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Report on user trials for a new BEI database

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Abstract

Purpose: This article sets out to describe part of the design process in the construction of a new search interface for academic users of The British Education Index and to make some recommendations for interface design and subsequent user support.

Methodology: Data and experience from four user trials of a prototype version are reported and discussed in relation to a broadly constructivist conception of information literacy in practice.

Findings: There were different purposes and different levels of skill and experience among the professional users in the study. Their actions, comments and suggestions during and following the user trials suggested that the diverse information literacy practices they demonstrated could be enhanced if on-screen clarity and consistency of terminology were improved. The results suggest general recommendations about improvements to the interface and subsequent support in help pages, the web context and training sessions. Such changes can be understood as positive attempts to support and enrich the information literacy practices of research professionals by providing a better search context.

Originality and Practical Implications: The enquiry reported was a pragmatic exercise to increase the value of a planned service, informed by a theoretical assumption that the information literacy practices of the users were context-bound and specific to each individual and to the individual's purposes.

1. Background

The British Education Index (BEI) first appeared in print in 1954 at the behest of UK education librarians whose readers needed listings of otherwise inaccessible scholarly articles. Consequently, user needs and information literacy have been central concerns for the service from the beginning (Hall, 1982; Sheffield, 1990, 1995; Sheffield and Saunders, 2002). New technology has been part of that history since the BEI started computer-processing its own information in 1976. Limited internet (pre-Web) access to its records followed in 1987. In 1990 a CD-ROM offered individual access to the BEI, together with its US, Canadian and Australian equivalents. Direct web access to some of the BEI information resources on a BEI web site followed in 1996 and along with those changes the number and range of services has multiplied well beyond the original bibliographic index. Co-operative work with colleagues in Network 12 of the European Educational Research Association (Saunders et al 2003) has led to a number of attempts to assess the ways in which educational researchers interact with bibliographic databases. These have set out to describe educational researchers' information literacy practices and the ways in which different purposes could be met in a search environment offering a range of options that made the most of those practices and, perhaps, encouraged their development.

Rather than seeing sophisticated information literacy techniques as a precondition for use of our bibliographic services, we have come to understand that each user already has a set of understandings and information literacy practices that can be more or less successful and can be developed as a part of the broader processes of identifying, locating, evaluating and using information. This acceptance demands an open approach to interface design and support

processes and, we have come to realise, is broadly compatible with a constructivist understanding of the learning process (Glaserfeld 1995). We locate this article's relatively narrow concern for technical information literacy practices within the broader definition of the Chartered Institute of Library and Information Professionals:

> Information literacy is knowing when and why you need information, where to find it, and how to evaluate, use and communicate it in an ethical manner. (CILIP 2007)

In effect we are investigating the space between knowing what information is needed and evaluating the qualities of that information. To put it another way, our attention is on the process of finding information in a resource that has come to be regarded as authoritative (Sheffield, 1990) for educational researchers who are already confident about their purposes and skilled in relation to evaluating information once they have found it. As producers and (in relation to our own web site) suppliers of the information, our primary concern is to help users find the sets of records which best suit their purposes.

Our experience has taught us that the somewhat technical processes of discovering references to the most fruitful sets of records demand some specialised knowledge and skills. Our contention is that higher levels of knowledge and skills, or support that can help develop them at the point of need, are necessary if educational researchers are to satisfy complex bibliographic requirements.

2. Purpose

By December 2006 The British Education Index had developed a new structure for previously separate collections of records to be combined into one database.

The BEI, using its ten years' experience with web interfaces to on-line databases, designed a first draft of a simple interface that would enable the main features of the newly aggregated database to be searched and for bibliographic records to be retrieved, with information about on-line access to full texts in most cases.

This web search interface was introduced to a range of real users in situations that were as close as possible to normal working environments in order to generate naturalistic data that would help us to:

1. collect information about the organisation and presentation of the new database and its interface;
2. collect information about the kinds of support that would be most likely to help users get maximum benefit from the new database.

3. Method

Three stages were proposed. The first was to conduct individual and small group sessions with researchers from the University of Leeds School of Education. The intention was to recruit educational researchers with a broad range of research roles and levels of expertise in the use of bibliographic databases. Both authors have some familiarity with membership of the School, and a combination of purposive and opportunity sampling enabled us to meet this intention. Our pragmatic need to diagnose problems with our prototype overruled our interest in formal statistical testing of generalisations about the information literacy of educational researchers as a group.

Broadly speaking the four sessions had a brief introduction, a fifteen to twenty minute hands-on exercise using the database and a twenty to thirty minute period during which further use of the database could continue with questions and comments between users and researchers. Each session was conducted in a room known to or regularly used by the participants. The content and processes of the searching were directed towards the individual researchers' own immediate interests and normal patterns of working. Within the constraints of the circumstances these factors introduced some aspects of the naturalism that would increase the validity of our data for the purposes of recommendation.

In a second stage the new database form was presented to a postgraduate education class, whose members had requested such a session towards the end of their taught programmes within the School of Education. The session was based on the format of the first four sessions. It enabled a wider commentary from practitioners and would-be researchers from several different countries, most of whom were unfamiliar with even the current forms of the BEI.

The third stage of data gathering was to allow further, unsupervised access to the new interface, while gathering email comments and queries and monitoring actual search behaviour via anonymised database logs.

4. Results

4.1 Stage One: small group sessions

Eight members of the School of Education were invited to test the new collection and its prototype interface. Two were seen individually and the other six were seen in groups of three.

The sessions aimed to draw attention to content, functions and user-support. After a brief introduction two simple tasks were given in sequence, with spoken and written instructions (with illustrations). The main purpose of this level of direction was to ensure that a variety of records were retrieved in the first ten to fifteen minutes and to encourage a feeling of confidence that the database could yield rich results. Users were then encouraged to pursue their own enquiries, to make comments and to ask for help. The interests and activities of the users were allowed to take precedence.

Within the sessions the general response to the interface was enthusiastic; content, functions, response times and appearance were all praised, and the word "uncluttered" was used in a positive way. All users needed some active support at one or more points to allow progress to be sustained. The level of help varied but recourse to help pages was probably reduced by the fact that we were present and available for support.

The eight individuals had a range of information seeking experience, from regular usage of the BEI in its commercial and local forms and familiarity with ERIC and Google Scholar at one end to very limited experience of literature searching and no significant use of the BEI at the other. Levels of seniority, research and teaching experience ranged from a short term contract researcher towards the end of a first post to a Principal Research Fellow and a Director of Research with many years experience. Previous surveys of educational researchers' use of bibliographic databases on line (Saunders and Sheffield 1998; Wake and Saunders 1998; Saunders et al 2003) suggest that information skills are often modest, that search sessions adopt basic rather than complex routines, and that most search sessions are short. Expert use and systematic searching are exceptional.

Our notes, audio transcripts and email responses from this stage contain references to five areas of interest.

Vocabulary

Words and phrases that were asked about, or which we observed as problematic included session, session information, use marked authors, identifiers, limit, retrieved and non-preferred. Clearly, the context of database searching gives such words some specific significance, but a significance that cannot be taken for granted.

Appearance

The rather austere screen, with a minimal logo and a lack of images and outward links was reported as "very clean" and "uncluttered". We took this to be a positive reaction. There was a request for some functional features (such as save records buttons) to appear at the top as well as at the bottom of result screens. A clear "Return to main search" option was asked for and it was noted that a horizontal line on a results page indicated a discontinuity that was confusing.

Functions/Data Structure

Design of the interface and of the database itself have made speed of response a primary concern. There were comments that searches worked very quickly, and we observed no-one waiting for results to be displayed. The general impression seemed to be that results were returned instantly. Questions were asked about the possibility of limiting search results by national origins and about limiting by age in years rather than educational phase or year groups. One respondent wanted to be able to restrict results to peer-reviewed journals only. A control button used to "Apply" up to four choices on the search settings page was described as "scary" by one user. In the context it was evident that this response was a recognition, as much as anything, of the potential power of the choices that were available.

Displays

In the first session especially there was a lot of discussion of the way that search results were displayed. A clear preference for listing records by date of publication (and the most recent at the top) was expressed. The year of publication was reported as strongly preferred in the abbreviated display (see Figure 1) while the unique record identification number was seen as unnecessary, even unhelpful. On first sight, the display of the thesaurus structure for a given term was not understood by all users. This included the "non-preferred" heading already mentioned. A dislike of having several "windows" open was expressed and the display of the open url, with its field name "identifiers" was reported as being unhelpful.

Feedback

Rapid informative feedback on system status was expected after each click or search step. Clarity about the availability of full text was sought, although it was appreciated that such availability was dependent on external factors. A wish to see information stored in the "Show Session" page on the main results pages was expressed.

Content

Database content was discussed by two or three users. Contents of US journals were expected by one user. A wish to see abstracts for all journal abstracts was raised by another. Specific titles were mentioned in two cases where they were well-known journals within the specific field of interest to the user.

Help

It was noted in one session that help was needed in smaller chunks than the large help file presented in the trials. Being sent to a relevant point within a long text was described as being less comfortable than being given a unique view of the one relevant section.

4.2 Stage Two: a larger group session

Our fifth data gathering session was with 12 students enrolled on a Masters Degree in Mathematics Education. Their tutor and a visiting lecturer were present, and took part. Each person had a computer to use, and the BEI's Chief Indexer came along to help support their efforts. Europe, Asia and Africa were represented among an internationally diverse group. Asked

to make a brief written comment on their purposes in using the database, students gave a wide range of responses. As international postgraduate students, their purposes focused on new literature in their specific field of interest, and on UK specific literature. One student wrote:

- interest in mathematics education research based in the UK

- as reference for my research and studies

- to look up for a keyword and the articles that are associated with that keyword

4.3 Stage Three: email and logs

The first four sessions yielded two written responses and a handful of email questions in addition to our own written notes and audio recordings. Forty-seven search sessions were identified on the database logs as having been made during our sessions, or in the weeks that followed, by the eight users in our trial. In addition, members of the British Educational Research Association's Council had been invited to explore the prototype in the weeks before our user sessions, and 17 sessions resulted. The logs gave dates and times, user ID names (not personal names or IP addresses) and a record of all database enquiries and processes. The distinct actions recorded by the SQL databases, for simplicity's sake, are referred to throughout as the article as "search steps". Table 1 shows the number and identities of sessions, and the number of steps recorded for each user. "BERA" is treated as a single user, although a number of individuals were involved.

Table 1

Sessions and search steps taken by user trialists and BERA Council members

User ID	Sessions	Steps	% of all steps
BERA	17	625	35.5
ut03	6	382	21.7
ut08	15	208	11.8
ut05	15	210	11.9
ut07	4	121	6.9
ut06	3	91	5.2
ut02	1	42	2.4
ut01	2	46	2.6
ut04	1	36	2.0
Total	64	1761	100

The total time devoted to these sessions by users was 14 hours, 42 minutes and 19 seconds. The minimum session length was 21 seconds; the maximum was 1 hour, 2 minutes, 53 seconds; the mean was 18 minutes, 46 seconds; and the standard deviation was 20 minutes, 14 seconds. As is clear from the number of sessions started by each of the eight local users, diversity was the most obvious outward characteristic of our users' behaviour. Closer examination of the logs gives more evidence of additional diversity in the detailed behaviour. There was a range of search approaches, from systematic combined queries using the history option to one word queries. Author names (perhaps the users' own) were also common. All these characteristics are familiar from our previous research, although the more purposeful activity of this survey group is evident from the fact that their search sessions are generally longer than those observed in an earlier study of naturally occurring searches (Saunders and Sheffield 1998).

The conversations during the guided sessions, and the written responses from the Masters students reinforced the impression that users' purposes varied considerably. Two written

comments by postgraduate students indicated a need to find citations that would enhance the appearance of dissertations. At another extreme, an experienced and frequently published author did make 14 return visits in the few weeks after his first session, and in a feedback communication he reported:

> *Thanks for the opportunity to try out the "new" BEI. I think it has got great potential. I will certainly use it from now on as a first port of call* [user ut08]

A breakdown of query types used in this exploratory phase reveals (as might be expected) wide use of most options. One interpretation of the figures given in Table 2 would be that seeing a full bibliographic record, with its notes, its link to a full text and a full display of its subject terms and other descriptors is the primary goal. Of the single steps taken by users, 42.7% were clicks on the title displayed in an abbreviated record (usually within a long list). These clicks call a full record that can often take up a whole screen where the optimum link to a full text is shown in the Document Locators field (See Figures 1 and 2).

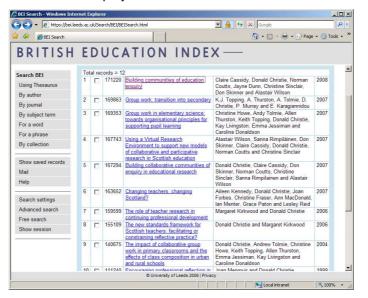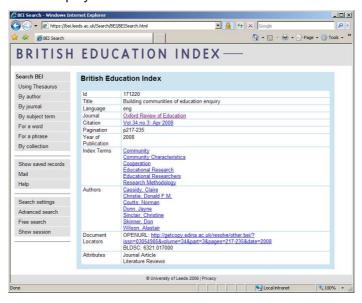Figure 1 Abbreviated records in a BEI display

Figure 2 A full record in the BEI display

NB screenshots in Figures 1 and 2 were derived, after the user trials, from an amended interface, with the display changed to replace "Identifiers" with "Document Locators"

Single word searches (our introductory session encouraged this approach, to gain confidence) were the next significant choice. BET Term (all fields) was the next most numerous query. BET is the British Education Thesaurus (Marder and Sheffield, 1988), the centre of our cataloguing work, and the means by which the subject matter of individual documents is classified. Searching the British Education Thesaurus for subject terms that have been used by indexers to classify the subject matter of journal articles is the optimum approach to identifying thematically connected articles in a field where concepts and phenomena enjoy regular renaming and where user-chosen "keywords" can have unpredictable or imprecise results. Because many searches are simple in nature, and perhaps because it runs counter to the "intuitive" style of making direct queries with whatever words or "keywords" come to mind, querying the Thesaurus as a first stage in the search process has been used only in a minority of search sessions, but it has remained a significant strategy for some types of use over a long period, associated with longer search sessions and with retrieval of more records (Saunders and Sheffield, 1998).

Table 2

Frequency of query types

	Frequency	Percent
Full resource record	743	42.7
Resources containing a specified word	146	8.4
BET Term (all fields)	114	6.6
Resources given Journal + Citation	92	5.3
Resources	91	5.2
Authors with frequency	89	5.1
Phrase search	89	5.1
Resources given index term	81	4.7
Resources given Author	74	4.3
Article Subject with frequency	59	3.4
BET Initial query Term=<user specified> In Thesaurus	46	2.6
Resources with authors in a nominated Session Set	30	1.7
Resources with BET index terms in a nominated Session Set	27	1.6
Journals with frequency	22	1.3
Resources with terms in a nominated Session Set	18	1.0
Resources in a specified collection	9	0.5
Resources with Ids in a nominated Session Set	6	0.3
Journals + Citation with frequency	2	0.1
Resources given Publisher	2	0.1
Total	1740	100.0

5. Discussion

Exploration of notes, audio transcripts and immediate memories led us to discuss a number of emergent points of interest. We focused on those that fell most obviously within our practical remit to make suggestions for improvements to the prototype search interface and the supporting context for users. Other issues, such as database coverage, we have left for later work. The

specific questions that we do follow up here can grouped under the headings of consistency and clarity.

Consistency has two aspects in relation to information literacy practices. The first refers to consistency with prior experience, or to put it another way, with existing information literacy practices. In early exploration users tried to find, and asked about, features that they already had successful experience of using in other database interfaces. This might be understood as a need for continuity in information literacy practices across a range of contexts. The most marked instance was a user who expressed a strong preference for the assisted Boolean query construction that he was familiar with:

> *Boolean search with boxes? Is this possible? But ideally I would like a box with the word I need – then a drop down list ...that would be ideal. I hate having to figure out where to put brackets etc* [user ut05]

The general principle at work here is that where existing information literacy practices can be used in a new context, success is more likely: unfamiliar procedures are likely to cause a loss of fluency and some delay, if not a degree of frustration or discomfort.

The second aspect of consistency is a requirement for internal consistency within the new environment. The point was raised most pointedly by a user who was looking at supporting text as he worked:

> *What's the difference between checking and clicking? It's not clear* [ut02]

While two words were used for what looked to him like the same process, his question expresses an expectation that terminology should be used consistently; if the expectation is put in doubt, confidence is undermined. In the first session ambiguity in the word pairs "query" and "search", and "save" and "retrieve" were also noted as sources of inconsistency that could affect confidence. It is a commonplace of learning studies that confidence is an important contributor to motivation and so to success.

A similar consequence would follow from failures in our second category, clarity. The less clear the options and processes, the lower the confidence that success will be possible. Clarity for one, of course, can be confusion for another. The response to instructions or labels will rely as much on the users' current information literacy practices as on the quality of the instructions themselves.

Cieslik and Simpson (2006) offer one example of research that describes some of the subtleties of adult literacy practices (which could be extended more widely to subsume information literacy) in the learning careers of adults. They point out that if the adults in their research find themselves uncomfortable with the literacy demands of a given task, they can use a range of strategies for coping.

> … skills are embedded in everyday practices. If such practices are constraining then actors modify them in pursuit of their goals (Cieslik and Simpson 2006 p4)

Any interface to a complex resource like the BEI needs to strive to be as clear as possible, while keeping rich and sophisticated opportunities open. New users might be reluctant to modify their existing practices and try to use strategies that have already worked for them in other, simpler situations. So any interface features that reduce uncertainty or which make the value of new options more obvious could reinforce the motivation to spend time learning new procedures.

The value of such modifications to users' prior practice, suggested in situ by consistent terms, logical sequences, mouse-over amplification of menu items and context specific help pages fit well with a constructivist approach to learning. Such an approach, synthesised from sources in developmental psychology as well as from phenomenology and sociology, would honour the user's existing knowledge and practices as constituting the fruitful points where assistance (or challenge)

can be offered. "Misconceptions" cannot simply be erased with clear instruction: a guide must first appreciate where the user has got to and make it possible for progress to be made. A useful account of these strands of thought is presented in Ernst von Glaserfeld's summary volume (Glaserfeld 1995). One passage in particular has proved helpful in our efforts to persist with a relatively rich and complex set of options when experience with Google might have made simpler interfaces the predominant site for the information literacy practices. Data gathered for a Europe-wide report (Saunders, Tajali and Monty 2003) indicated that use of internet search engines was, at that time, nearly twice as likely to be reported as "frequent" than was use of bibliographic databases.

Our concern is for education professionals learning to make the most of a bibliographic database, but Glaserfeld's observation about students' "unorthodox conceptions" seems particularly relevant:

> If the teacher at once reacts by saying that their ideas are wrong and tells them what is considered "right", the students may indeed adopt the suggestion, but the reason why it is considered better may not be understood. It would seem more efficient to present the students with situations where the lay theory they have been using does not work. The motive to look for a more successful theory may then arise from their own perspective. (p187)

Indeed all our users had valid understandings of the system they were being shown and information literacy practices that had already allowed them considerable career success. Progress depended on clarification of their own tentative understanding, or greater certainty that more was possible so that the motivation to persist was reinforced. The possibility is that a well-designed interface can offer a straightforward initial presentation while making more sophisticated approaches, and the help needed to capitalise on them, visible. The "cleanness" of the first BEI web interface in 1997 had been favourably commented on, and that quality was one we wanted to keep.

6. Practical consequences

The interface that has developed as a result of the user trials and the reflection that followed them is markedly different to the prototype with which we started. Given some of the technical demands for speed, security and workload not all recommendations have been adopted but there will be opportunities to review them after a period of public use in the future. The uncluttered appearance and speed of response have been maintained, while the provision of immediate feedback and session information has been improved.

Effort has been put into clarifying our core vocabulary and making sure that words like "search", "query", "save", "term", "browse" and "preferred term" are defined in a glossary and then applied consistently throughout the interface and its supporting documents. The glossary will be part of the supporting documentation on the web site that presents the interface.

The help pages are being broken down into shorter topics so that context specific help is delivered when a help link is chosen.

In addition, a series of worked examples, taking users step by step through a number of search processes, are being developed. The first is a search of the Thesaurus and ends with a combining of subsequent queries. It has been presented to a group of educational researchers and when adjusted following feedback will become the first of a series that will be available as training/support material through the newly-designed website that will present the database.

The changes that we have made to the interface are only the first steps in a continuous process of responding to users' information literacy practices. Monitoring search logs, encouraging queries and meeting users in a variety of contexts will allow us to make further changes and offer more helpful support.

A first public version of the interface, with a limited range of functions and access to the non-subscription (free) collections is now available through the British Education Index web site at http://www.bei.ac.uk.

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