

The look of search interfaces: how much does it matter? Examining Biological Abstracts on two vendors' platforms

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Abstract

Purpose: This study compared Biological Abstracts (BA) on two web-based information retrieval systems - EBSCOhost and SilverPlatter. The objectives of the study were: a) to find out whether Biological Abstracts, available on two different platforms, retrieved the same citations in response to the same queries, and b) to evaluate whether the search interfaces and retrieval methods offered by the two platforms were equally supportive of user information seeking behavior.

Design/Methodology/approach: Fifteen queries were searched using BA on SilverPlatter and EBSCOhost and the retrieved citations were analyzed for comparison. All queries were searched using the advanced search mode. Limiters and truncation were used. Unqualified searches using the default fields and qualified searches using specific fields were conducted. To compare the effectiveness of the two information retrieval systems, some of the searches were conducted from unskilled searchers' perspectives.

Findings: In most cases, the numbers of the citations retrieved in response to the same query from BA on EBSCOhost and SilverPlatter differed. An analysis of the citation records revealed that the two information retrieval systems differ in terms of phrase recognition patterns, types of search fields available and their intuitiveness to users' information seeking behavior. The user-friendly appearance of one search interface did not simplify the search process or lessen the interaction with the system in order to locate relevant information. In some cases, reformulation of phrase searching by using "AND" between individual search terms improved the search results.

Practical implications: Biological Abstracts on EBSCOhost and SilverPlatter were assessed to develop a better understanding of the advantages and disadvantages of those information retrieval systems and their effectiveness in searching and retrieving information in response to queries made by novice as well as expert users. This study is an indicator of the criteria that should be taken into account in comparing and evaluating databases for subscription in libraries.

Introduction

Biological Abstracts, the most comprehensive English language index of life sciences literature, is available through a number of vendors on various web-based platforms, such as SilverPlatter, EBSCO, OVID, Thomson ISI and NISC (Blair, 2005). As the interface design, searchable fields, added functions, frequency of updates, and pricing models of databases vary among the database providers, evaluation of databases on different vendors' platforms becomes necessary before libraries subscribe to them.

At the Adelphi University libraries, Biological Abstracts is available through Ovid Technologies on the SilverPlatter platform with the WebSpirs search interface. Webspirs is not a popular interface among the library faculty and users at Adelphi University. Many users of research databases at the Adelphi University libraries prefer the EBSCOhost interface. The Collection Development and Management Committee of Adelphi University libraries decided to run a trial of Biological Abstracts on EBSCOhost to explore the possibility of switching over. As a subject specialist, the Science Librarian was asked to assess Biological Abstracts on the EBSCOhost platform. In Fall 2005, a preliminary study was carried out to compare Biological Abstracts on the SilverPlatter and the EBSCO platforms.

The aims of the study were: 1) to investigate how effectively the information retrieval systems of Biological Abstracts on SilverPlatter and EBSCOhost locate information, and 2) to evaluate how the differences in interface design, searchable fields and retrieval methods as offered by the two database providers would impact users' information seeking behavior.

Database Description

Biological Abstracts provides bibliographic information and abstracts of primary research articles and literature reviews published in life sciences and medical journals. 90% of new citations include an abstract by the author and 11.3 million archival records are available back to 1926. Bibliographic citations of meeting reports, books and book chapters are available in backyears only. Articles are indexed from more than 3,700 serials and over 350,000 new records are added to BA each year (Thomson ISI, 2007). In addition to print format, Biological Abstracts is also available on CD and WEB based platforms through a number of database providers.

The subject coverage in BA includes both traditional (e.g., botany, microbiology, ecology) and interdisciplinary (e.g., biochemistry, environmental sciences, biotechnology) areas of life sciences. Biological Abstracts provides thorough indexing of the journal literature. Each record contains a number of data elements or fields that provide precise access points to information. These database elements can broadly be classified into four groups:

- Record Identification number or Accession number.
- Source Information (item title, ISSN, journal title, publication year, publication language, document type).
- Author Information (author names and affiliations).
- Subject Information (Major Concepts, Concept Codes, Organisms, Diseases, Parts, Structure & Systems, CAS Registry Numbers, Chemicals & Biochemicals, Gene Name, Geopolitical Location, Methods & Equipment Sequence Data, Time (geologic), Super Taxa and Taxa Notes).

Biological Abstracts can be searched using controlled vocabulary lists (Authority File or Thesaurus) as well as non-controlled terms (natural language). While Major Concept (MC) and Concept Codes (CC) are used to search broad subjects, specific subjects can be searched using other fields including Title and Abstract. The words and phrases added by BIOSIS editors that do not fit within the scope of any other fields are indexed in Miscellaneous Descriptors field. MeSH disease terms can be searched from 1999 to present.

This study compared Biological Abstracts on SilverPlatter and EBSCOhost platforms. A comparison of the features as offered by two database providers is presented in Appendix A.

Methodology

15 queries were searched using BA on SilverPlatter and EBSCOhost platforms (Table 1). Each query contained multiple search terms. All searches were performed using “Advanced” search interfaces of SilverPlatter and EBSCOhost. Limiters were used as needed. In order to determine how the differences in interface design, searchable fields and retrieval methods as offered by two database providers would impact users’ information seeking behavior, a few searches were carried out using novice as well as expert users’ search techniques (Table 2).

Using the novice users’ search technique, unqualified searches were performed in “Default Fields” on EBSCOhost and as “Terms anywhere” on SilverPlatter. Novice searches were carried out with Boolean Operators but without using truncation, synonyms or scientific names. On the other hand, the expert users’ search techniques included both qualified searches and unqualified searches, Boolean Operators, truncation, synonyms or scientific names whenever they became appropriate and necessary for comprehensive retrieval. The search techniques used for this study are presented in Table 2.

After the initial analysis of search results, six searches were repeated using the search expander “*Automatically ‘And’ search terms*” available on the EBSCOhost platform. The same queries were re-searched on SilverPlatter by putting “*And*” manually between individual search terms in a phrase, as the “*Automatically ‘And’ search terms*” option

was not available on the SilverPlatter platform. The results of these searches are presented in Table 4.

This study primarily focused on the information retrieval process in Biological Abstracts, on two vendors' platforms (SilverPlatter and EBSCOhost). No attempts have been made in this preliminary study to assess the relevancy of the citations retrieved to the users' information needs.

Table 1. Queries searched using Biological Abstracts on SilverPlatter and EBSCOhost platforms

1. Find articles published between 2002-2004 discussing the occurrence and roles of circadian rhythm in angiosperms.
2. Find articles published in 2002-2004 discussing the use of magnetic resonance spectroscopy in detecting brain injury.
3. Find literature review articles about genetically modified organisms published in 2000-2004.
4. Find English language articles that discuss the roles of bumblebees in facilitating pollination. Limit your searches to the years 2002-2004.
5. Find articles published in years 2002, 2003 and 2004 on biodiversity in tropical rain forests.
6. Find publications discussing the roles of Interferon in rheumatoid arthritis. Limit your search to the years 2002 and 2003.
7. Find publications on diabetic neuropathy. Limit your search to the year 2002.
8. Find literature review articles on human evolution published in 2002.
9. Find publications on the roles of Heat Shock Protein 27 in tumor biology. Limit your search to the years 2002 and 2003.
10. Find publications related to cellular biology of Ebola virus. Limit your search to the years 2002 and 2003.
11. Find publications discussing the role of zinc deficiency in respiratory diseases. Limit your search to the years 2002, 2003 and 2004.
12. Find publications that came out in 2003 and 2004 discussing the ethics of using human embryonic stem cells in research.
13. Find publications that came out in 2000-2004 on the effects of El Nino on the coral reefs.
14. Find publications on host-pathogen relationship. Limit your search to the years 2002, 2003, and 2004.
15. Find publications on Ferritin and bacterial diseases. Limit your search to the years 2000-2004.

Table 2. Searches by numbers, search techniques used and types of searches performed. (BO =Boolean Operator, PY=Publication Year, PT=Publication Type, DT=Document Type, La=Language)

Search #	Search techniques used on SilverPlatter	Search techniques used on EBSCOhost	Types of Searches
1	Circadian rhythm* as terms anywhere; Angiosperm* in Taxa notes; BO=AND; PY:2002-2004; DT=Article	Circadian rhythm* in default fields; Angiospr* in Taxa notes; BO=AND; PY: 2002-2004; PT=Article	Expert
2	(Magnetic Resonance Spectroscopy) or (MRS) in Methods and Equipment; brain injury in Disease; BO =AND; PY= 2002-2004; DT= Article	(Magnetic Resonance Spectroscopy) or (MRS) in Methods and Equipment ; brain injury in Disease Information; BO =AND; PY= 2002-2004; PT= Article	Expert
2	Magnetic Resonance Spectroscopy as terms anywhere; brain injury as terms anywhere; BO =AND; PY= 2002-2004; DT= Article	Magnetic Resonance Spectroscopy in default fields; brain injury in default fields; BO =AND; PY= 2002-2004; PT= Article	Novice
3.	(GMO* OR genetically modified organism*) as terms anywhere; PY =2000-2004; DT= Literature Review	(GMO* OR genetically modified organism*) in default fields; PY =2000-2004; DT= Literature Review	Expert
3.	(genetically modified organisms) as terms anywhere; PY=2000-2004; DT= Literature Review	(genetically modified organisms) in default fields; PY =2000-2004; DT= Literature Review	Novice
4.	Pollinat* as terms anywhere; (Bumblebee* or Bombus) in Organisms; BO=AND; PY = 2002-2004; DT= Article; LA= English	Pollinat* in default fields; (Bumblebee* or Bombus) in Organisms; BO=AND; PY= 2002-2004; PT= Article; LA= English	Expert
4.	Pollination as terms anywhere; Bumblebees as terms anywhere; BO=AND; PY = 2002-2004; DT= Article; LA= English	Pollination in default fields; Bumblebees in default fields; BO=AND; PY= 2002-2004; PT= Article; LA= English	Novice
5.	(Tropical rainforest*) or (tropical rain forest*) as terms anywhere; Biodiversity in Major Concepts field; BO=AND; PY= 2002-2004; DT= Article	(Tropical rainforest*) or (tropical rain Forest*) in default fields; Biodiversity in Major Concept field; BO=AND; PY= 2002-2004; PT= Article	Expert
6.	Rheumatoid arthritis in Diseases; Interferon* in Chemicals and Biochemicals; PY= 2002-2003	Rheumatoid arthritis in Disease Information ; Interferon* in Chemical Information; PY = 2002-2003	Expert
7.	Diabetic Neuropath* as terms anywhere; PY= 2002	Diabetic Neuropath* in default fields; PY= 2002	Expert

Table 2 (continued). Searches by number, search techniques used and types of searches performed. (BO =Boolean Operator, PY=Publication Year, PT=Publication Type, DT=Document Type, La=Language).

Search #	Search techniques used on SilverPlatter	Search techniques used on EBSCOhost	Types of Searches
8.	Evolution in Major Concept; Human in Organisms; BO=AND; PY= 2002; DT= Literature Review	Evolution in Major Concept; Human in Organisms; BO=AND; PY= 2002; DT= Literature Review	Expert
9.	Tumor Biology as terms anywhere ; Heat Shock Protein 27 terms anywhere; BO=AND; PY=2002-2003	Tumor Biology in default fields; Heat Shock Protein 27 in default fields; BO=AND; PY= 2002-2003	Novice
9.	Tumor Biology in Major Concept field; (Heat Shock Protein 27 or hsp27) in Chemical Biochemicals ; BO=AND; PY=2002-2003	Tumor Biology in Major Concept field; (Heat Shock Protein 27 or hsp27) in Chemical Information; BO=AND; PY= 2002-2003	Expert
10.	Cell Biology in Major Concept; Ebola Virus in Organisms; BO=AND; PY= 2003-2004	Cell Biology in Major Concept; Ebola Virus in Organisms; BO=AND; PY= 2003-2004	Expert
11.	Zinc deficiency as terms anywhere; Respiratory disease* in Diseases ; BO= AND; PY= 2002-2004	Zinc deficiency in default fields; Respiratory disease* in Disease Information ; BO=AND; PY= 2002-2004	Expert
11.	Zinc deficiency as terms anywhere; Respiratory diseases as terms anywhere ; BO= AND; PY= 2002-2004	Zinc deficiency in default fields; Respiratory diseases in default fields; BO= AND; PY= 2002-2004	Novice
12.	(Embryonic Stem cell*) as terms anywhere; Human in Organisms; Ethics in Major Concepts; BO=AND; PY= 2003-2004	(Embryonic stem cell*)in default fields; Human in Organisms; Ethics in Major Concepts; BO=AND; PY= 2003-2004	Expert
13.	El Nino as terms anywhere; Coral Reef* as terms in anywhere; BO=AND; PY= 2000-2004	El Nino in default fields; Coral Reef* in default fields; BO=AND;PY= 2000-2004	Expert
14.	(Host-pathogen relationship*) OR (host pathogen relationship*) as terms anywhere; PY= 2002-2004	(Host-pathogen relationship*) OR (host pathogen relationship*) in default fields; PY = 2002-2004	Expert
15.	Ferritin* as terms anywhere; Bacterial disease* in Diseases; BO=AND; PY =2000-2004	Ferritin* in default fields; Bacterial disease* in Disease Information; PY= 2000-2004	Expert

Results

The results of the expert and the novice searches performed on two vendors' platforms are presented in Table 3. The citations retrieved from each platform (SilverPlatter and EBSCOhost) were compared and analyzed. The findings are summarized below.

Circadian rhythm and angiosperms: The large number of records (504) retrieved on SilverPlatter was a result of searching *Circadian rhythm* as “terms anywhere”. Many of the records on SilverPlatter contained this search term in the Concept Codes field as “circadian rhythms and other periodic cycle“. The Concept Codes field is not a default field in BA on EBSCOhost. While “Terms anywhere” on SilverPlatter searches for the terms and their variants in all the fields available in a record, the default fields on EBSCOhost searches for the terms only in title, abstract, author, super taxa, source, subject, taxa notes, and miscellaneous descriptors. A few records on SilverPlatter contained phrases such as “circadian timing” and “circadian clock” which are synonymous to the search term “circadian rhythm”. These records were not retrieved on EBSCOhost as these terms are not the exact matches of the search term “circadian rhythm”.

Magnetic Resonance Spectroscopy and brain injury: The expert search technique retrieved 27 records on SilverPlatter and 19 citations on EBSCOhost. SilverPlatter retrieved a few records where the terms “brain-cell-injury”, “brain-damage:injury”, “traumatic-brain-contusion: injury” and ”minor-brain-injury: injury” were indexed in the Disease field. Searching “brain injury” in the Disease Information field on the EBSCOhost platform did not bring up these records as those phrases were not the exact matches of the search phrase ”brain injury”.

The novice search techniques retrieved 36 records on SilverPlatter and 29 records on EBSCOhost. An analysis of the search results showed that two of these seven records contained a variant (1H-magnetic resonance spectroscopy) of the search term “Magnetic Resonance Spectroscopy” in the abstracts. All of the seven records found only on SilverPlatter had the variants of search phrase “ Brain injury” indexed in Disease field. These variants are “brain-cell-injury”, “brain-damage:injury”, “brain-axonal-injury” and “brain-metabolic-damage:injury”. As the Disease Information field is not a default field on EBSCOhost , these records were not retrieved when the terms were searched in default fields.

Genetically modified organisms: The expert search technique produced 49 hits on SilverPlatter and 42 hits on EBSCOhost. The comparison of search results showed that seven citations were retrieved exclusively on SilverPlatter. Five of these records had the search phrase “genetically modified organism” indexed in the Organisms field. Those records did not appear on the EBSCOhost because “Organisms” is not a default field in that database. Two other records on SilverPlatter contained the variants of the search term in the abstracts: “Genetically modified aquatic organism” and “genetically modified micro-organism”. Unless the Proximity Operator N is used in a search, Biological Abstracts on EBSCOhost always looks for the exact match of the search terms or phrases in the record. As a result, the records containing variants of the search terms or phrases were not retrieved on the EBSCOhost platform.

The novice search technique retrieved 33 hits on SilverPlatter and 29 on EBSCOhost. Among those four records that appeared only on SilverPlatter, two citations contained the variants of the search term in the abstracts and other two records had the search term indexed in the Organism field.

Bumblebees and pollination: The expert search technique produced 135 hits on SilverPlatter and 130 hits on EBSCOhost. An analysis of the search results found that five citations that appeared only on SilverPlatter had the terms “pollinator” as well as “bumblebee” or “Bombus” indexed only in the Organism field. Finding the term “pollinator” in the Organism field on SilverPlatter was a result of truncating the search term “Pollination” to “pollinat*.” The “Terms anywhere” option on the SilverPlatter searches for the terms or words in question in every available field of a record. On the other hand, searching terms or words in default fields on EBSCOhost looks only into certain fields (title, abstract, author, super taxa, source, subject, taxa notes, and miscellaneous descriptors.) of the record. As the Organism is not a default field on EBSCOhost, that field was not searched for the search terms “Pollinat*” or “bumblebee” or “Bombus”.

The novice search technique produced the same results (38 hits) on both SilverPlatter and EBSCOhost.

Biodiversity and tropical rainforests: The expert search technique produced 53 hits on SilverPlatter and 48 hits on EBSCOhost. Five records that were retrieved only on SilverPlatter had variant forms of the search term “tropical rainforests”. In one record, the term “tropical rainforest” appeared in the Miscellaneous Descriptors field as “rain forest reserve: tropical “. The second record had the term as “tropical montane rain forest” in the title and the abstract. The third record contained the phrase as “tropical mixed rain forest” in Miscellaneous Descriptors field and the fourth record had the term as “Seasonal rain forest” in title and Abstract. In the fifth record, the term appeared in the Miscellaneous Descriptors field as “tropical lowland rainforest”. As phrase searching on the EBSCOhost platform is restricted to the order in which the words or terms associate in a phrase, the records containing variants of “tropical rainforests” could not be retrieved on the EBSCOhost platform.

Rheumatoid arthritis and Interferon: The expert search technique retrieved 65 records on SilverPlatter and 59 records on EBSCOhost. Four of those seven records that were retrieved only on SilverPlatter contained the variants like “interferon-regulatory-transcription factor”, “interferon alpha”, “interferon alpha-2b”, and “interferon-gamma” in the Chemicals and Biochemicals field. In six records, the search term “Rheumatoid arthritis” indexed in the Disease field as “Still’s disease: (arthritis-Juvenile-rheumatoid-(MESH))” or “(Arthritis-, Juvenile-Rheumatoid (MESH)). In one citation that appeared only on SilverPlatter, publication date was recorded as “February, 2001; 2002.” EBSCOhost excluded those records as the variants of the search terms in the Chemicals

and Diseases fields were not the exact matches of the search terms used in the query. Similarly, when the Publication Year field in a record contained two years that did not exactly match with the years in question, EBSCOhost did not retrieve that record.

Diabetic neuropathy: The expert search technique produced 131 hits on the SilverPlatter and 124 hits on the EBSCOhost platforms. The search term “diabetic neuropath*” on SilverPlatter retrieved records with the variants of the search terms, such as “painful-diabetic- peripheral-neuropathy”, “diabetic- sensory- neuropathy”, “diabetic- lumbosacral-radiculoplexus- neuropathy”, and “diabetic-polyneuropathy” in the disease field.. These records did not appear on the EBSCOhost platform for two reasons. 1) The Disease Information field is not a default field on EBSCOhost, and, 2) the variants did not match exactly with the search term “diabetic neuropath*”. In a few records retrieved on SilverPlatter, the variants of the search term, “neuropathic diabetic” or “non-neuropathic diabetic” were found in title or in abstract fields. As these terms did not exactly match with the search term, EBSCOhost did not retrieve those records.

Human evolution: The expert search technique produced 62 hits on SilverPlatter and 59 hits on EBSCOhost . SilverPlatter brought up three records which did not appear on EBSCOhost. An analysis of the records retrieved on SilverPlatter revealed that all but three citations had a single year indexed in the Publication Year (PY) field. In three records on SilverPlatter, the years were indexed in the PY field as 2002;2003. When these three citations were searched on EBSCOhost, the years appeared as 2002(2003) in the PY field. EBSCOhost’s specification of the order in which the words or terms entered in a query had excluded those records, as the variant form of publication year 2002(2003) did not match exactly with the year (2002) in question. On the contrary, SilverPlatter retrieved records with year variants regardless of the order in which the years were found in the records.

Heat Shock Protein 27: The expert search technique produced 30 hits on SilverPlatter and 31 hits on EBSCOhost. One record that was found only on EBSCOhost had the term “heat shock protein 27” in plural form. EBSCOhost automatically searches for both plural and singular forms when the search term is entered in singular form. SilverPlatter only searches for either singular or plural forms of the search term depending upon how it is used in the query.

The novice search technique produced 29 hits on SilverPlatter and 13 hits on EBSCOhost. A number of records that were retrieved only on SilverPlatter had the term “Heat Shock Protein 27” in the Chemicals and Biochemicals field. Chemical Information is not a default field on EBSCOhost. In a few records on SilverPlatter, the search term variants, “ Heat Shock 27 KD protein1“ and “Heat shock protein(hsp) 27” were located in the abstracts. Phrase searching on the EBSCOhost without the proximity operator N does not retrieve the records with the variants of the search phrase.

Ebola virus and cell biology: the expert search technique brought up the same search results on both SilverPlatter and EBSCOhost.

Zinc deficiency and respiratory diseases: The novice search technique retrieved the same citations on both SilverPlatter and EBSCOhost platforms. However, the expert search technique produced different results. In response to the search “ ((Zinc deficiency as terms anywhere) and (respiratory disease*) in Disease field)) and (PY= 2002-2004)”, Biological Abstracts on SilverPlatter retrieved 11 records. Searching zinc deficiency in default fields and respiratory disease* in the Disease Information field on EBSCOhost retrieved no records at all. An analysis of the search results revealed that respiratory disease is indexed as “respiratory system disease “in the Disease field on both SilverPlatter and EBSCOhost. If the proximity operator N is not used, EBSCOhost searches for the words in a phrase in the order in which they are entered. As the phrase “respiratory system disease” indexed in Disease Information field on EBSCOhost did not match exactly with the search phrase “Respiratory disease*”, no records were retrieved. On the other hand, SilverPlatter provides a more flexible environment by allowing phrase searching without an emphasis on the order of word association in a phrase. As a result, searching the phrase “respiratory disease*” retrieved 11 records on SilverPlatter regardless of how the term was indexed in the Disease field.

Ethics and stem cell research: The expert search technique retrieved 34 hits on SilverPlatter and 32 hits on EBSCOhost. Two records that were found only on SilverPlatter had the phrase “stem cell: embryonic–structure” indexed in the Parts and Systems field, and this field is not considered as a default field on EBSCO.

El Nino and coral reefs: The expert search technique produced 46 hits on SilverPlatter and 42 hits on EBSCOhost. An analysis of the results showed that one of those four records that appeared only on SilverPlatter contained the variants of the search term El Nino as “El Nino-Southern–Oscillation”, and “El Nino-Southern –Oscillation-Event” in the title, abstract and miscellaneous descriptors. Another record had the term “coral reef” as “shallow-reef-flat:dead-coral, live-coral” in the miscellaneous descriptors field. Two records had the term as “reef coral” in the titles of the articles. Although title, abstract and miscellaneous descriptors are the default fields on EBSCOhost, the variants found in these fields were not the exact matches of the search terms used. Searching phrases or terms without the proximity operator N on EBSCOhost retrieves the words only in the order in which they are entered. As a result, those records were not retrieved on EBSCOhost.

Host-pathogen relationship: Searching “host-pathogen relationship*” retrieved only 10 hits on the SilverPlatter and 22 hits on EBSCOhost. When the search terms were modified as ((Host-pathogen relationship*) OR (host pathogen relationship*)), 30 citations were retrieved from SilverPlatter and 22 records on EBSCOhost. SilverPlatter

retrieved records with the variants of the search terms, such as “pathogen-host-vector relationship”, “pathogen-host relationship” and “host-pathogen trophic relationships” either in the abstract or the miscellaneous descriptor fields. The records containing these variants were not retrieved on the EBSCO host platform due to its specification of the order in which the words appear in a search phrase. Also, truncating the term “relationship” improved the retrieval on SilverPlatter. Biological Abstracts on SilverPlatter searches for both singular and plural forms of a term or a word only when that term or the word is truncated in the query formulation.

Ferritin and bacteria: The expert search technique produced 50 hits on SilverPlatter and 43 hits on EBSCOhost. The preliminary analysis of the search results showed that seven records that were found only on SilverPlatter contained the search term “Ferritin*” in the Chemicals and Biochemicals field. This field is not a default field on EBSCOhost. When the search was modified using “Ferritin*” in the Chemicals field on both platforms, the number of hits became equal on both platforms (EBSCOhost= 43 hits and SilverPlatter= 43 hits).

Table 3. Searches by numbers and types with the numbers of citations retrieved from Biological Abstracts on SilverPlatter and EBSCOhost.

Search #	Types of Searches	Number of citations retrieved (SilverPlatter)	Number of citations retrieved (EBSCOhost)
1	Expert	504	93
2	Expert	27	19
2	Novice	36	29
3.	Expert	46	39
3.	Novice	33	29
4.	Expert	135	130
4.	Novice	38	38
5.	Expert	53	48
6.	Expert	65	59
7.	Expert	131	124
8.	Expert	62	59
9.	Expert	30	31
9.	Novice	29	13
10.	Expert	16	16
11.	Expert	11	0
11.	Novice	1	1
12.	Expert	34	32
13.	Expert	46	42
14.	Expert	30	22
15.	Expert	50	43

Expanding the searches using “And”: The results of six searches that were repeated using “and” between the individual search terms, varied in two cases (Table 4). In four cases (Search # 2 Expert, Search #2 Novice, Search#9 Novice and Search #11 Expert), the search results were identical on both SilverPlatter and EBSCOhost . An analysis of

the results showed an increase in the number of hits when “And” was used between the individual search terms of a search phrase. In all cases, using the expander “Automatically And search terms” improved the retrieval on EBSCOhost. Those citations that were missing on EBSCOhost when phrase searching was done without using “And” between individual terms (Table 3), appeared in the results of the searches reformulated later with “And” (Table 4).

When “Zinc deficiency” and “respiratory disease*” (search #11 Expert) were searched using “And” between the individual terms, the results were different. Two citations appeared only on SilverPlatter and three of EBSCOhost’s records were exclusive. An analysis showed that those three citations on EBSCO’s platform contained the plural form of the search term ”Deficiency.” Because of SilverPlatter’s specification on the singular/plural form of search terms, those records were not found among the citations retrieved on SilverPlatter. In search #9 Novice, 12 citations appeared only on EBSCOhost and 10 citations were retrieved on SilverPlatter only.

Table 4. Searches done using “And” between the terms and the numbers of citations retrieved from Biological Abstracts on SilverPlatter and EBSCOhost.

Search #	Types of Searches	Number of citations retrieved (SilverPlatter)	Number of citations retrieved (EBSCOhost)
2	Expert	32	32
2	Novice	69	69
9	Novice	52	49
11	Expert	19	20
11	Novice	11	11
13	Expert	63	63

Discussion:

The findings of this study showed that a number of factors affected the retrieval performance of Biological Abstracts on two different vendors’ platforms (SilverPlatter and EBSCOhost). They are:

- 1) the search strategies used (Novice vs. Expert, qualified vs. unqualified)
- 2) the types of search fields used (terms anywhere vs. default fields)
- 3) use of truncation, proximity operators and expanders
- 4) Phrase recognition ability of the Information Retrieval (IR) systems (variants vs. exact search phrases/terms)

The Information Retrieval (IR) system of Biological Abstracts on EBSCO’s platform is well designed for expert searchers who have knowledge about how to use a proximity operator or an expander to look for phrases/terms and their variants. The availability of various search limiters on EBSCOhost interface can be helpful to the searchers who have expertise in subject as well as in search techniques. Using this search interface novice users may not always successfully retrieve information for a variety of reasons.

Novice searchers generally tend to use only the phrases or words from original questions and they lack the knowledge of query formulation and reformulation using refinement techniques (Hass, 2003; Hsieh-Yee 1993). Very often novice users are not familiar with all the functionalities of the information retrieval (IR) system that they use. While expert searchers use a thesaurus or an index available in the system to modify the queries, novice users do not use these tools (Brajnik, Mizzaro, Tasso and Venuti, 2002)

Entering a term or a phrase in the default fields on EBSCOhost interface only searches title, abstract, author, super taxa, source, subject, taxa notes, and miscellaneous descriptors fields in a record. The “terms anywhere” option on the Webspirls interface of SilverPlatter, on the other hand, searches all the fields available in a record and retrieves information accordingly. It helps the expert searchers refine the search strategies as they locate the fields where search terms and their variants are appropriately indexed. According to Rose (2006), “most of the time, search is an iterative process. Users do not know the right questions to ask until they begin to see some of the results and learn about the subject.” The “terms anywhere” option on SilverPlatter also causes a higher recall than EBSCOhost. This may help novice users retrieve necessary information without reformulating the queries.

This study found that the information retrieval (IR) system of SilverPlatter is more intuitive to user information seeking behavior than that of EBSCOhost. The most effective way to retrieve records with search term or phrase variants on EBSCOhost was to use a proximity operator or an expander in queries. That was not the case with SilverPlatter. Users can retrieve records with variants of search terms or phrases on SilverPlatter without using any proximity operators or expanders. This feature definitely helps novice searchers to locate useful information. They lack the knowledge of how and when to use a proximity operator or an expander to improve the search strategies.

The search expanders on EBSCOhost interface are located at the bottom of the search interface and are not easily noticeable to the novice users who are not familiar with the search interface and its design. Moreover, novice users may experience difficulty in understanding the functional difference of the Boolean operator “AND” and the search expander “*automatically AND search terms*” available on the Advanced search interface of EBSCOhost.

As this study found, truncation plays an important role in retrieving information on EBSCOhost as well as on SilverPlatter. When a search term is entered in its singular form, EBSCO’s information retrieval (IR) system automatically looks for both singular and plural forms of that search term. But it does not look for the singular form if the plural form of the search term is used in the query. Without truncation, SilverPlatter only looks for either the singular or the plural forms of the search terms depending on how users enter them in queries. Searching the terms or words without truncation on both platforms can eliminate records that may contain useful information.

When the search interfaces of BA on SilverPlatter and EBSCOhost were compared, a number of differences were noticed. On EBSCOhost, the “Basic” search interface does not include any Publication Type or Document Type limiters. As a result, the searches that needed the application of a limiter such as “article” or “literature review, could not be conducted using EBSCO’s “Basic” search interface.

On the “Advanced” search interface of EBSCOhost, the limiter “article” is located in “Publication Type” and the limiter “literature review” is located in “Document Type”. On SilverPlatter, both the “article” and the “literature review” limiters are available under “Document Type”. The search fields available on the “Advanced” search interface are listed in alphabetical order only on SilverPlatter and they are easy to locate. “WebSpirs Search hints” “Search examples” and “tips” are displayed at the bottom of the basic search interface of the BA on SilverPlatter. Searchers notice them as soon as “Basic” search interface appears on the screen. Users of the EBSCOhost interface can find the search guide and the database information by clicking the “Help” button on the basic and advanced search interfaces.

The result list on the EBSCOhost can be sorted by date or title. The citations need to be added to the folder before printing. The default format of displaying results on EBSCOhost is the bibliographic citation without abstract. On SilverPlatter, each citation needs to be marked before printing using the adjacent checkbox. The default format of displaying results on SilverPlatter is the bibliographic citation with abstract .

Information retrieval is a complex process which involves a series of tasks including problem definition, source selection, formulation and reformulation of query, search execution, examination of results and information extraction (Vilar and Zumer, 2005; Marchonini, 1992). It is evident from this study that the Biological Abstracts database on both platforms (SilverPlatter and EBSCOhost), requires search expertise to formulate effective search strategies for information retrieval and to exploit the full potential of the IR system.

More and more libraries are making their databases available to novice users through remote access. These users have poor knowledge about search interfaces, the database design, availability of searchable fields, the operators (e.g., truncation, proximity) and their functions. Novice users do not always consult librarians to formulate or reformulate their search queries for effective retrieval. If novice users are not able to translate their information needs into the terms used by IR system, they will experience difficulties in finding useful information. The search interface and information system of a database should recognize the diversity of users and their searching capabilities (Vilar and Zumer, 2005). End users of an IR system want to achieve success with minimum cognitive efforts (Marchonini,1992). The design of the search interface and the retrieval mechanism of a database should be simplified to satisfy the information needs of the users whose levels of knowledge and abilities of searching IR systems vary. End-user searching without intermediaries becomes very common in today’s technology-driven environment, as more information resources are available to the users through remote access and the World Wide Web. Librarians and information professionals should take

users' information seeking behavior into account in evaluating databases and IR systems. Also, the IR system that offers less complexity in searching and retrieving useful information may appeal to the searchers who prefer to look for information on the Internet rather than searching the commercial databases available in the libraries.

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Appendix A

Features of the Biological Abstracts database as offered by SilverPlatter and EBSCO

Features	EBSCOhost	SilverPlatter
Searchable fields	Default fields (Title, Abstract, Author, Editor, Inventor, Super Taxa, Source, Subject, Taxa Notes, and Miscellaneous Descriptors); Title; Author; Corporate Author; Author Affiliation; Source; Series Information; Date of Publication; ISSN; Meeting Information; Language; Abstract; Subjects; Major Concept; Super Taxa; Taxa Notes; Organisms; Gene Information; CAS Registry Number; Chemical Information; Disease Information; Alternate Indexing; Sequence Data; Parts Structures; Methods Equipment; Geographic Information; Geological Time; Miscellaneous Descriptors; Medium; Publication Type; Document Type; Concept Code; Biosystematic Code; Fossil Indicator; Gender; Publication Year; Entry Date; Accession Number	Terms Anywhere; Abstract; Author Address; Accession Number; Author, Editor, Inventor; Book Author/Editor, Book Publisher; Browsable Author Index; Book Source; CAS Registry Number; Chemicals and Biochemicals; Citation; Concept Codes; Diseases; Gene Name; Geopolitical Location; ISBN; ISSN; Journal Name; Language; Major Concepts; Meeting Information; Meeting Sponsor; Methods and Equipment; Miscellaneous Descriptors; Document Type; Author E-mail; Organisms; Parts, Structure and Systems of Organisms; Sequence Data;; Series; Source; Subject Terms; Super Taxa; Taxa Notes; Time; Title; Topics
Limiters	Date Published Journal Name Language Publication Type Document Type Taxa Notes Type of Organism Name New Taxon Modifiers Development stage of Organism Gender Fossil	Frequently used limits: Accession Indicator Publication Years Document Type Language Update code Other limits: Material Type

Vendor Features	EBSCOhost	SilverPlatter
Limiters	Disease Affiliation Chemical Role Sequence Type Organ System Abstract Available Full Text	
Truncation	*	*
Wildcard	?	?
Expanders	Also search for Related words; Also search within the full text of the Articles; Automatically "And" Search Terms	Not available
Boolean Operators	And, Or, Not	And, Or, Not
Proximity Operators	Near Operator (N) Within Operator (W)	With, Near, Adjacent (adj.),
Search History	Available	Available
Find Citation	Not Available	Available
Find Similar Records	Available	Available
Refine Search	Available	Not Available
Thesaurus	Available	Available
Index	Available	Available
Print/E-mail/Save	Available	Available
Database Help and Guide	Available	Available