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Mapping a path to the empowered searcher

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Abstract:

This article considers the use of mindmapping as part of information literacy education. Important parts of the search process are: identifying the information need (or defining the information problem) and formulating search strategies. Research has shown that these are areas with which people have significant problems. It is argued that current approaches to information literacy education often do not give enough attention to these aspects. Mindmapping and concept mapping are briefly defined. The use of these approaches as part of an undergraduate Information Literacy class is described. The benefits of using these techniques to educate people in information literacy in the workplace are highlighted. The article finishes by advocating that these approaches could be more widely adopted.

1. Introduction

In order to be information literate, people need to be able to find the information to meet their needs. Even though search algorithms and interfaces are improving, people are more empowered if they know what to do if their Google searches do not magically turn up the results they want.

A number of different problem-solving activities are involved in a successful search. This is reflected in models of information seeking (e.g. REF 1) and definitions of information literacy. For example, the Standing Committee on National and University Libraries (SCONUL) *Seven pillars of information literacy* (REF 2) include:

- Recognise information need
- Distinguish ways of addressing gap [between the need, and what you know]
- Construct strategies for locating
- Locate and access

A number of recent studies identify that key areas where searchers go wrong are those of problem definition (recognising your information need) and developing search strategy.

The JUSTEIS report has shown that UK students are poor at search formulation, and sometimes vague about what it is they are searching (e.g. about name, scope, content of databases: REF 3) In the USA, Pollock and Hartley (REF 4) note in their study of two groups of internet searchers that "Nearly all participants from both trials had difficulty formulating good searching keywords even when they had all the information they needed"

Jansen et al (REF 5) performed a largescale analysis of transaction logs of the former search engine Excite and found that an average a search query contained only 2.2 terms. A small percentage of users used modifiers: for example 6% used the plus sign, fewer used Boolean Operators, and, when further examined, mistakes in use of operators emerged (e.g. 38% of users making mistakes with the minus sign, such as putting it in the wrong place).

In another web-use study, Spink & Ozmutlu (REF 6) note the low amount of query reformulation, which they observe is also reported in other research. Lucas and Topi (REF 7) suggest that the Help material provided by search engines should devote more attention "to issues related to the selection and use of search terms, which are often ignored" (p105)

Thus, apart from a wealth of anecdote from practitioners about people's low skills in search strategy formulation, there is a growing body of research evidence. One problem that may be hindering people's progression to information literacy is that education for searching has tended to focus on the "access and locate" aspects (e.g. how to search a particular database or search engine in a particular way) rather than the "recognise the information need" and "construct effective strategies" elements. This, despite the fact that (REF 8) "knowing how to shape a topic and to translate it into search terms is likely to be the largest problem faced not only by undergraduates, but also by anyone doing research." (p111) This may mean that, left to themselves, people revert straight back to what seems to be the normal approach to searching: taking the words you first thought of (or which have been given you to search) and searching for the *words* rather than the *subject*.

Obviously, the issue of selecting keywords is often mentioned in training material. However the way in which it is introduced and discussed often may not acknowledge that for many people the idea of a "concept" is hard to understand. For example, the internet tutorial TONIC (REF 9) in its section on "Searching the internet" says that "The first step in building an effective search strategy is to define the type of information you are looking for" but it does not explain *how* you should do this, simply continuing two paragraphs later with "Once you've defined what you are looking for, you can then think about the sorts of resources which might lead you to that type of information"

There is a further problem in that traditionally search strategy has tended to be linked in library training with Boolean Logic. Although a grasp of Boolean is still needed for a number of the electronic products purchased by libraries, that number is decreasing as more and more progress to relevance ranking of output. Importantly, the major search engines, and many website search engines, default to relevance ranking. Strategies for optimising relevance ranked retrieval differ from Boolean strategies. People who think they have been taught that "strategy" means "Boolean" will think that they have not learn anything of use for search engines (or, possibly worse, will then add ANDs and ORs in a random manner to search engine searches).

Therefore there seems a clear need to develop more effective ways of educating people about search topic definition and strategy formulation.

2. Mind/concept mapping

Mindmapping is associated with Tony Buzan (REF 10), who continues to publish and work in this area (REF 11). Mindmapping involves visualising an issue, problem, subject etc. The subject of the mindmap is dropped into the centre, thick branches are drawn to denote key themes and secondary branches are added to indicate subthemes. Branches and sub branches are clearly labelled either with key words or with graphic representations. Linkages and relationships are indicated graphically, and use of use of colour and pictures is encouraged. Mindmapping can be used to stimulate creativity and is said by Buzan to help develop brainpower: in particular the right side of he brain which is associated with creativity, empathy and intuition.

Mindmaps are personal views (views from a particular mind) and therefore cannot be "incorrect"; however a person may use the technique more, or less, effectively to map their mind. Software has been developed which enables onscreen development of mindmaps (e.g. MindManager (REF 12)

Concept mapping is a similar technique. In some cases it may be used to describe mindmapping without using that term (since Buzan has registered it as a trademark). Sometimes it is used more specifically to describe a map which illustrates the relationships of concepts, these concepts being expressed as words or phrases. For example, texts or transcripts of research may be analysed by researchers to identify key concepts. Again, software such as Atlas/TI (REF 13) has been developed which facilitates the process of term indexing and concept map display.

These techniques have been used in educational development work for some time. Plotnick (REF 14) and Moen and Boersma, (REF 15) describe some of the applications and advantages.

3. Application of mindmapping to information literacy

3.1 Introduction

Working with a colleague who taught mindmapping stimulated the author into experimenting with the use of mindmaps as a way of:

i) Helping students to visualise their view of a search problem. This could help them think about what they understand of the search problem: where they already have knowledge and where they have gaps. This visualisation could be useful at various stages of the search, at the start and also as the search progresses, and the changing view of the subject could be reflected in a changing mindmap;

ii) Creating a reference point for potential search terms. Words and phrases might be transferred directly from the mindmap to the search. If graphical representations have been used, there is a chance that they might stimulate more alternative search options that the "word you first thought of." A mindmap might be particularly appropriate to guide a relevance ranked search, with its visual indication of "weighting" and rich picture of the topic;

iii) Providing a reference point for the success of the search. The scope of totality of the retrieved items can be compared with the scope indicated by the mindmap;

iv) Obliging students to spend more time planning the search, and encouraging them to think about the process;

v) Enabling interactivity between students. For example, this might be the starting point to developing a joint search strategy, or as a tool to help a student "searcher" discuss a search with a student "client" who wants a search done.

3.2 Evidence of existing use

The school library sector shows more evidence than the academic library sector on using brainstorming and mindmapping techniques in the process of teaching information literacy. For example Murray (REF 16) identifies concept mapping as a useful aid to concept definition. The Big6 model itself (The Big6 "information problem-solving model" REF 17) includes the steps

" 1. Task Definition
1.1 Define the information problem
1.2 Identify information needed in order to complete the task (to solve the information problem)
2. Information Seeking Strategies
2.1 Determine the range of possible sources (brainstorm)"

Kesselman (REF 18) has discussed the usefulness of creativity techniques including mindmaps for librarians. Todd and Kirk (REF 19) have talked about the use of concept mapping in educating information science students.

3.3 Example of an information literacy module

This section starts with a brief overview of a one-semester core information literacy module taken by first year students on Sheffield University's BSc Information Management. It goes on to describe the ways in which mindmapping is used during the module.

The aims of the module are for students to start to develop their own conception of information literacy and to enable students to identify, evaluate and choose between key information resources in a variety of media. By the end of the module students will have learnt:

- to analyse their own information behaviour and start to identify ways in which they can become more information literate
- to understand some information literacy models and theories
- to plan a strategy for seeking information and search for information in specific information sources

- to apply an evaluation framework to information resources
- to interact with an enquirer to identify what they want and carry out a successful information search on their behalf.
- to communicate more effectively orally and in writing

The SCONUL seven pillars of information literacy model is flagged up as a framework for learning from week 1, and the major piece of coursework is a portfolio in which students have to reflect on their progression in each of the seven pillars, and back this up with evidence. Evidence includes presentations the students are required to make about their searches, bibliographies, mindmaps etc.; i.e. material which can confirm (or contradict!) students' assertions about their learning. The class is taught for three hours a week, with a one hour lecture session followed by two hours in a lab, and WebCT is also used in order to make class materials accessible and facilitate communication and information exchange.

Mindmapping is introduced as a technique in week two of the class, and its relevance to the specific class and the students' studies in general is explained. The following exercises and assessments involve mindmapping:

i) After the introductory lecture, students mindmap the same topic individually and search for relevant material. They are asked to tick search terms in the mindmap that they use in the search

ii) A group search exercise, using a health information problem, is carried out over a period of two weeks, culminating in a PowerPoint presentation from each group. As well as providing their own answer to the question, the students have to explain their search process, including a mindmap of their original perceptions of the search topic and a mindmap of their final perceptions of the subject (see Appendix 1).

iii) Each student has to carry out an individual search on a topic specified by a fellow student. Class time is set aside for students to develop an initial mindmap, which can be used as part of the discussion with the "client" for whom they are doing the search. When students hand in their portfolio coursework at the end of the semester, they have to hand in both this mindmap and a further map which represents their understanding of the search topic at the completion of the search. These mindmaps are allocated marks.

iv) A compulsory question in the examination provides students with a search topic and requires them to mindmap it as part of the planning process.

In the first two years of the class there was no evaluation specifically of the mindmapping element: and as it is part of the overall learning, teaching and assessment strategy, it is not straightforward to identify cause and effect. However, it can be stated that:

i) Students become more effective at mindmapping through the class, and there is evidence in other classes that they have applied the technique elsewhere (e.g. as a way of presenting ideas in presentations);

ii) Students do make the connection between mindmap and search, and many move between the two in a way that appears to improve their searching;

iii) The maps are successful in making students pause and reflect on what they searching for, and getting them into more of a habit of reflection;

iv) The maps are very good for stimulating interactivity e.g. comparing views and as a focal point for discussion for what the search is about. Mindmaps of the same topic can be very different; more different than a list of "brainstormed" keywords.

v) A graphical representation of a search may be more easily added to and annotated than a linear representation of a search, and this is good when one is emphasising the iterative nature of a complex search.

vi) A minority of students are reluctant to move away from text as something that appears in lines and columns, and are reluctant to see the benefits of mindmapping. At the other end of the spectrum, sometimes a student who has more difficulty with written text will prove to be an excellent mindmapper, and this is obviously empowering for them.

4. Workplace applications

Mindmapping and concept mapping are used in the workplace, as is clear from descriptions of business versions of concept mapping software. Project planning is a frequently mentioned application, as is any business activity requiring brainstorming. The approach may be used as part of workplace training of various kinds (e.g. as part of creativity development, or as part of an exercise concerned with some aspect of management). Incorporating a mindmapping element into information literacy training may have the following advantages:

i) It may be a technique that human resources personnel are already familiar with, and that they recognise as a "real" development tool. It may help to situate information literacy as part of problem solving or creativity development activity;

ii) Staff may be familiar with it from a business context, and therefore take it seriously;

iii) If it is an approach that is already undertaken for project planning, there may be an opportunity to insinuate information-problem mindmapping into the process;

iv) Since mindmapping can be used to stimulate interactivity, it may form a useful part of a knowledge sharing initiative.

5. Conclusion

If more attention is paid to the crucial search problem-definition and strategy formulation parts of information literacy, then appropriate educational approaches need to be adopted. Simplistic approaches, that downplay and gloss over the complex problem-solving aspects of these activities will not be helpful to searchers (and research indicates that they have not been helpful in the past). More time and attention need to be devoted to these stages. Brainstorming and mindmapping appear to be being used sporadically as part of information literacy education, but the approach is not widely discussed in the literature. More widespread adoption could help take searching out of the library skills ghetto and onto the agenda as a key skill for the knowledge creating organisation.

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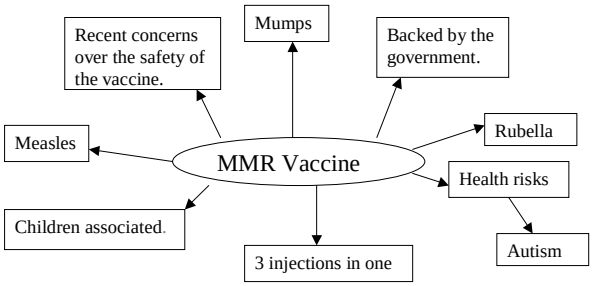
Appendix 1

Examples of mindmaps: from a presentation by Olly Jakes, Phil Ryan, Randdeep Dhillon, Vickie Street and Richard Francis (Inf104 Class 2002)

Mindmap of topic before search



Mindmap of topic after search

The search "Risks of MMR vaccine" helped us find the highlighted information.