in the use of a service. Success in social marketing is expressed, for instance, in change of behavior, by the number of persons who experienced the change, the level of customer satisfaction, etc.

Health librarians work mostly in educational or scientific institutions, and generally in the public sector. Library training does not have to produce profits, outside of the profit seen in the form of better-educated users of sources of information and users with higher information literacy. In longer perspective, improvements made in the realm of treating patients bring forth better results, such as a healthier population. Social marketing principles can therefore be most useful when setting up library training courses and plans. After these general remarks let us move to discuss the main marketing activities.

5.1.4. Marketing activities in relation to library courses

The marketing encompasses the following activities:

Defining goals and developing a plan of marketing activities

First of all, you must clearly identify the short-and long-term goals that are to be achieved in relation to the information literacy courses to be conducted by the library. These goals must be specific, such as: "the introduction of the information literacy teaching to all subject university courses, by the year..." or else, "preparation, in 6 months, an offer of voluntary library training for clinicians" or "developing e-training in critical appraisal of scientific publications for physicians, by the end of 2011." The time in which we want to achieve our goals should be clearly specified, and detailed plan of stages and milestones made, which will help us discipline our course of action. The specific aims should be accompanied by justification. The marketing plan has to be consulted with the management and persons who will be conducting marketing activities and also those who will teach. Such consultations are usually necessary also while the marketing activities are carried out. If you do not at the very beginning devote time to developing a good plan for your marketing activities, your work cannot bring expected results or you will be faced by unexpected difficulties and barriers, like lack of time, money, human resources, etc.

Internal analysis

A thorough analysis of the situation and resources of the library and parent institution should be made. The analysis covers many aspects.

Decision-making. It is important to gather up as much information as possible about: who in the parent institution decides on the matters of education, who may have an impact on such decisions, who may be potentially interested in engaging librarians in the educational process?

Goals of the whole institution. It is also necessary to know the strategic objectives of the parent institution, what it is trying to achieve and how the library courses can help to reach these goals. Joining the goals of a parent institution is crucial and will be welcomed by its decision makers. This will gain us supporters, and can be a condition for receiving support.

Note: The aim of the university may be, for example increasing the share of problem-based teaching in medical education, or expanding the e-learning offer, or to better prepare graduates for lifelong learning. A library can support such objectives by offering certain kinds of teaching to students and faculty.

Note: Check the programming documents and strategic plans of your parent institution, every major institution has such policy papers, which are updated periodically, especially when authorities change. Talk to those responsible for strategic planning, and find out whether training in information skills can support present plans. Try to attend meetings where such matters are discussed, with particular emphasis on meetings where decisions are taken on subject teaching.

Resources. A necessary step will be determining the human resources and the infrastructure of the library: who can conduct training, will it be necessary to upgrade the skills of library staff, what space can be used, do we have appropriate computer infrastructure, internet and intranet access etc. The question of where the training can or should take place has to be answered. Will it be more profitable to keep the courses at the library or will it be better to conduct the training at the users' premises, or else in rented or shared rooms used for other educational purposes?

Costs. The cost of conducting courses. This cost is: the work of librarians, maintaining library infrastructure, teaching aids and materials, etc. The cost analysis will help develop a budget and adjust plans to the financial capabilities. It must be remembered that various marketing activities will also generate costs.

Preparing a detailed internal analysis allows constructing an offer of courses which will not suddenly come across unexpected obstacles, such as: the lack of qualified librarians-teachers, computer stands, lectures halls, etc.

External Analysis

External analysis is an analysis of the library's external environment. It consists of the close environment, such as local area, other libraries in the city, or more distant environment, such as the whole health or education system in a country, legislation, etc. This analysis is made mainly to identify potential library courses participants, and also library competitors and allies in its educational activity. Since this is a very important element of marketing, this external library environment will be discussed in more detail in Chapter 5.2.

The analysis of internal and external library conditions can be done with use of **SWOT** (**S**trength, **W**eakness, **O**pportunities, **T**hreats) analysis. It is a good tool to find all strong and weak aspects of the library, to think about, what external opportunities can support our plans and which can threaten them. Upon this analysis all further marketing activities will depend.

A template for SWOT Analysis is based on UBC Library SWOT Analysis
http://www.library.ubc.ca/home/swot-analysis.pdf

SWOT analysis of a library situation in regard to conducting library courses (an example)	
Strength e.g. high professional qualifications of librarians, good reputation of the library, etc. (*Which strengths may we capitalize on in order to reach our goal? How can we use our strengths?*)	**Weakness** e.g. shortage of staff, librarians lacking pedagogical skills, etc. (*Which weaknesses must we eliminate in order to reach our goal? What can be improved? How will we do so?*)
Opportunities e.g. new learning models, redefined role of the library, etc. (*Which opportunities should we consider in reaching our goal? What should be done first?*)	**Threats** e.g. unfavorable influence on other Library responsibilities, budget cuts, professional burnout, etc. (*What can we do to minimize the impact of threats? What should be done first?*)

Positioning and developing the "product"

Positioning is a precise description that shows the niches on the market that library training can fill. Information obtained through the external analysis of the situation, needs, competition, but also the internal analysis (competence, experience, resources, etc.) will identify those areas of education, where librarians can be the best and most needed, in which they cannot easily be replaced by other teachers. But, let us hurry, for this niche is slowly being filled by representatives of other professions. Additionally, the number of students is decreasing, academics are looking for new subjects that they can teach. The niche of information literacy must be brought under control by librarians as soon as possible, if they do not want to be marginalized in this respect.

Note: It may be useful to identify projects where information literacy skills are very important, e.g. research projects, systematic reviews, student projects, cooperative projects between a hospital and a teaching institution etc. Courses developed and targeted at these specific needs and users can be a part of a library's educational offer.

Positioning will allow us to realistically develop a detailed offer of teaching, precisely foreseeing the needs of the environment and taking into account different circumstances, such as: human resources, infrastructure and finance. Each training/course should be described in detail in terms of substantive content, the use of forms and methods of teaching, the conditions for acceptance and participation, requirements of staffing, necessary resources and budget. The more adapted to the real needs of users the training will be, the greater the chance that it will arouse interest of its recipients and be effective. The key issue determining the success of our operations is the quality of our product (See also Chapter 2.1).

Designing and conducting information campaigns and advertising

We have done the analysis of capabilities and conditions, we have defined our position, and we have developed the proposal of courses, their budget and the staffing needs. The next stage of marketing is to develop a detailed plan of how we will reach the goal. This plan lists and describes consecutive activities and the timetable, which lead to the final goal: conducting defined courses by health librarians. Among these activities are: gaining the acceptance and support of decision-makers and what is most important; looking for course participants. During this stage of marketing our „product" is basically ready and can be presented and advertised as the library's educational offer.

If libraries want to make their training part of a broader compulsory educational curriculum, they must obtain approval of superiors responsible for educational programs. A ready, well-thought through offer will certainly be met with a better reception and has the chance of being accepted and of gaining the support needed. However, we must first convince institution policy makers of the fact that such training is needed, and secondly that librarians are the most appropriate people for teaching information literacy. For this purpose it is necessary to tap into research that proves both these points. There are studies which show that improved information skills result in, for example, better academic performance, fewer medical errors. A short review of recent studies assessing the impact on health outcomes may be found in William Hersh's 3^{rd} edition of the book "Information retrieval" (2009, p.288) or in the article "Evaluating the impact of library user training..." (Trinder et al, 2007). There are also studies that show that librarians have the most profound knowledge of this subject matter, and that they can be very good teachers (Mackey T.P. and Jacobson T.E. 2008). It may be useful to recall specific examples of renowned research centers and universities, where such training has been conducted (more in Chapter 5.3.).

Convincing policy-makers is one thing, another is to capture the interest of target groups, future participants of courses. It will not happen immediately and not all at once library courses will become a compulsory part of education. It is therefore necessary to conduct an advertising campaign. Often marketing is identified with this stage, while advertising is only one element of marketing activities. Advertising is important in paving the way for our "product" into the minds of the potential participants of the courses, arousing their interest, enhancing motivation. Depending on which group we want to get the information out to, we will need to adapt to the characteristics of this group and use its proper information channels.

We should distinguish between activities which are solely informative and those measures used for gaining publicity. The last should be more creative. It is not an easy task, therefore if possible, let us place the job of preparing advertising materials in the hands of a specialist.

An important element of a successful information campaign will be the development of signs that will be identified with the training and will consistently adhere to a single symbol, wording, names, etc. Try to find or create an interesting logo for all information and training materials offered by the library. This will help the library and the courses offered to be easily identified. It is seemingly trivial, but a very important aspect in gaining the "market" by company and "brand" building, and in general can build the position of the library in the field of information education.

Language used in information and advertising has to be readily understood by target groups, professional terminology should be avoided. For example, the term "information skills" may not arouse the interests of our potential trainees, they are not librarians, and do not care about our professional terminology. We should always test whether the messages are understandable and interesting among non-librarians.

When designing publicity material, check what the participants of the training want to achieve and make that a promise in the advertisement. Examples of good and informative titles on courses:

- "PubMed, without secrets!"
- "How not to get lost in the Internet"
- "Meet RefWorks and you'll instantly quote any known publication"

You may support your advertising with examples of renowned research centers, where people receive training in information skills, or refer to the results of studies that say that information skills help to study or do research, etc.

Dissemination of information about the courses should be done through different channels. They can be sent via e-mail or posted on popular web pages among target groups, in the magazines they read, and on notice boards they look at. Leaflets can be made, information can be placed in the college bulletin or on notice boards, spread by using the institution's e-mail distribution lists. If the paternal institution has departments dealing with regular or continuous education, then it is good to use their channels of distribution of information. Students often use separate repositories of educational materials, have collective e-mail addresses. Information about library trainings placed there will reach them easily. The networks the library is part of can also be used for information dissemination purposes.

You can also use some of the scientific conferences or events that take place periodically (e.g., university fares), where the library may place a presentation of their trainings. At conferences it is usually easy to put up a poster advertising the courses or have a short presentation. It must also be remembered that satisfied trainees are the best promoters of library courses.

Marketing is not a one-time activity. The environment undergoes change, as do the needs of addressees of library courses. Therefore, some marketing efforts need to be repeated periodically, such as a needs assessment. And some, like information dissemination, have to be conducted on an ongoing basis.

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Zaltman, G., Kotler P., Kaufman, I. [Eds.] (1972) Creating social change. Holt, Rinehart, and Winston.

Suggestions for exercises

Exercise 1. Organize a discussion in a small group. A teacher — medical doctor, who teaches „pediatrics", trains students how to search PubMed? Let us think, why he does this? Can a librarian replace him? Should a librarian replace him/her? What a librarian needs to do to take over this task? (Adjust these exercises to circumstances).
Exercise 2. Each person in a group writes down an answer to a question: Have you ever been asked to conduct training for the faculty on how to use electronic journals databases (or other) accessible in your institution intranet. If not, what were the 4 most important reasons, what do you think? If yes, why? Compare the answers. Choose the most frequent ones, and discuss, do you want to change this situation? If yes, what can be done to attract faculty to such training? If no, why?
Exercise 3. Think over and discuss in a group, who are your competitors in teaching information skills? In what areas are you better then your competitors? Where and why are you worse? Do a SWOT analysis of your situation, on a board or on a flipchart.
Exercise 4. Point out the means and possible channels of dissemination of information about library courses in your environment. What are the advantages and disadvantages of various channels? Present the results of your work in a form of a short oral presentation.
Exercise 5. Conduct a SWOT analysis of the idea of establishing/developing library courses for chosen category of users (i.e. for nurses, for patients, etc.).

Suggestions for assignments to assess learning

1. Develop a marketing plan and activities schedule, for particular information literacy training, aimed at i.e. scientists (or other target group).

2. How will you solve a following problem: The library offers several trainings in database searching? The interest is minimal. Your task is to increase the level of participation, starting the new academic year. Describe in detail your activities.

3. Present a detailed budget of organization of a specific information literacy course. What are categories of costs that have to be taken into consideration?

4. Which trends in scientific information are in favor of teaching activities of health libraries? What is against such activity? How can we minimize the unfavorable factors?

Teaching tips and recommended methods

- Check, may be at your institution (especially if this is an educational institution) if there are general marketing courses available? Signing for such course, may be useful.
- When you teach marketing to colleague librarians it is recommended to use as much as possible of activating teaching methods, like: focus discussion, group work, field work, etc. Marketing is a social activity, you learn it best when interacting with others and with the environment.

Additional readings and links to teaching materials

Broady-Preston, J. (Ed.) (2000) *Strategic marketing for library and information services.* London, Library Association Publishing.

This book examines the current and state of marketing by LIS practitioners and institutions. Gives examples of how marketing can be made more widely applicable within LIS and illustrates some of the usefulness of marketing in special LIS settings and contexts.

Dowd, N., Evangeliste, M., Silberman, J. (2009) Bite-sized marketing. Realistic solutions for the overworked librarians. Canadian Library Association. Ottawa.

This book is structured to quickly impart simple and cost-effective ideas on marketing your library. It is s full of examples, lists, work sheets, and other aids.

Flaten, T.K., Saur, K.G. [Eds]. (2006) *Management, marketing and promotion of library services based on statistics, analyses and evaluation.* München.

Immroth, B. Lukenbill, W.B. (2007) Teacher-School Library Media Specialist Collaboration through Social Marketing Strategies: An Information Behavior Study.

An interesting example of a project using social marketing principles and AIDA model to promote collaboration between teachers and librarians. School Library Media Research 10. 22.

Koontz, C.M., Gupta, D.K., Weber, S. (2006) Key publications in library marketing: a review. *IFLA Journal.* 2006; 32: 224–231

Kotler, P., Lee, N. (2008) *Social Marketing: Influencing Behaviors for Good* (3rd Ed). Thousand Oaks, CA: Sage

Recognized as the definitive textbook on social marketing. A valuable resource that uses concepts from commercial marketing to influence social action. It provides a solid foundation of fundamental marketing principles and techniques then expands on them to illustrate principles and techniques specific to practitioners and agencies with missions to enhance public good.

Kotler, P, Lee, N., Cheng, H. (2010) *Social marketing for public health: global trends and success stories.* Jones & Bartlett

Kendrick, T. (2006) http://www.facetpublishing.co.uk/title.php?id=548-3category_code=958 *Developing Strategic Marketing Plans That Really Work. A toolkit for public libraries.* Facet Publishing.

Walters S. (2004) Library Marketing That Works! Neal-Schuman Publishers.

A How-To-Do-It manual for librarians, provides step-by-step guidance for every phase of a marketing program: determining the mission, conducting a SWOT analysis, doing market research, holding focus groups, planning campaigns, developing strategic marketing plans, and evaluating marketing efforts

Links

Marketing: Sources for marketing information and library services http://dis.shef.ac.uk/sheila/-marketing/sources.htm — *great Internet source of references compiled by S. Webber — a lecturer in the Department of Information Studies, Sheffield University, UK. Lists some printed and web-based material relating to marketing of library and information services.*

Marketing Teacher. *Free marketing teaching resources (readings, sample marketing analysis, ppt. presentations etc) provided by a group of marketing lecturers from southern England. All contributors to the website are qualified marketing lecturers with many years of marketing education experience.* http://marketingteacher.com/

CHAPTER 5.2.

Participants of information literacy courses, competitors and allies

Barbara Niedźwiedzka

Once...

The Commission on Teaching at the College of Public Health has asked the medical library to draw up a course on “information systems in health care”. This topic was included in the core curriculum of the undergraduate studies. The librarian responsible for teaching information users suggested a typical course run by the library, consisting of: library orientation, searching PubMed, searching full text journals database, the use of the RefWorks program. The Commission’s members themselves did not fully comprehend the meaning hidden under the name of “information systems in healthcare” so they accepted the proposed 15 hour program. The students attending the course were not pleased. After their studies they were to work in government institutions, sanitary inspection, centers for health promotion or in non-governmental organizations dealing with health. The PubMed database contained publications that were generally too distant from their information needs, which were strictly embedded in local realities. Collections of full text medical journals were similarly of little use. A reference management program did not have much application to writing a modest size Bachelor’s thesis. What they really needed was to learn about sources of epidemiological data, legal acts and health regulations databases, databases containing sociological and demographic studies. They were disappointed and bored with the classes, not seeing a direct application neither in their studies, nor in tasks for which they were being prepared to undertake in their future jobs.

Introduction

Investigation into, and analysis of the library environment is a very important element of marketing library courses. A medical library which conducts teaching is usually part of a larger entity. It can be a medical university, school or large hospital. But this library is also an element of a larger organism — such as the whole health care system of a given country. A Librarian working in a library of a particular institution may sometimes have a narrowed perception of environment and may not take into account information users beyond those which he/she deals with on an everyday basis. A university librarian sees mainly students, teachers, researchers. A librarian working at a health promotion center thinks about health educators, or certain health risk groups. Working in a hospital — one may tend to think that the world of information users is limited to doctors, nurses, perhaps also to patients.

Before developing a program for information training for public health students, the librarian from the case described in the beginning, should have first done an analysis of the Public Health curriculum. May be he should also briefly look over one or two basic handbooks in the field. Importantly, the librarian should have found out what tasks the students were being prepared for. This would obviously help better adjust the library course to their needs.

Teaching librarians may also not always keep in mind that their educational activity can trespass their immediate environment. And it has to be said, that conducting a wide range of information literacy courses is probably one of the professional opportunities for health sciences librarians in the future.

In this chapter, let us have an overall look at the health system, to find within it information users who potentially may become participants of library courses, and also to learn about competitors and allies in the educational activities of libraries.

5.2.1. Health care system

The definition of a health system of the World Health Organization says that the “health system includes all activities whose primary purpose is promoting and recovering health”, and that “... Health systems comprise all organizations, institutions and resources that are spent on health activities” and “health action is any effort already undertaken in the field of individual health, or public health, or by cross sectional action, whose primary objective is to improve health” (World Health Report 2000). As the report says the health system has its functions, which can be reduced to four basic functions: providing various health services, obtaining resources, financing and management. We can also say that any activity that in any way contributes to our health or treatment is part of the system, and it consists of institutions, organizations, and people of various professions who pursue these activities.

Country health systems are linked to the systems of other countries, and are under the influence of international organizations that deal with health problems across the continent and even around the world, such as the Commissions of the European Union or the WHO.

Health systems of individual countries differ from each other in regard to the structure, division of the functions and responsibilities, etc. Because in this chapter we are ultimately most interested in our prospective trainees, there will not be presented any particular system or specific institutions, but only their general types. In a particular country a certain type of institution may have a slightly different range of activities then in another, or the institutions will combine certain functions. Therefore each time, when analyzing the library environment, teaching librarians need to look closely at their national system and its institutions.

Another point of getting to know the health care system is also to get to know the content of important and strategic documents. The law acts, position papers, relevant regulations, all these documents can give valuable insights and make it easier to tailor library courses. They can also give good arguments for the library's position.

5.2.2. Medicine and public health

While medicine, understood as science and as curing, for most librarians is an area familiar and clear, for some it may not be entirely clear what is hidden under the term "public health". Since public health encompasses a very wide and diverse range of health institutions, professionals and information intensive activities, a short overview of them has been prepared.

WHO definition says that: "Public health services are concerned with the health of the public at the population level and include a wide range of products, activities and services aimed at the health of the whole population, although often finally delivered to the individual. Public health services and activities include:

- Surveillance of the health status of the population
- Communicable disease surveillance
- Emergency response to disasters or communicable disease outbreaks
- Ensuring a healthy environment through setting, monitoring and enforcing standards in areas such as air, drinking water and soil
- Food safety
- Occupational health and workplace safety
- Injury prevention, including road safety
- Disease prevention such as vaccination and chronic disease prevention services in primary and secondary care
- Health promotion and health education
- Evaluation of services
- Health related research

source: WHO http://www.euro.who.int/publichealth (10.04.2010)

According to The Centers for Disease Control and Prevention (USA) Public Health activities are also to:

- Inform, educate, and empower people about health issues
- Mobilize community partnerships to identify and solve health problems
- Develop policies and plans that support individual and community health efforts
- Enforce laws and regulations that protect health and ensure safety

- Link people to needed personal health services
- Assure a competent workforce for public health and personal health care
- Evaluate effectiveness, accessibility and quality of personal and population based services
- Research for new insights and innovative solutions to health problems

source: CDCP http://www.cdc.gov/od/ocphp/nphpsp/EssentialPHServices.htm (10.04.2010)

Public Health	Medicine
Focus on communities (populations)	Focus on individual patients
Emphasis on prevention & health promotion: staying healthy	Diagnosis & treatment: getting healthy
Interventions aimed at the environment and human behaviour: care for the whole community	Interventions aimed at medical care of individual patients
Diverse workforce, variable education & certifications	Well-established profession, standardized education and certification
Social sciences integral; clinical sciences peripheral to education	Clinical sciences integral; social sciences less emphasized
Observational and quasi-experimental research studies: case-control and cohort studies	Experimental research studies with control groups: Randomized control trials (RCTs)

Figure 1: *The differences between public health and medicine (After: E. Martin et all. Evidence-Based Public Health: Finding and Appraising Relevant Resources. 2004. http://library.umassmed.edu/ebpph/class04_manual.pdf)*

Public health as research and education field is multi and interdisciplinary. Its components are among others:

- Epidemiology
- Health policy
- Health education
- Health promotion
- Health institutions management and administration
- Health economics
- Pharmaceuticals management
- Control of communicable diseases
- Environmental health & sanitary inspection
- Care of the chronic sick and aged
- Maternal & child health care
- Occupational health

- Mental health and social adjustment
- Nutrition
- Information systems

There are two crucial characteristics of public health activities that differ from medicine: they stress preventive rather than curative aspects of health and they deal with population-level, rather than individual-level health issues. Figure 1 helps to see this difference.

Note: The table above shows differences between practice of public health professionals and medical doctors or nurses. But, it should not be forgotten that medicine it is not only clinical practice (diagnosing, treatment etc), but also medical and preclinical sciences, and various medical, graduate and undergraduate, education. This reminder is intended to keep us from losing sight of the fact that it is from these areas of science and education that most library course participants come from.

5.2.3. Types of institutions where we can find recipients of library courses

In almost every health care system the following types of institutions exist:

- Institutions of public health policy at national, regional and local level (e.g. Ministry of Health and its departments, regional and local health departments, health commissions in the parliament)
- Government agencies dealing with a specific field or aspect of health care (e.g. health technology assessment agency, an agency registering medications, an institution for dissemination of research results, an institution which collects data on health, etc.)
- Healthcare providers (e.g. hospitals, clinics, practices and specialized centers, spas, ambulance units, nursing homes)
- Research institutions (scientific institutes, research centers, university hospitals)
- Educational institutions (e.g. universities and medical schools, schools educating various specialists: public health professionals, health educators, managers of health care institutions, etc.)
- Centers for health promotion and health education
- Sanitary inspection institutions
- Institutions that finance health care (sickness funds, health insurers)
- Professional associations
- Non-government institutions dealing with health issues
- Pharmaceutical companies, producers of medical devices, equipment etc.
- Pharmacies and other health related stores

This list is given just to briefly present how extensive the institutional infrastructure of any health care system might be. And these are only broad types of institutions. In all of them teaching librarians can find possible recipients of their teaching activity. For some recipients information skills are indispensable, even if people do not call them information skills or information competency. A particular institution will have its own, sometimes unique scope of activities. How can we learn what they are? Web pages nowadays give more and more information, also their reports and employee publications can be useful.

5.2.4. Tasks or activities in the health system for which information skills are especially needed

There is probably no activity in the health field, which does not require information knowledge and skills. The model of "evidence based health care" extends the application of the principles of evidence based medicine to all professions associated with health care, including purchasing and management." (Center for Evidence Based Medicine Glossary. Http://cebm.jr2.ox.ac.uk/docs/glossary.html)

In the health care system, there are, however, activities and tasks that are to a greater degree saturated and dependant on the current scientific information. This information can come not only from medical science, but also from economics, management, politics, law, sociology, psychology etc. Activities that are the most saturated and dependant on current research information include:

- Medical treatment and related activities
- Conducting research
- Studying medicine and related sciences
- Analyzing epidemiological and other data
- Health technology assessment
- Doing systematic reviews of research
- Research processing and dissemination
- Health Financing based on analysis of research data of effectiveness, etc.
- Managing, planning and organizing in health care institutions
- Health promotion and education
- Evaluation of research
- Evaluation of effectiveness of health interventions
- Developing guidelines and standards

5.2.5. The recipients of library courses

In all of the types of institutions mentioned above, the people working there need various kinds of information skills in order to obtain, process and use information, therefore they are possible participants of information literacy courses. They can come from various educational backgrounds including: medical doctors of all specialties; nurses and midwives; physiotherapists; sanitary inspectors and emergency care people; public health professionals; technicians and laboratory staff; psychotherapists and psychologists; pharmacy staff; scientists in various interdisciplinary fields, like e.g. medical physicists; health promoters; health educators; environmentalists; nutritionists and dietitians; sanitary inspectors; health policy makers; managers and administrators; academic teachers at health related studies; health economists; epidemiologists; social workers; students of health related studies; health informatics; representatives of producers of medications, materials and equipment; health librarians; journalists who write about health. And we can not forget about patients and clients of the health care system — who often need information skills. They need to be information competent to navigate well in the system, to communicate with health professionals, even to take part of care into their own hands.

The above list is neither complete nor in any way systematic, it is only an attempt to show the variety of possible participants of library courses. A practical use of this list can be that it may help in thinking about how different courses can be offered by a particular library, how they can be specialized. Some recipients may need more tailored courses, some courses can be more general and targeted at a wider audience. There is certainly no library that could provide courses for all. Most libraries will have their priorities or limited resources. Because of various reasons the libraries may also want to encompass only certain categories of information users. Depending on individual circumstances the range of possible recipients of library courses can be different.

It is not enough to identify the target groups, their work and information behavior must also be well understood. Do teaching librarians know, for example, what the job of the researcher in a university hospital is specifically. At which stages of his work, does the researcher most need the information skills? Do they realize that a first year medical student usually does not look independently for scientific information, too busy with learning from given handbooks, and information skills are not his biggest problem at that time. Do they know what information an epidemiologist needs? Or the health department staff of the local government or a health promoter? These are just a few examples of questions that need to be asked when characterizing the group of present or potential recipients of information literacy courses. The answers to these questions can be found in literature describing work and information behavior of certain groups of information users and their educational needs. How needs assessment is being done you may read about in Chapter 1.2.1.

Do you know that… On average academics are rather unwilling to participate in the library training, and the reasons for this may be as follow:

They do not like to be taught by people with lower academic degrees
They do not want to admit that they do not know something
They do not like situations in which they do not have control
They have a strong sense of self-efficacy, and believe that they can comprehend anything
They like to study independently. (White 2002/2003)

What might this knowledge be useful for?

Training for this category of users, shall be so designed as to give them as much power over the whole situation as possible. They will decide together about when, where and how the training is to progress. Let them, in as far as possible, determine its contents. During the training they should be given as much opportunity to share their own experiences and ideas. Working in a group they should be allowed to learn from one another. Their interest will be greater, and the sense that they have brought something into the training process themselves will make them more satisfied. Not only will the effect of the training be better, but we will also gain allies in our efforts.

Do you know that... Nurses usually write diploma papers. Depending on the country it can be a bachelors paper, master thesis or other written assignments.

What might this knowledge be useful for?

To accurately plan when the information literacy teaching should be held. The year in which students write their theses is the perfect time to teach them information skills. They must at that time collect the literature of the subject, the available data and documents. Their information competence becomes of immediate use. Nothing motivates better to improve it.

5.2.6. The competitors

An important element of an external marketing analysis is the identification of potential competitors — namely those who could hold such trainings in theory or those already conducting similar forms of training. In some countries, like in example Norway or UK, librarians have a well embedded role in academic institutions and in teaching. But in many countries their role as teachers is not that obvious. Commonly subject teachers, IT teachers, theses supervisors undertake the task of teaching information skills. This is caused by many factors. First, it is a common belief that it is not too complicated "no man's land" and that anyone can teach these things. Almost every diploma work supervisor discusses the structure of scientific work, reference styles, and those teaching Evidence Based Medicine (or wider — Evidence Based Health Care) usually show how to search the databases of publications. Probably, in the opinion of librarians, these supervisors teach briefly and superficially but they will probably not give up teaching information skills so easily. Only proving that these skills and knowledge can be taught professionally, and that librarians can do the teaching, might convince people who construct the curricula to put information literacy courses into the hands of librarians. (Read more in Chapter 5.3).

Another reason, why subject teachers teach information skills is that policy makers and academics sometimes do not even take into account the fact that a librarian may be able to teach well and conduct education in certain areas of knowledge and skills far more competently than others. What is the reason for this? On the one hand, we are still conservative in many countries, in our perception of librarians' roles, and the other reason is the lack of activity of the latter, who do not manifest enough of their competence and capabilities.

Do you know that... At the medical studies of your university there are some professors of medicine who teach so called research skills? A part of these teachings is usually information literacy skills (searching and selecting adequate information, citing, managing bibliography, etc.). If you do not believe it, check out the syllabus items for the faculties of medicine, nursing, etc. A teaching librarian may support these classes with, often better, knowledge of information sources and higher searching skills.

Competitors, according to a SWOT Analysis (described in 5.1.4.) can be looked upon as threats. But a library's strategy should focus on transforming competitors into its allies. One possible way of achieving this, is to co-operate in teaching, engage in common projects, support subject teachers in their tasks. An example of such support can be to analyze students searching skills as they are presented in bachelor papers, or after EBM course, and to propose training to improve them.

5.2.7. The allies

In addition to the recipients of library courses and the competitors of teaching librarians you have to identify your allies. That is, to determine who in the institution or in the wider library environment can support the idea of information literacy training, and who can cooperate with teaching librarians. This might for example be the dean responsible for education, or perhaps a professor — a member of the curriculum committee, which has a very good relationship with the library and knows its capabilities. In some institutions there is a unit dealing with the education. People who we identify as allies may play an important role in supporting librarians' proposals at decision-making forums and may also be used in promotional activities. The authorities of an institution may, at times, make participation in the information literacy training mandatory. For example, the library at the Norwegian Directorate of Health the Library conducts a 3 hours course on how to work within the concept of knowledge-based/evidence-based health care. Initiated from "above" the course is mandatory. More on allies in chapter 5.3.

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MLA (2004) Evidence-Based Public Health: Finding and Appraising Relevant Resources. MLA Continuing education course. http://library.umassmed.edu/ebpph/class04_manual.pdf

Suggestions for exercises

Exercise 1. Think about a current public health problem (e.g. bird flu). (Daily press can help to find such information). Discuss with your students-librarians which public health services/institutions and which professionals will be solving that problem. What information would public health workforce need to solve this problem? Can a librarian help them find necessary information?

Exercise 2. Find a text in a newspaper from a responsible body (i.e. WHO, or Sanitary Inspection) announcing the crisis/emergency/epidemic/pandemic on a national/global level. Make students read it, and then discuss: who would need information and what kind of information may be useful to cope with the situation.

Exercise 3. Make up a story (or use a real one) about a person who gets ill. Choose a complicated/infectious/expensive to treat disease. Make students draw on a flipchart and describe this person itinerary across health system. Which institutions will be involved. What kind of information will need professionals who can cope with the problem? Reward student who indicates the biggest number of professionals and their information needs.
Exercise 4. Tell your students to fill in below table to put some order in their knowledge about particular category of library course participants. Tell them to fill gaps in their knowledge by reading appropriate literature.

Category of students	Characteristic features of this category of information users	Library course features which can enhance participation and effectiveness of teaching	Library course features which can hinder participation and effectiveness of teaching
researchers	Narrow specialization Independent Self-learners High motivation		
medical students			
health educators			
managers			
patients			
Etc.			

Exercise 5. List the categories of potential trainees of your library. To whom else can you direct your teaching service? Give a short Power Point presentation.

Suggestions for assignment to assess student's learning

1. Prepare a presentation on information sources for epidemiologists (or for health promotors or for managers of health care institutions etc.)

2. Find out what are the health responsibilities of your local government. On base of these responsibilities describe what information may need people working in health department, and what kinds of information skills training would be of use to them.

3. Describe, based on literature (or on a basis of conducted interview), what is the characteristic of a chosen category of health/medical information users. Concentrate especially on features that affect their information behaviour and use.

4. Develop a short questionnaire which can help you characterize the chosen category of health/medical information users.

Teaching tips and recommended methods

- Health systems differ a lot from country to country, therefore when teaching this subject you have to carefully check information and give appropriate examples fitting your own country reality. Be very specific, find by yourself the necessary details about governance, institutions, sources, etc.
- Recommended teaching method: lecture with ppt. presentation, case study + discussions in small groups

Additional readings and links to teaching materials

Ennis, L.A., Mitchell, N. (2010) emphThe Accidental Health Sciences Librarian, New Jersey Information Today, Inc.
In this book Ennis and Mitchell offer guidance on a health care environment, people, refer to wide range of critical resources, tools, share expert tips and advice, covering essential topics for health sciences librarian. The book has strong American bias to it, but can be a good starting point for a librarian new to the health care field.

Brownson, R.C. (2003) Evidence-based public health. Oxford University Press.
An authoritative and comprehensive guide to the major issues, challenges, methods, and approaches of global public health. A good reading for a librarian who wants to learn more what public health is about.

Gray, J.A.M. (1997) Evidence-Based Healthcare. How to Make Health Policy and Managament Decision. Churchill Livingstone.
A textbook on evidence based decision making written for healthcare, medical and nurse managers, but helpful in understanding what various health care professionals do and what they need information for.

Links

European Observatory of Health Systems and Policies publishes country-based reports (HiTs) that provide a detailed description of each health care system and of reform and policy initiatives in progress or under development http://www.euro.who.int/observatory

Health topics — At this WHO site you may learn more about possible health care topics http://www.who.int/topics/en/

Health Economics Information Resources: *A Self-Study Course* http://www.nlm.nih.gov/nichsr/-edu/healthecon/index.html

Evidence-Based Public Health: *Finding and Appraising Relevant Resources* http://library.umassmed.edu/ebpph/class04_manual.pdf

CHAPTER 5.3.

Organization of information literacy courses, and advocacy

Barbara Niedźwiedzka

Once...

A university advisor, responsible for the academic major "Medicine," came into the medical library with a request posed to the librarians to prepare 10 hours of training on the subject of scientific information. Soon the library developed a syllabus consisting of 5 hours of lectures and 5 hours of practical exercises. Participation in the course was made compulsory, but did not give any credits. The course was intended to take place during the first year of studies, in the library's computer lab. A librarian with experience in searching databases of publications was designated to teach the future doctors.

Course participants often skipped the lectures and the lab classes were often disregarded. The classes in the library were held at a different location than the remaining courses, and the first year of studies was overloaded with subjects followed by exams, which tested knowledge from specific textbooks. When in their fourth year, students were assigned the task of conducting a review of clinical studies surveying the effectiveness of drug X, the students who had long forgotten the few hours of lectures and boring exercises in the first year, found themselves in big trouble. Meanwhile the librarians were kept busy giving them individual instructions.

Introduction

In this part of the module special attention will be paid to what can be done to better integrate information skills trainings with medical and related education. Complete and well-thought out integration of library courses with the curricula is an important task. Then librarians do not have to be so concerned with attracting students, and can teach under the umbrella of various academic regulations, which make teaching easier.

For the organization of the training to be optimal, thorough knowledge of the environment, the participants, and some elements of marketing are very important. All of this was addressed in chapters 5.1. and 5.2. Attention will also be given to the efforts made to optimize organization and integration of the training with other teaching by looking at examples of existing solutions and standards of teaching information skills in higher education.

The subject of finding supporters in the mission of raising the competence of information of users and using their support in the promotion and implementation of library courses will also be addressed.

5.3.1. Organization of library courses

Information skills courses may be conducted by librarians in complete separation from other educational paths, or may be more or less integrated with the teaching of a particular subject or field of study. This teaching may take place in large or in small groups or individually.

Teaching designed for large groups typically take the form of lectures and/or a presentation or seminar. Small groups (up to 15 people) have more opportunities for interaction, practical exercises and use of methods activating the students, such as, focused discussions, small projects, games, etc. (See also Module 1)

The teaching can be conducted in a traditional way, the teacher working in direct contact with the student or using e-learning means. In the latter case, the teacher can monitor a student's progress in real time, or merely review and comment on the progress of education using internet or Learning Management Systems. The student can also study independently, in interaction with a computer programmed to lead him through the course content. More about Learning Management Systems, which are becoming increasingly applied, both in e-teaching and for administrative purposes, can be found in Charter 1.6.

Possible organization of classes

- Students sign up for classes and then the teaching takes place when a required number of participants is met
- Training for individual users in the library by appointment with the librarian-teacher
- Teaching ordered for a group of information users in the library or in their workplace (e.g. for doctors in a hospital, or for employees of health promotion center, etc.)
- Teaching as a part of a larger course (e.g. within the frame of medical specialization courses) done according to the course rules and timetable
- Teaching takes place within a frame of a specific subject (i.e. during EBM or Internal Medicine course)
- Information literacy courses can be a separate credit course

  Other hybrid solutions are also possible

As you know In many medical libraries, students undergo a brief, sometimes mandatory, library orientation. This is a kind of tour, during which library resources and services are presented to first year students. During this meeting the library and librarians for the first time create their image among users, which is not easily to be changed. Upon whether or not this "tour" is interesting may depend how the users perceive the librarians. If they recognized them as competent professionals it is more likely that they come back later to get in depth trainings.

Library courses can be divided into two types, training that is obligatory and training in which participation is voluntary. This division may be important because different measures and resources may be needed for each kind.

Mandatory training does not require special advertising. It is an integral part of a particular curriculum. Library teaching can be connected with the whole curriculum or with certain subjects or courses within it. In the first case, completing library training is a condition for graduating or completing a certain part of the studies (e.g. 1st year of Nursing). Such training can be called — a library course integrated with the curriculum.

Voluntary training. Participation in voluntary training depends entirely on the motivation of potential participants. Only teaching that is well-matched to the potential needs and circumstances, given the right information and publicity which has awakened or strengthened people's motivation, can bring the library courses a greater number of participants. That is why well conducted marketing and advertising in case of voluntary courses is especially important.

A library course can also be a part of a particular subject/module/course or group of subjects, for example, it may be part of an "EBM course" or a part of a course on "Methods of scientific research" or "Epidemiology". Then one of the conditions for obtaining credits for this course is participation in a training conducted by librarians. Let us call this solution — a library course integrated with a subject.

Example of a library course integrated with a subject

An information literacy training can for instance be a part of the Pharmacotherapy course at Medical Studies. A teaching librarian will get for example 4 hrs to: present pharmaceutical databases, to show how to search them and how to use medical decision support tools. The course may also encompass information on checklists useful in critical appraisal of drug research studies. Students must complete these 4 hrs of library training as one of the conditions for passing the Pharmacotherapy course for which they get 7 credit points.

Information literacy teaching which is integrated with a specific subject (let's say oncology or pharmacoeconomics) has the greatest degree of linkage with the substantive content and is the most effective as it relates to specific issues currently being the subject of studies and interests of the students. (Handbook for Information Literacy Teaching, 2007).

Information literacy teaching which is integrated with the entire curriculum may be a little detached from concrete, current tasks and problems which students solve. At the same time, however, it has the advantage of being more versatile. Introducing information skills trainings to each subject in a given field of study is neither feasible nor justified, as most of the information skills are more generally applicable. For example, someone who learns how to use a reference management program can apply this ability to every field and to various tasks. For the most part, only knowledge of very specific sources of information in a given discipline, and highly specialized skills (for example, researching databases of diagnostic images) are really worth connecting with a specific subject.

Example of a library course integrated with curriculum

At the Medical College in Krakow (Poland) there is an extensive Information literacy course integrated with the undergraduate Public Health curriculum. This is a mandatory (60 hrs course) for which students obtain credits. The course covers searching in various publications and factual databases (e.g. Cochrane Library, OEC, WHO, etc.), critical appraisals skills, assessing quality of Internet sources, writing publications, etc. The course is not connected with any particular subject of Public Health curriculum, but uses various subject matter and addresses various information skills useful in studying and working in the field of public health. The librarians who conduct this course co-operate closely with teachers of Research Methods to complement each other in their teaching. Students receive 3 ECTS for this information literacy course.

Information skills can also be taught linearly, from basic and general skills to more advanced and narrower skills, and may take place throughout the entire course of medical studies. Such an educational program is offered, for example, by a medical library in Oslo (Personal communication). Similar library training is conducted at universities in Sweden (Tovote, 2001).

The ideal solution in planning library courses would be, to first give students training to develop certain skills for general use (e.g. the general principles of searching the databases of publications, a critical analysis of the quality of information sources, etc. Then, to follow-up with training that is more specific, within the constructs of particular subjects (or groups of subjects), for example, information skills training that would relate to the field of genetics. This situation, however, is rarely realistic. Usually there is not enough time for information literacy training in the overloaded curricula. There may also be a lack of teaching staff or organizational incapability of a library. In such cases it is more reasonable to "insert" library course in a given field of study, or only in certain subjects, in which the information skills and knowledge are particularly needed (e.g. EBM classes, classes on research methods).

Do you now that It is very important to determine when the library courses should be held. This is dependent on many factors, including dominant methods of teaching, tasks performed by students, etc. Knowledge of the potential users of the training will allow us to establish this. Had the librarians from the "case" described at the beginning of this chapter taken into consideration the real needs of those students, had they studied carefully the curriculum and learned about the tasks the students were supposed to perform, they would have certainly proposed that the library training takes place later in the course of their studies. They should receive such training at a time when they needed to look for scientific information independently. It would definitely not be in the first year of medical studies.

In the traditionally taught medicine, where students during the first years are mainly made to listen to lectures and learn through memorizing, it does not make much sense to equip them with information skills. Only, when the student begins to study more independently do these skills become useful and necessary. But, in schools where "problem based learning" is initiated from the beginning of the studies, students must be equipped with information skills at the start.

Sometimes information literacy courses may be imposed by the authorities of an institution, or by a government, as in the example of the Norwegian Directorate of Health, where training intended to teach the paradigm "evidence-based health" is compulsory for all employees. Or, as in the British public health system where widening the information skills base of NHS staff has been reinforced by the strategy "Working Together, Learning together" (Department of Health, 2001).

The integration of library courses with subject curricula or subjects is not an easy task. The level of integration varies from university to university, and can be slow and gradual. It seems though that the goal of teaching librarians should be to integrate their teaching with curricula. A close link between library courses and the curricula, and especially obtaining recognition in the form of ECTS credits, reinforces the status of library courses, raises the prestige of the librarian-teachers, mobilizes and motivates students, and therefore makes teaching more effective. The universality of this solution will certainly help to raise the level of information competence among professionals in health care.

Independent from integrated courses, a health library should also offer a range of voluntary sign-up courses. However, as it was said before, in such cases, measures to raise awareness of these courses would need to be stepped-up to encourage participation. These courses, apart from some basic skills (e.g. PubMed searching), may teach searching in narrowly specialized databases (e.g. database of biochemical compounds, or law acts) or less obvious information skills like: editing or scientific writing. Large medical schools' libraries offer a fixed range of courses which are repeated, and participants can sign up for the dates that are convenient for them.

Examples of health libraries' educational activities

Courses/trainings offered by the Health Care Libraries University of Oxford (UK)
http://www.bodleian.ox.ac.uk/hcl/services/information_skills/regular_sessions
Courses/trainings offered by the Library Liason@Mac McMaster University (Canada)
http://library.mcmaster.ca/liaison/classes
Courses/trainings offered by the Countway Library of Harvard University (US)
https://www.countway.harvard.edu/menuNavigation/libraryServices/classes.html#literacy

5.3.2. Integrating the information skills teaching with the curriculum

What can be done to introduce library courses to the curriculum or to individual subjects? First, it is essential to raise the interest of those individuals who coordinate the subject teaching and the interest of individual lecturers.

Medical schools usually encompass many faculties, types of studies, hundreds of subjects and teachers who teach them. To get hold of this changing matter, there should be a liaison librarian assigned to communicate with a particular faculty, department or curriculum coordinator. Such a library liaison is responsible for communication and can respond in a flexible way to any changes and to educational needs of a particular group. The integration can be worked on in different ways.

1. **Top-down way**. Departments of universities have their own educational program committees that shape the curricula. Similar committees exist at any larger training centers. In turn, each course or field of study has a person who is a co-ordinator. This person may submit the library teaching offer to the Program Committee what can start a discussion and initiate the appropriate changes in the curriculum.

Do you know that

In many countries information literacy education is included in educational standards of medical and related studies.

2. **Bottom-up way**. We can start by convincing the particular professor that his/her students need information literacy training and that it will help him/her teach. If we succeed, that person may propose changes in the scope of the course and invite a librarian as an additional teacher. Ultimately, however, this change will also have to be made formal. Each subject has its own specific curriculum, which determines the substantive content of the subject and specifies who teaches what. The syllabus for each course is approved by the relevant committees and school decision-making bodies, and teaching hours are specifically accounted for, also financially.

3. **Visiting trainings**. Information skills training can be also conducted by "visiting" librarians in the framework of specific subjects. This takes place when the subject teacher invites the librarian to carry out specific instruction. Also in this case to be invited, we first have to awaken subject teacher's interest in library instruction. This kind of "guest appearance" however may result in a more stable and formalized cooperation.

Sometimes it may happen that teaching librarians may encounter incomprehension and reserve on a side of subject teachers. This may be due to the fact that sometimes teachers themselves do not have great information skills. They also may not realize the diversity of information skills, or of how much they could facilitate their own teaching. Or perhaps, sometimes such facilitation is actually inconvenient. Proficient in information sources, critical students may be perceived as harder and more demanding. It also happens that some teachers are reluctant to share their "territory" of teaching, and a librarian can be seen by some teachers as a threat (Immroth, Lukenbill, 2008). It also can be that teachers simply do not appreciate the competence of the librarians, and teaching librarians first have to convince them that it is not justified.

Do you know that,

In Bergen (Norway) University Library changed vocabulary from "teaching at the library" to "courses at the library" for not giving the impression that the library will take something from the teachers (personal communication).

To make library teaching really support subject teaching sometimes it is necessary to re-structure the content of the course. This should be done in co-operation of subject teacher and a librarian. An interesting examples of such re-modeling of a course to make library training most effective give L.E. Briggs and J. M. Skidmore (2008, 87–106).

The information literacy teaching integrated with other paths of education always requires close cooperation between teaching librarians and faculty. The key word here is cooperation, it is not about the rendering of services by libraries, but about cooperation in developing the curriculum so that the information skills facilitate the realization of that curriculum. A good example of such co-operation is Buskerund University College in Drammen (Norway), where librarians in co-operation with course co-ordinators had planned and conducted, together with subject teachers, information skills training throughout all 3 years of bachelor studies in Nursing and in Radiography (personal communication).

5.3.3. Advocacy

In trying to gain supporters for the idea of intensifying and the integration of library courses into the curricula, we can use various measures. We can use examples from other universities or institutions of good reputation, representing a gold standard for others. Presenting exemplary excellent education centers which teach information skills or regulations, standards of information skills education etc. which are followed in other places can also be useful. It is important to keep in mind that most people are not innovators but they adopt new ideas only when they see that others use them (Rogers, 1995). It is important to work along different channels both formal and informal. We can also use: word of mouth, expert opinions, media. And, what is very important, teaching librarians have to be visible in the education field.

Use examples of universities where information competence courses are well developed

What are others doing in the area of improving the level of information competency? American universities have the longest tradition of teaching information skills. One of the purposes of education, agreed by the Association of American Medical Colleges in 1998, was to make sure that "a graduate of studies in medicine has the ability to obtain, manage, and use biomedical information to solve problems and make decisions related to patient care or health-care of the entire population" (AAMC, 1998). The past 30 years of the gradual introduction of information skills training programs has made the usefulness of information skills for achieving the objectives of major subjects obvious for faculty members and has allowed for development of various forms of cooperation between faculty, information specialists, and computer specialists. The first library to introduce integrated library training into the curriculum was Queen's University in Canada in 1991. Training customized to the themes of a particular course is offered by, for example, Countway Library of Medicine of Harvard University, McMaster University Medical Library and Queens and Cairns Library at the University of Oxford. The broadest training of its kind is offered at Harvard University's library, going far beyond the typical information skills training. It offers more than thirty periodically repeated courses, including, use of programs in the application of bio-informatics, digital imaging and management of medical records. Therefore it falls within the scope of medical informatics, which is a specific feature of American universities, where education in information skills is much more closely associated with medical informatics than it is in Europe.

Countries such as Great Britain, Germany Norway and Denmark, have not remained far behind American universities. Academic libraries in the UK consider teaching information skills to be a very important task (Biddiscombe, 1999), and statistics show that in recent years the number of hours of information skills teaching is constantly growing. This trend is very clear, especially in the newly launched courses, and libraries organize a growing number of special training units in their structure (Bainton, 2001). Other European countries (e.g. Spain, Portugal, Greece, Poland) have only in recent years introduced the term "information literacy" to the language of medical and health education.

Overall, training in the skills of information is currently dominated by a conception of education which consists of moving away from separate training courses to moving towards a cross (disciplinary) teaching pathway. What this means is that at the request of teachers for different subjects libraries provide a training program suited to the specific goals of education, created from "building blocks" of standard training courses offered by the library.

Some libraries of medical schools that have extensive teaching programs, have separate departments for teaching and librarians who only teach. Incorporating training into specific subjects is done by, mentioned already, special coordinators performing the function of liaison between faculty and the teaching team of that library. Receiving credit for a library course is based on materials related to the subject, and is one of the elements of the final exam. The ability to find the appropriate and valuable scientific publications is also increasingly part of the final clinical exam (this is at the University of Leicester in the UK) or part of the final examination concluding 5 years of medical studies (e.g., at the University of Oslo).

In many universities credit for courses in scientific information is given in the form of ECTS, and librarians are part of the education programming teams.

Use standards

Some countries have developed standards and models of information literacy. An appropriate example of such standards, even if there is no standard in a particular country, may serve as an argument, which a liaison librarian may present at appropriate gatherings. Below are some information literacy standards or models:

- United States of America — Information Literacy Standards for Higher Education of the Association of College and Research Libraries
- UK. Kingdom — Information Skills in Higher Education UK Standing Conference of National and University Libraries (SCONUL)
- Spain — Spanish Web standards REBIUN academic libraries
- Australia — Australian Information Literacy Standards, Council of Australian University Librarians, Griffiths University
- Germany — Dynamic model of information literacy (Homann 2003)
- Norway — "Information competence — user education in university and college libraries"

These standards were usually created in collaboration between academic staff and scientific information scientists and provide a framework and basis for training in various fields and at different levels of education. In some countries, where official standards are not in place, you may be able to find information about a work in progress, like for example in Poland, where first publications with propositions of health information literacy standards can be found. (Grygorowicz, Kraszewska, 2007). In addition, these standards are sometimes given additional support from the official government's strategy for education. For example, in Great Britain the relevant documents, carrying out the idea of an information society in health care include: Information for Health Strategy (1998) and Building the Information Core — Implementing the NHS Plan (2001). In Poland there is a strategy of the Government "Strategia rozwoju społeczeństwa informacyjnego w Polsce do roku 2013" (The Strategy of Development of the Information Society in Poland to 2013).

The following play an important role in the development of information literacy trainings: the National Library of Medicine (US), national libraries and associations of medical libraries (e.g. Norwegian Library Association, Section for Medicine and Health) and international associations (e.g. European Association for Health Information and Libraries). They promote the educational activities of health libraries by developing standards, guidelines, organizing continuous education of health librarians, conferences devoted to these issues, etc. These resources can be used by teaching librarians in their advocacy activities.

Use word of mouth

In raising supporters, it is important to use those who have already been convinced, specifically the individuals who were satisfied with the library training. Satisfied participants will be the best ambassadors of the idea of library teaching.

Use opinion leaders

Presentations given by a leader of opinion in a given environment (e.g. by a known scientist), who speaks well of qualified teaching librarians, or of the benefits of library training, which he attended, at a conference or at meetings is priceless.

Use feedback collected by the library

The library can start a website/blog where trainees express their opinions about library courses and their educational needs. These opinions may be useful and used at strategic moments. The same can be said for the results of the assessment of courses carried out or student ratings. A blog on the library's website can also become an important part of building a network of users, friends and consultants.

Get management's interest

Invite decision makers, managers, those whose support would be beneficial to the library to talk. Remember that they are busy people, therefore you may make this an "over lunch" meeting connected with visiting one of the courses you conduct.

Build profiles of librarians — professional teachers

Librarians tend to express themselves by writing only for their "congregation" in their special journals, by speaking at their conferences, where no one needs to be convinced. It is not enough. Librarians conducting teaching should write about their experiences, the role and effects of library courses to medical and related journals and professional magazines. They should present their educational achievements at medical conferences, where they meet the decision makers and health information users. The aim is not so much advertising of specific training courses, but to give speeches and publications which argue for implementation of information literacy courses, demonstrating their benefits. In this way, accustoming the environment to the idea, building understanding and gaining allies.

Use mass media

If there is an opportunity to use media, for example to give an interview for a professional magazine, or to participate in a television debate regarding education, librarians should go for this to promote their teaching.

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Suggestions for exercises

Exercise 1. Conduct a discussion about possible organizational solutions in regard to library teaching. Divide course participants into two teams and ask them to present very shortly their proposals and arguments. The teams have to oppose and present contra arguments. Possible topics:

- Integration of library courses with core curriculum versus "free floating" courses

- Integration library courses with whole curriculum versus Integration with a particular subject
- Courses in the library versus courses at users' work place

Teaching information skills at the beginning of studies versus teaching closer to the end of education (choose a particular study curriculum).

Exercise 2. On a basis of the analysis of the structure and staff of the educational institution, indicate people who can support introduction of information literacy course into particular curriculum (e.g. nursing or other).

Exercise 3. What would be the best way to organize course in information skills for hospital patients? Discussion in small groups + ppt. presentation.

Exercise 4. Think, what are the possible benefits of attending information skills trainings? Write 5 attractive information messages adjusted to a particular target group informing about library courses/training.

Suggestions for assignments to assess student's learning

1. Based on the analysis of curriculum of a chosen kind of studies develop a proposition of the most effective organization of information skills teaching (i.e. for Physiotherapy students).
2. Write an official letter (and make a list of appropriate addressees) in which you propose and justify including information literacy training in curriculum of chosen studies.

Teaching tips and recommended methods

- Teaching librarians how to integrate their teaching with subject teaching you may invite a teacher of a chosen subject to discuss with librarians possible problems such integration may encounter and solutions to these problems.
- Present as many as possible of "real life" solutions. In the Recommended Readings you will find many cases and reports describing collaboration between teaching librarians and faculty or relevant authorities. You may use these cases as a base for a discussion in your course.
- Recommended teaching method is a case study.

Additional readings and links to teaching materials

Jacobson, T. and Mackey, T. (eds) (2007) *Information literacy collaboration that works*. Neal Schuman Publishers.

This collection brings together proven information literacy collaborations between library and faculty, departments, and other instructional units. Each chapter is written by the collaborating librarian and faculty member and provides a model for collaboration.

Kraat, S.B. (ed) (2005) *Relationships between Teaching Faculty and Teaching Librarians*. Haworth Information Press.

Ten articles on how librarians need to be an integral part of the teaching process and how librarians develop relationships with faculty colleagues and departments

Rockman, I. (2004) *Integrating Information Literacy into the Higher Education Curriculum: Practical Models for Transformation*. Jossey-Bass.

Practical examples from a wide variety of institutions that show how information literacy programs and partnerships can transform the higher education teaching and learning environments.

Links

The Information Literacy Website http://www.informationliteracy.org.uk/

A gateway to a wealth of high quality information including websites, blogs and case studies.

Advocate for Information Literacy http://www.ala.org/ala/mgrps/divs/acrl/issues/infolit/profess-activity/advocate/index.cfm

Association of College and Research Libraries give important points to consider when speaking out about information literacy.

Journal of Information Literacy (open access) http://ojs.lboro.ac.uk/ojs/index.php/JIL/index

An international, peer- reviewed journal that aims to investigate information literacy.

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