Title: Improving information retrieval with dialogue mapping and concept mapping tools

Training university teachers to use a new method and integrate information searching exercises into their own instruction

Virpi Palmgren, Kirsi Heino and Jouni Nevalainen

1. Introduction

Development of education practices and new education methods are increasingly important in Finnish universities. There is pressure because of internationalization and quality targets with no extra funding to be expected. This can be seen also in the training organised by the library.

The Library of Helsinki University of Technology (TKK) has almost a 40 years' experience in teaching information retrieval. In these years several course models have been used and thousands of students have participated in the training (Palmgren and Heino, 2002). The Bologna process has changed the situation and new courses had to be planned. The library has now its own part in the bachelor's seminar where instruction has been planned to ease the writing of the bachelor's thesis; for example students do as an exercise an information seach on the topic of their bachelor's thesis. Library training reaches all students twice: in the beginning of the studies and in the bachelor phase.

Because the groups are large and the time to be used is limited, learning environments and other methods to ease the tuition are being used. There is perforce less room for face to face teaching in the schedule. (Heino and Palmgren, 2006)

In order to reach the goal of information literacy the students have to apply the basic skills they have learned in the library courses to their actual studies. TKK teachers are in a vital position. Therefore new training for teachers has actively been planned as a part of their pedagogical training. The new course represented in this paper combines different competences and allows for co-operation between different fields of knowledge within the university.

Mapping methods are being used for structuring information search. Maps are known to be a good method for outlining things in general; however piecing together information searching exercises is difficult. When a student receives the topic for her/his thesis she/he is often lost – does not know about the topic or how to search for information. Also researchers need to familiarize themselves with their topic in order to make a thorough search. With the help of mapping software it is easier to analyse the topic and to choose relevant search terms and structures. At the same time the researcher's knowledge of the topic deepens. With the help of the maps the information search is connected with the writing process which usually is the aim of the whole process.

2 Course arrangements

2.1 Mapping software details

The mapping software used on the course is freely available from the web and the course participants liked the idea of using free software. It is not fair to demand course participants to buy commercial for only one course. In the business world their use is more understandable. To provide this software for students, it has been discussed with the Computer Centre that the software could be included in the program packages installed in all computers in the computer rooms at TKK.

Mind maps are the best known, simplest and most used mapping method. FreeMind mapping software (http://freemind.sourceforge.net/wiki/index.php/Main_Page was used in the course. It was used to plan the course to present it to the course participants (See picture 1). Mind maps have a major advantage compared with for example PowerPoint slides which can only show a fraction of the topic at a time. Mind mapping does not transform and improve the content of thinking in a similar manner than more structured notations of dialogue mapping or concept mapping. The latter ones focus on essential building blocks of thinking such as concepts, relations, questions and arguments. (Nuutila and Törmä, 2007).

CmapTools software (http://cmap.ihmc.us/) is intended for making concept maps and Compendium software (http://compendiuminstitute.org/) for dialogue maps. They were used to help structuring the search process. The aim was a dynamic search and structuring process with the help of the mapping software.
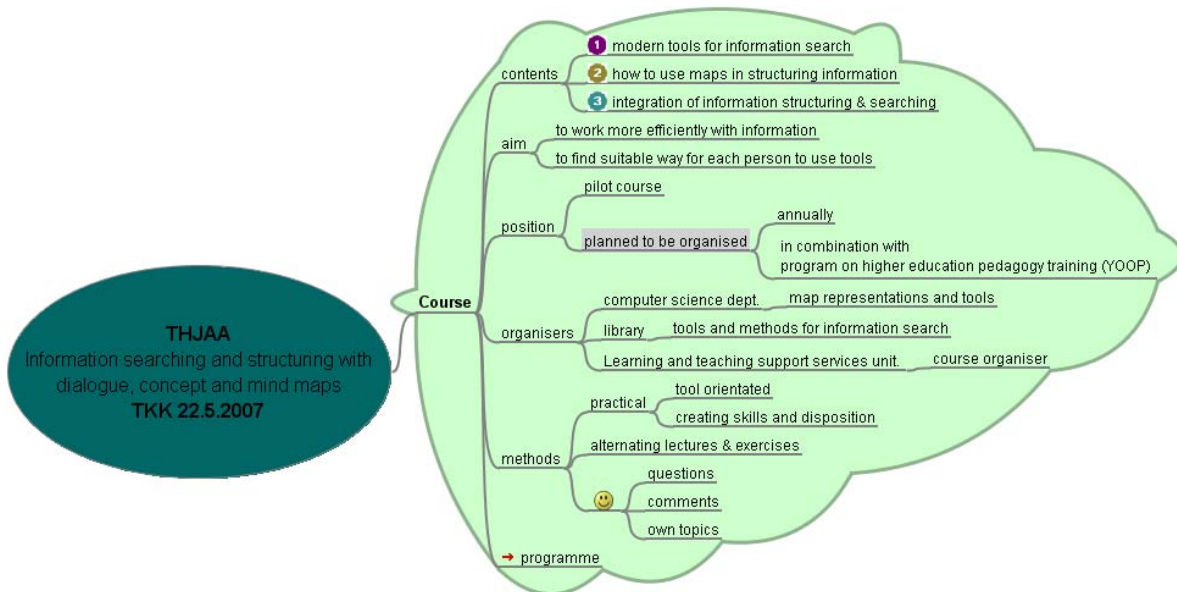
Picture 1. Example of presenting the course programme by using a mind map

Concept maps enable identifying, widening and defining search terms which can be utilized in the search. At the same time the concept map outlines the relations between different concepts related to the topic. It is possible to define relevant broader and narrower concepts, partial and comprehensive concepts, other near concepts and synonyms. Course participants did some exercises where they analysed texts by choosing the relevant concepts and created relations between them. (See picture 2).

With the help of dialogue maps it is possible to present questions, answers and reasons. They are suited for planning, problem solving and knowledge creating. Information searching can be started by forming a question of the topic and finding answers and identifying useful ideas. It is also possible to make critical questions concerning the information search (See picture 3). Open rather than closed questions are to be used in dialogue maps. For example the question "is the project ready?" could be replaced with a question "What are the deficiencies in the project?"
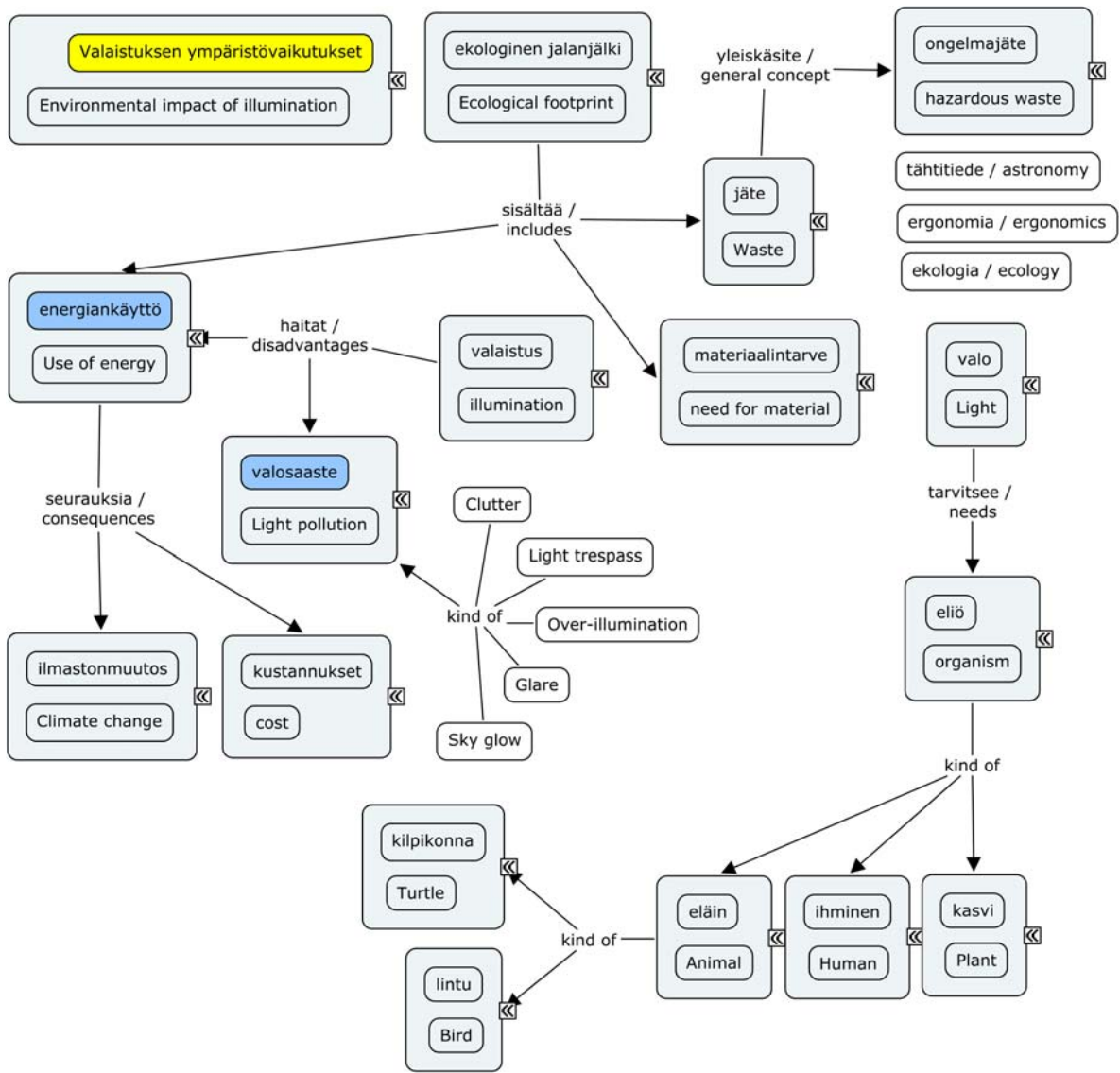
Picture 2. Example of using a concept map for outlining search terms

Course participators were advised to take their own laptops with them to the course so that they could start working at once. Maps are seldom completed during one session and ideas may appear at random times. Attendees used laptops and WLAN when searching for information. They were however advised not to take laptops with them when doing the group work in order to make it easier for them to concentrate on the actual group work.
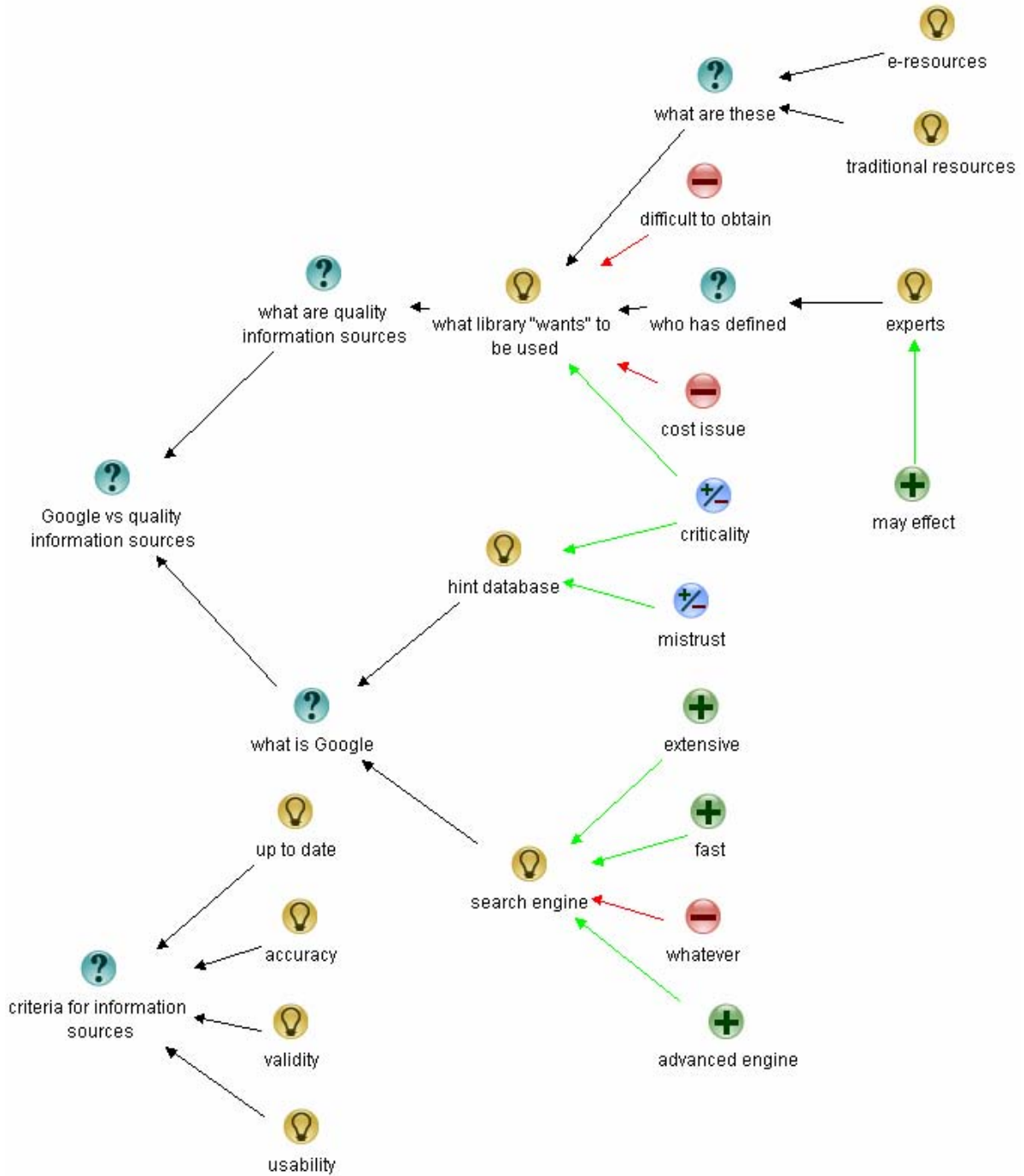
Picture 3: Example of using a dialogue map: When to use Google and when to use quality information sources?

2.2 The language issue

Finnish language is not easy to use in concept maps because of its complicated structure. In concept maps the sentence structures are split in two knots and relations between them. English instead is much better suitable and adaptable for this purpose. English is also used to a large extent in the Finnish academia for both study and research. Today, central literature, publications and to an increasing extent also teaching is in English. This is why many exercises were done in English. Finnish terms were translated into English and used in parallel with the English ones. See picture 2 for an example.

2.3 Information retrieval

On library courses it is recommended to keep search diaries. Often, when wanting to continue an earlier search, one has already forgotten the course of the earlier one. Mapping software can be used for keeping a search diary. One can write down the search terms used and also make links to the search results, which is especially useful as it helps to clarify the topic of the search. However, development is yet to be done on the functionality as the different programs can not be completely integrated.

2.4 Future challenges

The course held was the first pilot version. There is a long way and a lot of questions to be met before these methods are in full use:
- how to find teachers who are interested, motivated and who have time for learning and applying these new methods

- how to find information search topics which are easy enough and suitable for everybody

- what kind of courses does this method suit best

- funding?

3. Planning the course

3.1 Background: a novel course

The library decided to start new courses aimed at TKK teachers as a part of the Program on Higher Education Pedagogy Training (YOOP). This way the students will be the ones to get the final benefit of the extra information retrieval training.

During autumn 2006 TKK library and TKK Department of Computer Science and Engineering started an interesting co-operation (THJAA). New software for making mind maps (Margulies and Maal, 2002), concept maps (Novak 1998) and dialogue maps (Conklin 2006) will be used for structuring information retrieval. These methods have been taught on separate courses but there was a need for topics fitting to all. More information about these courses can be found at course sites made by innovative education developers Esko Nuutila (Dr. Tech.) and Seppo Törmä (Dr. Tech.) http://tge.cs.hut.fi/Courses/KartatYOOP2007/ . This project got a warm reception from the university because it can be adapted throughout the university and will benefit several departments. Teachers can also update their knowledge of information searching.

The chart (picture 4) represents the channels of information training at TKK. The presentation will focus on the left side of the map.
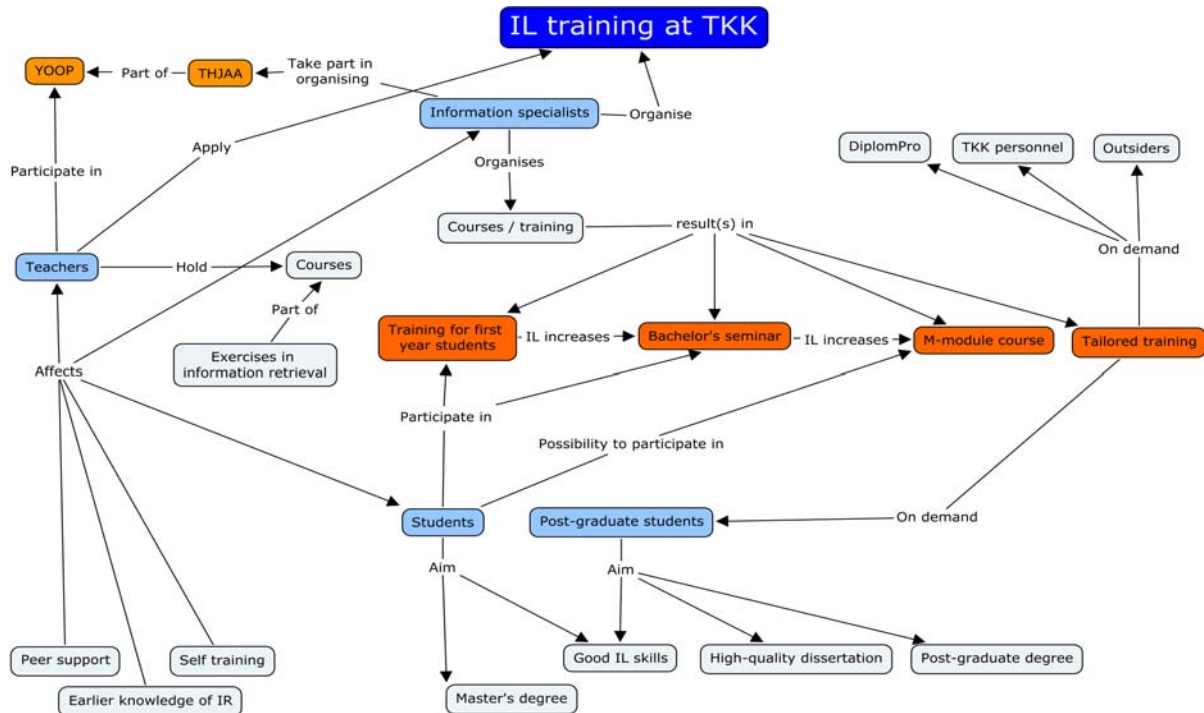
Picture 4. The chart of channels of information training at TKK.

3.2 The planning process

The course was planned by two researchers from the computer science department, three information specialists from the library and a planning officer from the Learning and teaching support services unit.

The course had to be planned so that the creativity of the course participants would be encouraged. This way the library training and the library teachers would develop and get new perspectives and ideas. The library staff has a certain way of thinking and new views from the field can be very useful. Therefore model answers for the questions were

not given on the course to encourage different ways of thinking and all unexpected answers would be eagerly received. Naturally the exercises had been tested beforehand by staff, to see what kinds of questions were best for the purpose. The use of the programs was easy but analysing the topic was more complicated and took time. After the problem had been presented with the charts it seemed quite simple.

Free mind map software FreeMind was used for planning the course. During the intensive phase of the planning there were one-hour meetings once a week.

The members of the course planning group familiarised themselves with each others' fields of expertise; the computer experts studied the theory of information searching and the library staff made mind maps. It was necessary to select the best mapping software for different kind of tasks. It was not easy to know beforehand which would be the best alternative. By trial and error it was soon possible to choose the best programme for every task.

TKK was the first university in Finland to combine mapping techniques with information retrieval. In the beginning of the information search it is usual to face difficulties in understanding the topic and defining the need of information. The use of mapping methods combined with information search has been of interest of other Finnish educational institutions too (Kämäräinen, 2007).

4. The course

4.1 Participants

The course was aimed for the teachers of the university. The interaction between teachers and the library is even more important after the changes caused by the Bologna process. The course was marketed especially to the TKK teachers who are doing pedagogic studies, who are actively interested in new teaching methods and who perform related teaching experiments.

Teachers are needed to give information searching assignments in their own courses in which case the application of basic searching skills would be directly connected to actual studying. The teachers may also have an insufficient knowledge of the changing information retrieval methods or lack the experience necessary for applying them on the courses. The improvement of the information searching skills of the teachers is a beneficial by-product of the new course to be discussed here. Almost without exceptions teachers also do their own research where they can take advantage of this update of knowledge.

Teachers can use the mapping methods and information retrieval skills for

- an analysis of the core substance in their own course material; for their own use
- to be used by students for exercises
- to be used as training material.

Twelve people signed up and participated on the course.

4.2 Questionnaire – the level of knowledge before the course

The course participants had to fill in a questionnaire on their experience and knowledge in information searching, library services and mapping software. The questionnaire also included links to extra information. The idea was that a certain level of knowledge would be guaranteed and no basic skills training would be needed.

The course participants were well aware of the essential information resources in their own field of study. It was noteworthy that young teachers were familiar with open access. It was quite confusing to find out their lack of knowledge in basic library services. Therefore it is important to have a questionnaire before the course. Information searching skills are important for teachers because students learn them already in the library courses. The questionnaire has to be conducted in good time before the course, so that the results can be utilised in the planning of the course.

4.3 Conducting the course

The course was placed in the end of May in order to get more teachers to the course. The courses and exams had just ended and summer vacations not yet started. There were four course days: the Tuesdays and Thursdays during two consecutive weeks. During the first course day only the mapping software was presented. The library was responsible for the second course day and the topic was the basics of information retrieval. The responsibility for the two last course days was shared by the organising parties. During them searches were done and mapping software was used to help to define the search problem.

Because the days were so near each other it was not possible to do any homework between the course days. This made the course very intensive. The active daily working time was about six hours.

There were five teachers working on this pilot course: two who knew mapping software and instructed on its use and three information specialists from the library. The size of the group, twelve persons, was quite ideal: there were enough persons for discussion, yet everybody had an opportunity to tell her/his opinion on the topic which was being dealt with.

The training sessions were such that there was a short lecture, lasting about half an hour and possibly also a demonstration on the topic which was followed by training in groups or pairs. Some of the exercises seemed to be too difficult because the course participants did not yet know enough about the mapping software. The original idea was that in the beginning exercises should have been easy i.e. hands on. The exercises also had to be such that everybody was familiar with the topic (studying, university, information searching etc). The course participants were from different departments. Information specialists participated in the group and pair exercises when it was not their turn to lecture.

The method was to display the chart on a computer screen so that everybody can see it. One person, a teacher or a course participant, acted as a facilitator and wrote down all the concepts. This is the way how Jeff Conklin advises meetings to be held (Conklin, 2006). All the exercises were also saved on the course pages http://tge.cs.hut.fi/Courses/THJAA/.

Plagiarism is a problem in the academic world (Carroll, 2002). The practices concerning the handling of plagiarism seemed to differ substantially between various departments at TKK. Plagiarism and ways to avoid it were discussed. For example exercises can and should be made so that they do not encourage plagiarism. The use of mapping methods makes plagiarism more difficult.

Because of the flexible timetable it was possible to fit an extra topic to the last course day: bibliography managers and especially RefWorks demonstration by request of the course attendees. It would have been useful to integrate bibliography managers to mapping software but it will be a challenge to the future courses.

4.4 Course feedback

We urged the course participants to give critical feedback on all aspects of the course (timing, structure, organising, content). Because this was a pilot course it was necessary to get truthful feedback. This course is likely to run and perhaps be placed in optional courses for example for post-graduate students.

We got feedback from seven course participants. They all thought that the course was useful or very useful for their work as teachers and also as researchers. The implementation of combining the different mapping software and information retrieval was considered to need more planning as it was not complete. However, completing a map takes a lot of time. To make the mapping software a mastered routine tool takes a lot of personal practise.

5. Conclusions

A lot of time went into the planning of the course, but how it works in practise could only been seen with a pilot course. Next time, the course will have new participants and they may have different knowledge, skills or needs than the participants of the first course. The course is sure to be unique every time. The objective was to have an innovative course with an aim to create new insight into outlining information searching with the help of new tools. At the same time the personnel of the library is in contact with the practical teaching and research done in the university. There has to be a learning process, during which different areas of expertise are brought together and new applications are built. The teachers of the course also learn in teaching the course.

The learning process should continue also after this course and persistent work will be rewarded as our students – who are assumed to be the ones to benefit in the end – will get better learning results and digest the core substance of a topic to a further extent, which makes the studying process easier.

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