

Establishing guidelines for the effective evaluation of web-based periodical bibliographic and full-text databases search interfaces.

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Abstract:

With the web fast becoming the common platform for access to periodical bibliographic and full-text databases, it is vital that librarians recommending the purchase of these databases evaluate not only their content, but also the search interface and search functionality. This paper describes a set of evaluation criteria for librarians to apply when reviewing the web interfaces of periodical databases. Criteria considered include; logon and logoff procedures, search functionality, flexibility and usability, advanced and novice search modes, on-screen help usefulness, error messages, record marking management, print, saving and e-mail capabilities, truncation and boolean operators, SDI facilities, command language capabilities, visual design and icon function recognition, library holdings features, and the availability and versatility of customisable front ends.

Introduction

With the advent of the internet, the variety and accessibility of periodical bibliographic and full-text databases has increased rapidly. As a result, librarians selecting products for their libraries spend considerable time and effort in comparing database content and subject matter, management of information, costs and license agreements. To assist with this selection process, several library organisations, such as CAUL's Electronic Information Resources Committee (1999), have prepared general principles for libraries to follow. It is only recently that the search interface and search functionality have also been considered as important factors in the choice of database purchase. In the past, searching was very much the domain of librarians and as they are skilled searchers they could easily cope with the products' search vagaries. With the transition, however, from librarian centred research to clients undertaking their own searching, the design of interfaces has now become extremely important. In order for clients with various levels of expertise to undertake searches successfully and for librarians to exploit databases already paid for, databases need to be far more intuitive and flexible. In Tenopir's (1997) study, for example, she argues that the mistakes that end users make in their searches may be due more to poor system design than poor searching skills. Similarly, in a more recent research project, Tenopir (1999) concludes that though quality of content and convenience are the major factors influencing users choosing to search a particular database, the usability of the product is also considered important.

The web interface

The most common method of achieving a more user-friendly product is to design a web interface for the databases. Due to its familiarity to users and the ability to integrate different media and services, the web browser is an extremely powerful and flexible tool (Metz & Junion-Metz, 1996). The criteria used to determine what makes a well designed web interface has been the subject of a number of recent studies (Barnard, 1999; Campbell & Waddell, 1997; Ciolek, 1997; Cooper, 1997; Falcigno & Green, 1995; Mosley & Xiao, 1996; Navorro & Khan, 1998; Satov, 1998). These studies have primarily considered the design elements with a list of "do's and don'ts" on how to design web pages. They discuss download speed, screen layout and terminology, searching capabilities, currency of information, colours, navigation and orientation, consistency, inclusion of help facilities, and graphic elements as primary factors in the users' satisfaction level and success rate in obtaining meaningful content when using the web sites.

Though these studies refer to general web sites; the design principles are very useful when comparing the design of web-based periodical bibliographic and full-text databases. Similarly, factors that constitute a well-designed web search engine are applicable. *Search Engine Showdown* by Greg Notess (1999), for example, rates search engines by the flexibility and comprehensiveness of their search capabilities.

When designing and evaluating web-based products it is also essential to consider users with disabilities and indeed, the *Disability Discrimination Act 1992* (Cmwlth),

stipulates that equal access for people with a disability must be given where it can reasonably be provided. To assist organisations' compliance, AusInfo (1999) has prepared a comprehensive document on publishing Commonwealth information in electronic formats. This includes providing guidelines for structuring and creating user interfaces. Similarly, the World Wide Web Consortium's (1999) *Web Accessibility Initiative* has prepared guidelines and policies for developers and reviewers.

Establishing Guidelines

In Watzman's (1998, p.152) discussion about visual design, she states that 'there are no rules in visual design, only guidelines'. Mehlenbacher (1993), further argues that even guidelines may not be useful in determining good design because they are either too rigid or too generic. Developing a set of guidelines, however, remains a popular method for comparing systems. Though it is a relatively simple process, it can provide a thorough evaluation and will help to focus on what the essential and desired elements should be (Cherry, 1998). As criteria will change, it is important that a checklist prepared from guidelines remains comprehensive yet flexible. This will ensure that the checklist is able to accommodate future changes in both system design and usage of the systems. An example of such a checklist is the usability index developed by Keevil (1998). This adaptable index has been developed so web page designers can quickly determine the usability level of their web sites. Keevil comments that though using checklists to evaluate products is subjective, bias can be controlled by reducing interpretation to a low range of values, such as asking questions that require choosing Yes or No.

Methodology

The focus of this paper is the development of a set of evaluation criteria that librarians can apply when reviewing the web interfaces of databases. Each criterion was chosen because of findings from previous studies, from authors' own experiences of searching command driven and web-based databases, and from their observations of how staff and students search databases during training sessions regularly held at Southern Cross University's Lismore and Coffs Harbour campuses. Before finalising the checklist, five independent evaluators were asked to compare the interface design and search functions of several databases to which the University Library currently subscribes. As different evaluators tend to find different problems, this process helped in ensuring that the checklist included the major elements (Nielsen, 1999).

The authors have focused their evaluation on the search interfaces and search functionality of the most common web-based databases to which libraries are currently subscribing or considering for subscribing. Evaluation of database content, value for money, licensing attributes and the quality of retrieved information is not discussed.

The criteria

Database Entry Page

Database names are frequently meaningless and library users are commonly unfamiliar with which database will suit their needs. It is necessary for the entry screen that lists all the databases available via a vendor to clearly outline the subject content of each database, so that the potential searcher can make an informed decision. Once in a database, the screen must plainly identify which database the searcher is using.

Searching

The most important aspect of using a database is searching. As databases increase in size, the user is faced with retrieving a large number of records for each search. The quality of the retrieved records can vary considerably and often the most relevant bibliographic information is missed entirely. It is therefore essential that the search process is flexible enough to handle very specific search strategies.

Databases need to address the requirements of novice users with a basic search level and experienced and expert users with an advanced option. Truncation is a vital tool for searching plurals and multiple word endings, and accommodating differences in English and American spellings in one search. A beginner may require a 'one size fits all' truncation solution by using a multiple suffix truncation symbol. Advanced users, however, require single and multiple suffix truncation, single and multiple internal character truncation and where possible, prefix truncation.

Singular/plural searching occurs when a database automatically searches both the plural and singular form even though only one form has been specified. This is a negative search feature, particularly as it will increase the number of hits. A searcher may not be aware that this process has occurred and may only want the word they have typed in. Conversely, a searcher may presume the word has been searched in both the singular and plural when in reality it has not.

All academic disciplines have their own subject phraseology. Searching by phrase, adjacency and proximity searching permits the user to interrogate a database with greater precision. Very often subject phrases may contain a stopword that would normally be rejected by the search. It is vital, therefore, that phrase searching permits the use of stopwords, preferably without the user needing to include quotation marks. An online thesaurus that lists the preferred subject headings of a database is an essential tool. It assists users in maximising search efficiency by accommodating subject specific terminology that may be unknown to the searcher and by accommodating international differences in subject terminology.

For novice users, it is recommended that the default search screen of a database be divided into essential search fields, such as title, abstract, keyword, author and subject heading. To assist users who may not know the differences between fields, the inclusion of simple search examples would be useful. This reduces the likelihood of a large search result and the need for the novice user to use boolean operators. Boolean

operators have been a standard online search tool for decades and though very powerful in refining searches, they can be confusing for new and infrequent users. For more advanced users, a good online guide that clearly explains how to use the operators is an advantage.

To determine how successful a search strategy has been, such as whether they have chosen the most suitable database or the most appropriate search terms, searchers require feedback from the database. This is reflected in an accurate results list for all terms entered, so that decisions can be made to refine or expand the search if required. It is therefore important that a database clearly displays the search history list. This search history must allow the searcher to manipulate previous searches by selecting search numbers and permit new search lines to be added. Advanced searchers familiar with the use of boolean operators and brackets often want to plan and execute complex searches. A database ought to be designed to allow multiple search strings to accommodate expert searchers. As searches can be complex and may be used at a later time, it is useful for searchers to be able to save their search history.

It is not unusual for a searcher when reading a record to discover that there is an expert author, specialist journal or relevant subject heading that accurately describes the topic. It is important, therefore, that the searcher is able to immediately click on the relevant link within the record. This ensures that related resources are effectively and efficiently sought.

To action a search, it is preferable that the searcher has the choice of hitting the Enter key or clicking on a product's action button. This is the most common method used by search engines and hence familiar to searchers.

Limiting

In full-text databases, providing a checkbox to limit retrieved records to full-text is an excellent way to refine a search. Limiting by date is also a useful tool and although most databases include this element, it is often very unclear how to format the date. Other limitation choices should include limiting by language, publication type and journal title, and by discipline specific limits, such as 'human' in medical databases. It is recommended that limits (or even additional search terms) can be applied after a search has been completed without the need to re-type the original search strategy.

Graphics

For electronic journals in full-text databases to truly replicate paper-based serials they must include all graphics, such as photographs, charts and tables. To be useful and meaningful, these graphics need to be a facsimile version of the paper product. At this stage, only a few databases are including graphics in colour and very often the graphic is not the same size. For fast downloading, it is recommended that 'thumbnail' graphics be provided with the choice of viewing them in full-size. Graphics most definitely need to be readable and printable.

Viewing Records

It is desirable that records can be viewed in a number of ways, such as by citation, by citation and abstract, and by the full record. Field names of displayed records should not be abbreviated and the layout of records must clearly identify individual records. Many full-text databases are now including the choice of viewing articles as an image of the original document by creating files in Portable Document Format (PDF). PDF files, however, are hard to access using screen readers and hyperlinks within the document are usually lost. It is recommended, therefore, that PDF is not the only option for viewing full-text and that an additional choice is given, such as ascii text, MSWord, HTML or XML.

Record Retrieval

It is essential that there is flexibility in 'marking' records for future manipulation. This includes being able to mark specific items, all items, or a group of items (e.g. 13-30). It is also recommended that users can choose which fields of records can be retrieved.

Record Output

Once records have been retrieved, users need to have a choice to print, email, or save to disk. Whatever the choice, users for future reference need to be able to attach the search history to their results. In printing, it would be useful to give an indication without going to Print Preview of how many A4 pages is required. It must be clear to the user whether it is the browser's or the product's print button that is to be used and it certainly shouldn't be a combination of both.

The ability to email results has become essential. Most databases have this feature though rarely is it possible to email more than one person at a time. It is also useful to be able to add the email address of the sender and for the sender to add a message.

Saving records to disk must be a simple process that does not require the user to be experienced with computers. Default save settings, such as file names with the extension .EXE, .CGI or .HTML will result in novice users saving files that are unusable.

Selective Dissemination of Information (SDI)

An automatic alert service that notifies users of the most up-to-date information based on pre-defined user profiles, is becoming a standard feature of many databases. Most are free but some require an additional fee. SDIs should be secure with only the user and database administrator being able to modify and delete a profile. There should be provision for automatic email updates including, if relevant, the full-text of the items. It is desirable for the user to be able to indicate when the SDI should cease and/or for an automatic reminder to be sent each year asking the user if the SDI should continue.

General Design

Web based database design should follow the general design principles of web sites. This includes limiting colours to four (excluding logos and images) and the background and text not clashing or blending. The use of white space avoids the crowding of page elements and font size of 12 point or larger ensures that text is readable.

There must be continuity of presentation across different screens of the database. Icons, for example, should be consistent, particularly when one represents a function, such as the 'search button'. Most databases use a combination of product specific and browser elements for navigation. Whatever is used, navigation should be intuitive for users and the connection not lost if the incorrect option is selected. Though frames can assist with navigation, they may adversely affect printing and require extensive scrolling of screens. Icons need to be large enough for a user to easily select the correct option even when they are grouped together. A database with meaningful graphics or universally accepted symbols for icons, such as a question mark for Help, will also assist the user in navigating the product.

Terminology

Often the most confusion in database searching is caused by the use of library jargon. This is exacerbated by the inclusion of abbreviations and acronyms. Users tend to be quite literal in their interpretation of terms and hence language must be simple, must make sense and be unambiguous. Even the use (or lack of) punctuation needs to be assessed, for example, the statement 'use AND OR NOT' is often read as 'use AND or NOT'. Terminology must be consistent across search screens, grammatically correct and with no spelling errors. It is desirable that explanations are given 'at the point of need' to reduce users relying on their memory or having to seek Help to clarify terms.

Help

Help functions are often not very helpful! Again, the use of simple and clear language to define terms is very important. Help should be context based and each explanation defined using search examples rather than by lengthy descriptions. Sometimes Help is so detailed that it becomes confusing so it is desirable that it is divided into basic and advanced sections, and that it contains a list of Help contents.

Advanced Features

With databases becoming increasingly sophisticated, additional features are provided. This includes the ability to provide 'e-reserve' services by creating links from web pages to items listed on a database, and linking local holdings from the OPAC or a holdings file to a database. Records may also be linked from one database to another though this is usually confined to databases provided by the same supplier. More recently, upgrades of databases have enabled libraries to customise the search interface, including changing terminology and allowing search examples to be added.

Such flexibility helps to ameliorate confusing elements and it is recommended that this feature be further extended and included with all databases.

The checklist

Based on the above criteria, a checklist has been designed so librarians can calculate the usability of the search interface and search functionality for each database under consideration. Just as search engines will change, so do databases. As a result, the checklist has been designed as a 'work in progress' spreadsheet document that can be easily adapted to suit different objectives. This is available for downloading from <http://www.scu.edu.au/library/VALA2000/checklist.html>.

Summary

In the current environment of economic rationalisation, it is understandable that the decision on what databases libraries subscribe to will depend on value for money. Costs, content, and information management and access options are all vital elements. With the trend, however, for users to have desktop access to these databases, it is also important that databases are designed for the general user. As a result, when considering purchasing databases, it is recommended that the design of the search interface and the search functionality be evaluated. Furthermore, as librarians are the link between the end user and product developers, a thorough knowledge of how databases function is vital and will ensure that future enhancements continue to improve the effectiveness and efficiency of database searching for the end user.

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