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**Federated Searching: Is the death toll sounding for Information Literacy?
Do we really want to "Google"™ our libraries?**

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Abstract

Federated search technology provides library users with an avenue to locate information in a similar way to Google™ search. It answers many a frustrated, time pressured users' prayer by allowing them to search across multiple information resources at the same time. As library professionals, should we embrace this technology and celebrate the simplicity of this search mechanism and the release of information, or should we cringe in fear and write the obituary for information literacy and life long learning? Our library is currently in the process of installing federated searching software. This paper will explore whether the introduction of federated searching could affect the development of information literacy skills in our library users; what impact it will have on the way information literacy is currently taught, and provide an insight into the advantages and disadvantages of using federated search technology in a university library environment.

Introduction

A review of the current literature of material has been undertaken in the writing of this paper and we have focused our attention on federated searching and its impact on information literacy in higher education library facilities that cater for academic students.

While many academic libraries debate the pros and cons of federated searching and its impact upon their students information seeking behaviour, "Google™" continues to listen to feedback and respond to the demands of its users (Miller, 2005). This paper explores the results of several studies relating to federated search tools and the influence they have on information literacy training. From these papers we are able to reflect upon our own university library's experience and agenda in trying to create a federated search portal. While our readings and experiences are not conclusive we attempt to review all the works with an open mind and focus on the positive outcomes for users.

Federated searching defined

The term 'federated searching' has been around for a number of years and it is often interchanged with terms such as 'metasearching', 'cross data-base searching', 'broadcast searching', 'parallel searching', 'simultaneous searching' and 'integrated searching'. (Sadeh, 2006). For the purposes of this paper, we define these interchangeable terms as a "search system using a common interface that enables the simultaneous searching of databases form a variety of vendors" (Lampert, 2005, slide 6).

This single search interface replicates that of the Google™ search engine and provides an opportunity for users to have a one-stop access point to numerous electronic library resources such as e-journals & books, library catalogues, databases and web search engines (Luther, 2003).

The "Google" Experience

So how has the Google™ search engine gained its popularity? Miller (2005) says it is because they ("Google™") have answered their users' wants with a simple search interface and powerful results. Miller's (2005, p.2 [2]), interpretation of powerful results relates to "high content, low hassle, and happy users" not the results produced by a search strategy thought out and executed in an adaptive way. Our own experience as librarians at Central Queensland University shows us that students use Google™ search engine and other search engines for many different purposes, sometimes with great results, sometimes with results that are less than great. The worrying part is that the students do not always know the difference in quality of the results that are produced.

Google™ search engine has engaged users with its ease of accessibility, use and relevancy ranked results. Neilson (2005) states that web users "expect searching to have three components:

- A box where they can type words
- A button labelled "search" that they click to run the search
- A list of top results that's linear, prioritized, and appears on a new page – the search engine results page".

This ease of use is not always replicated in academic libraries, users often having to pass through a number of pages before getting to a relevant database. Luther (2003) reports that many library users struggle with online databases they do not immediately understand how to navigate. Frost (2004) supports this by emphasising that for first time users, the number of databases confronting them is very confusing, and they are often perplexed at the different ways in which they have to familiarize themselves with individual databases to find information. Frost (2004) further suggests that they would no doubt appreciate a common interface as they have with Google™ search with which to conduct their first steps into searching.

Within the library environment, this has caused quite a conundrum. How can we meet our users' needs by supplying quality information along with their expectations of a quick and easy search process like that of the Google™ search (Luther, 2003)?

Some librarians believe that federated searching provides such an avenue in which to meet the expectations of the "Google" generation while providing access to selected resources (Luther, 2003). Users would encounter within the library environment a simple search interface that enables them to search resources not normally searched by a web search engine. At our own library, library resources are becoming more online, incorporating databases, e-books, newspapers and reference material so why not make these accessible as possible to our users?

Information seeking behaviours

Google™ search and other search engines have influenced the information seeking behaviour and expectations of our library users (Luther, 2003). They expect the information seeking process to be "quick and easy" and the results that they get to be "good enough" (Luther, 2003 & Frost 2004). We know that many library users source information using search engines (Luther, 2003). It is therefore natural to assume that they might prefer to use similar search mechanisms when they are in more formal settings such as the library.

A student's quest for information is influenced by different information seeking behaviours and individual learning styles (Kuhlthau, 1991, Weiler, 2005, Heinström, 2006) this challenges librarians to be flexible in conducting their information literacy workshops. Kuhlthau's (1991) model for information seeking behaviour suggests we acknowledge the feelings of the information seeker, and take into account how time consuming and frustrating locating information can be. Indeed while librarians are very familiar with the library environment, student perception of, and how they, as non-professionals, interact with our libraries, can affect the information seeking process. Library anxiety is a real phenomenon that affects the self-efficacy of our users (Kuhlthau in Weiler, 2005, p 47).

No one student is like the other - they all have very individual approaches to their learning and how they will organise their study (Heinström, 2006). Heinström (2006, p 244) describes these differences in student learning behaviours, thus -

- "fast surfers" put in the minimum effort to find resources and results returned are good enough for a pass,

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- "broad scanners" search across a number resources but have no real strategy with their searching - serendipity plays a big role in the information seeking process for these users. Serendipity is defined in this case as when users come across other relevant information whilst looking for specific information.
- "deep divers" are characterised by the amount of effort they put into their searching so that the resources retrieved are of the highest quality.

Although Heinstrom's (2006) study relates mostly to high school students, we have included it in this paper as we feel that school leavers most likely bring some of these traits and characteristics with them into the university library environment.

Edwards and Bruce's (2006) studies, help confirm the existence of similar information seeking characteristics to those described by Heinstrom (2006). What is illustrated by these two authors (i.e. Edwards and Bruce) as "panning for gold" can be likened to the searching strategies used by "deep divers" (Heinstrom). Certainly Edwards and Bruce (2006) emphasise the need to understand the position of the end-user. They encourage the importance of awareness toward the ways in which searching for information is currently approached by university students. By recognising that user behaviour is complex, Edwards and Bruce (2006) further suggest that we can discover why certain search behaviour exists and from this create a foundation that has the potential to guide our students' to more rewarding search experiences.

For instance, Hallam (2005 [2]) suggests that school leavers being unaware of the resources available within the university, are less likely to try new resources and therefore feel more comfortable with quick searches. Federated search tools provide an opportunity to introduce students to new resources via the familiarity of a simple search interface (Hallam, 2005 [2]). It is recognised however, that more sophisticated searching and exploration of other databases is expected as a student requires more information about complicated topics (Hallam, 2005 [2]). Edwards and Bruce's (2006) studies suggest students be encouraged to reflect upon all the elements in the search process; that is, tools, planning, resources and results.

All learners need to have substance as well as a process in their learning journey (Knowles, Holton and Swanson 2005). According to adult learning theory, for many adult learners, there has to be relevance when conducting searches for information. The transferability of generic information literacy skills is not obvious to everyone (Knowles et al, 2005).

Within the university library environment, information literacy workshops need to address the information seeking behaviours of school leavers and adult learners.

Federated Searching Pros and Cons

It is easy to appreciate, how an application like federated searching could appeal to information seekers, who are more used to using search engines like Google™ search, exert little effort or thoroughness in their searching practices, and are time starved (Hallam, 2005 [1 & 2]) . Information seekers who have had little previous exposure to information sources and tools such as the online databases, which academic libraries subscribe to, often have little patience at the type of search process that is required in this setting (Hallam, 2005 [2]).

Federated Searching provides

- an opportunity to give its users one-stop searching – need to know little about specific databases
- easier access
- searches across pre-selected resources
- increased potential for obtaining results acceptable for academic assessment items
- increase in the usage statistics of costly databases
- meeting demand for a simple search interface that searches across a number of resources

(Lam & Foo, 2004, Hallam, 2005 [1], McCaskie, 2004)

However, limitations include:

- depth of searching – special features in native database interfaces are not available, search may be quick and broad, lacking preciseness and deepness

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- database response rates – lengthy download times
- database coverage – not all support federated searching (Z39.50 or XML protocol)
- database licensing issues – off site user issues
- duplication of results
- reliability of relevancy ranking
- information literacy issues
- technology is still evolving – hesitation to jump on board before it is all worked out

(Lam & Foo, 2004, Hallam, 2005)

Information Literacy

Few have examined the impact of federated searching on Information Literacy and their conclusions have not been conclusive. This is mainly due to the newness of federated searching portals within libraries and the lack of studies available. Of those that have researched this trend results vary.

Information Literacy implies that a person is able to recognize when information is needed and be able to identify, locate, evaluate, organise and use the information found effectively (ANZIIL Information Literacy Framework 2004).

To assist us with understanding user education in information literacy, Bruce, Lupton and Edwards (2006 pp.1-18) propose a model which they call 'Six Frames for Information Literacy Education'. This model is intended to help library practitioners teaching information literacy to consider different perspective than that of just the "Content" or "Competency" frames that many library professionals are all too familiar with. Bruce et al (2006, p1) suggest that information literacy is not a theory but rather the way in which people approach it. The other four frames are "Learning to Learn", "Personal Relevance", "Social Impact" and "Relational". The characteristics of each frame are clearly described with the focus in relation to teaching, learning, content and assessment (Bruce et al, 2006, p18). Perhaps with the introduction of search tools such as federated searching, we may be able to broaden the connection between the

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learner and the subject matter and thereby improve the learning experience from the learner's perspective by including some of the concepts from the Six Frames Model.

Basili in McCaskie (2004 p.13) recognizes that while today's generation is very familiar with the online environment and the technology that drives it, they are often confronted with vast amounts of information that has varying degrees of reliability. Information overload is a common problem with many online users unable to decipher the quality of the resources retrieved. Information literacy workshops attempt to address this issue by providing the information seeker with the opportunity to gain knowledge in evaluating and analysing the material found.

Lampert and Dabbour's (2005) paper reported that the majority of users were impressed with the federated searching technique; many users considered it easier to use than databases and see it as the way of the future. However, the librarians within the same study were guarded about the use of federated searching as a search tool and saw federated searching as having a negative or neutral influence on their users' information literacy skills (Lampert, 2005). Concerns raised included that users would not be able to: distinguish between particular resources searched; identify the differences in the types of sources of information within the search results; or recognise the benefits of using the native interface or thesaurus features of a particular database.

Terrell (2004) also identifies similar concerns in his paper, and examines the impact of federated search tools on the Information Literacy Standards as set out in the Australian and New Zealand Institute for Information Literacy (ANZIIL) Framework.

He questions whether these standards would be compromised if students do not take the time to recognise the particular databases they are searching or that they are not able to adjust their search strategies to suit the uniqueness of a database. While he acknowledges the appeal that federated searching has for students he asserts the need for information literacy sessions to address the weaknesses that he sees in the searching process with these tools.

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Terrell (2004, p7) himself concedes that having trialled federated searching during his research he was “impressed by how much easier it is, compared with choosing the databases to search, modifying my search strategy for each one, checking thesaurus terms, remembering the appropriate wildcards and adjacency terms to use, and coping with multiple download methods”.

Cox (2006) continues to examine the issues raised by Terrell and identifies several other issues that need to be taken into account when conducting information literacy workshops and working with federated search tools. Some of these issues include: users could mistakenly assume that all library resources are included within the federated search system and therefore overlook some potentially valuable resources; lack of ability to limit results to peer-reviewed material; there is still a potential for information overload with poorly constructed searches. Cox concludes with a positive argument that federated search technology provides us with a new avenue to introduce information literacy to library users.

In reply to the above discussions we contend that librarians are in an ideal position in which to assist users to make informed choices within a federated search tool. Within a federated search interface users can still need to be instructed in how to select which databases are to be searched. Federated searching does seem to cater for those university students who have a need for quick results. As librarians ourselves we acknowledge that federated searching cannot be as effective as using the native interface. However, federated searching is a good place to start searching, especially for our novice or undergraduate user, and it does cater for those who have a need for quick results. It provides them with a limited selection of databases and an opportunity to search with a familiar search interface. Federated searching additionally has the ability to conduct searches using Boolean logic, truncation and wildcards. The effectiveness of the search strategy lies with the individual and the manner in which they incorporate these tools into their searches. We would expect that ‘deep divers’ (Heinstrom, 2006) and even a few ‘broad scanners’ (Heinstrom, 2006) will further their resource scope and satisfy their research need by searching deeper in individual databases.

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Individual database searches require correct use of system techniques, well planned and effective choice of search terms and an advanced knowledge of search and database features. A user's knowledge of a topic plays also an important role in the search process (Fourie, 2006). The perfect search is hard to formulate, if not impossible, if a student is able to use the federated search tool to identify useful resources and save time, then its assistance is worthwhile. A time poor student stressing over a number of assessment items to be completed, does not want to be confronted with an unlimited choice of databases and the necessity to learn each systems unique characteristics in order to make use of it effectively. We would suggest that federated searching has a potential to assist users to build their self-efficacy, assisting their self-confidence so that they are able to find reputable resources of information (Weiler, 2005).

Luther (2003) suggests some librarians fear that federated search technology has the capacity to remove the user from person to person interaction with a librarian who is committed to teaching the user how to find information. While there is the potential for this to be a valid argument we would suggest that because of the electronic environment that libraries exist in, users are increasingly accessing library resources remotely or opting to search the web thereby eliminating the opportunity for personal interaction (Luther, 2003).

In her findings after examining results from case studies, interviews and surveys, McCaskie (2004, p.44) found that at one university with the introduction of federated searching there was "more interest in using electronic resources", "with more users attending skills drop in sessions". The sessions had been running previously but they now included a federated search skill element. Users attending information literacy sessions would not only learn how to effectively use this tool but also be introduced to search operators and other database resources (McCaskie, 2004). This is an encouraging aspect of McCaskie's research (2004, p.2), who concludes that "federated search tools cannot prevent users from becoming information literate but by using information literacy skills users can make better use of these tools".

Federated Searching

Federated searching does not have to be seen to detract from a library or its attitude to students and their searching techniques. As information literacy tutors we are challenged daily by an environment that imposes constant reassessment of best practice. By taking opportunities to look at new ways at teaching information literacy as suggested by Bruce et al (2006) library practitioners could facilitate collaborative learning by enabling users to restructure their ways of thinking and reasoning. Federated searching is a tool which could provide an opportunity for reflective learning within information literacy education.

If it is true that “only librarians like to search? Everyone else likes to *find*”, (Tennant 2001, p.29) it may then be “time for librarians to accept that library users are not interested in being like us” (Luther, 2003, p 4). Luther (2003, p 6) says that “if we don’t understand that the majority of our users are novice searchers who may wish to remain that way we are missing the opportunity to serve the pragmatic user who is happy with the ‘good enough’ answer.”

CQU Experience

At CQU Library, members of our facility have been investigating the introduction of a federated search facility. Our library is interested in implementing this search facility as an avenue to allow users to streamline their searching process. Users initially will no longer have to recreate search strategies in a number of databases. They will now be able to search across selected multiple databases, linking directly to articles regardless of which database these documents are located in.

The project has currently stalled at present due to technical/ firewall issues. We have started testing a hosted solution option and if all goes well then we should be up and running in test mode very soon.

Some other libraries that have introduced federated search tools onto their websites include: the University of Technology Sydney, where guest are able to log on and search their catalogue, free databases and websites such as PubMed and Highwire Press; James Cook University, University of Tasmania and Curtin University to name a few. While we are unable to explore their resources due to licensing restrictions, each

library has a number of help sheets available to assist users in managing their federated search tool.

Currently at CQU Library, information literacy is offered in a variety of formats. These include drop-sessions, embedded into the curriculum of certain disciplines, programs for students enrolled in university bridging courses such as STEPS (Skills for Tertiary Education Preparatory Studies), TEP (Tertiary Entry Program), and Information Literacy sessions for students enrolled in English language courses at CQU Language Centre. Also on offer is Information Literacy sessions catering to requests from lecturers in relation to specific assignments, individual database workshops and other sessions given to alert staff and students of resources and their use on a fortnightly basis. Having reviewed the current literature about the possible impact on information literacy CQU library would be advised to continue with the variety of sessions with the inclusion of instruction of how to effectively use the federated search tool. As students progress through their studies it is envisaged that they will most likely move from the federated search tool (a first years fast surfers paradise) into more comprehensive use of individual databases and their native interface when the need arises (research deep divers) (Heinstrom, 2006).

Conclusion

Federated searching within the academic library environment provides its users with an opportunity to experience and explore information that they may not normally find within a web-based search. By offering a familiar search interface for users, federated searching provides another option to Google™ search. Individual information seeking behaviours and personalities can be catered for; undergraduate students as well as researchers can use this tool to their benefit. One group for a quick and ready fix for their searching needs and the other group to analyse which resources hold the potential for greater retrieval.

Information literacy sessions incorporating federated search techniques could help provide a balance to any perceived limitation to information literacy competencies. Databases still need to be chosen and Boolean operators are still available to offer some control over search strategies.



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The bell does toll but not for the death of information literacy. We see it as a warning bell, sounding for libraries to be more accommodating, more intuitive and to take into consideration user behaviour when designing information literacy programs.

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