# Analyzing Organizational Schemes of Information Resources in Library Websites by User Education Approaches

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**This paper examines the organizational schemes of information resources provided in 38 academic business libraries or collections from 50 top-ranking business schools. A wide variety of schemes, ranging from a simple alphabetical list by database titles to research guides in which resources are inseparably embedded where relevant, were found to illustrate current practices in presenting information resources in the web-based environment. In addition, the paper develops a typology by which the schemes are classified and assessed by resource integration dimension, resource/user orientation dimension, and user-education approach dimension. This typology will assist in assessing existing schemes from the perspectives of both search and instruction as well as in developing new schemes.**

## Introduction

As more and more Web-based information resources are made available, librarians seek to facilitate the use of such resources through library websites by organizing and presenting them in effective ways. Although acquiring, classifying, and organizing resources is the core expertise librarians] the nature of the Web environment, a digitalized space that removes the physical limitation in arranging resources, presents enormous challenges while opening new possibilities to both librarians and users. Accordingly, the importance of appropriate organizational schemes of information resources is increasing dramatically.

Organizational schemes of information resources in library websites exist in a number of forms ranging from as simple as an alphabetical list to a research guide that describes a research process with related resources inserted where relevant. Some of the schemes are more suitable for supporting a quick information search while others are better at describing a body of domain knowledge. Therefore, evaluation of the schemes should not turn exclusively to the measurement of effectiveness and efficiency as most usability studies do. Instead, the evaluation should incorporate the pedagogical aspect of the organizational schemes that help users assimilate the knowledge structures of a domain. Knowing the actual use of different organizational schemes by users and assessing their robustness will contribute to the design and evaluation of a library website. To that end, a prerequisite is to identify currently existing schemes and establish useful criteria for the evaluation.

This study reviews current practices in organizing information resources of various types in academic library websites. Considering that the primary scheme of general academic library websites is by academic departments, to maximize the variability of the types of schemes found, a specific discipline was chosen –business. Then, the study develops a unified typology by which organizational schemes are classified and assessed from the perspectives of both information seeking and instruction.

## Literature Review

### *Organizational Schemes of Information Resources*

Sowards (1998) created a typology for reference websites in academic libraries in terms of their depth and organizational structures. In the two-facet typology, depth categories, which refer to the number of times a user must click to arrive at the server with the actual content, were grouped into three: one layered, two layered, and three or more layered websites. Organizational categories, which refer to resource arrangement approaches, were grouped into four: alphabetical order, subject, DDC (Dewey Decimal Classification) or a similar numerical systems, and keyword search engines that allow a user to create his or her own list of resources on the fly. A combination of the two facets characterizes a specific type of reference website. Jackson and Pellack (2004) examined 112 Internet subject guides in academic libraries, collecting data on the location of subject guide pages, arrangement structures of resources, presence of annotations, resource types included, and maintenance practices. When it comes to resource arrangement, 61 percent of the subject guides provided resources in alphabetical order by titles. Nine percent showed a random arrangement, which the authors considered as an obstacle to successful resource finding. In the same vein, Kirkwood (2000) reviewed 63 academic business library websites using Soward's (1998) typology. His conclusion was that the libraries tended to provide an initial level of resource organization by subject and immediately provide links to the actual resources at the second level of the websites.

Examining library websites provided by top 20 business school libraries, Abels and Magi (2001) found that nearly all the libraries offered links to databases and business-oriented websites. The links to databases were mostly presented in alphabetical order by titles and the links to websites, by subject. Also, about half of the libraries presented resources by subject such as company and industry and six posted course-oriented lists of resources.

The findings of these studies consistently identified the prevalent types of organizational schemes as subject and source type (e.g. databases and websites), but they did not aim to be comprehensive nor establish a framework whereby library websites are assessed in terms of organizational schemes as this study does.

In tandem with the types of organizational schemes, another critical aspect of resource arrangement to be considered for supporting successful information searches is integration of resources. In the above-mentioned study, Kirkwood (2000) paid special attention to the integration of different types of resources including web-based and print resources. He found only 49 percent of the business library websites reviewed combined their print, databases, and websites together on the same page under the same subject headings. In Abels and Magi's (2001) study, nine out of twenty libraries presented websites and subscription databases in two separate lists. On the other hand, eight libraries offering links to both databases and websites did integrate the links in one unified list. To enable users to discover exhaustive resources on a certain topic in a single place without going through the different formats of resources, the integrated approach of resource organization seems to be one criterion for judging usable websites.

### *User Education Approaches*

User education approaches to library instruction have progressed in parallel with learning theories and information seeking behavior research. For bibliographic instruction in academic libraries, Tuckett and Stoffle (1984) explained three user education approaches: a *reference-tool approach*, a *conceptual framework approach*, and a *theory-based approach*. Corresponding to this categorization, Kuhlthau (1987) described the evolution process in library instruction using three user education approaches: a *source approach*, a *pathfinder approach,* and a *process approach*. In an empirical study that analyzed web-based tutorials created for information literacy, Sundin (2005) identified four user education approaches: a *source approach*, a *behavioral approach*, a *process approach,* and a *communication approach*. The *reference-tool approach* (Tuckett & Stoffle, 1984) also referred to as the *source approach* (Khulthau,1987; Sundin, 2005) describes the characteristics and use of each information resource. It emphasizes aiding users to choose the most appropriate resources in their local libraries. The *conceptual framework approach*, *pathfinder approach,* or *behavioral approach* teaches users the sequential information gathering process, which generally starts with a background resource such as a directory and ends with indexes and abstracts. The *theory-based approach* or *process approach* strives to foster users' reasoning process skills in problem solving. Rather than seeking a quick answer to a specific question, this approach regards a resource as evidence to be examined for shaping a topic. Both Tuckett & Stoffle (1984) and Kuhlthau (1987) advocate the latter approach grounded in human beings' high-order cognitive capabilities. Sundin's (2005) *communication approach* is concerned with the social and communicative aspects of information seeking. Table 1 compares Tuckett & Stoffle (1984), Kuhlthau (1987), and Sundin's (2005) approaches along with the focus of each approach.

Table 1. Comparison of User Education Approaches

| **Focus of each approach** | **Tuckett & Stoffle (1984)** | **Kuhlthau (1987)** | **Sundin (2005)** |
|---|---|---|---|
| Use of individual resources | Reference-tool approach | Source approach | Source approach |
| Sequence of resources | Conceptual approach | Pathfinder approach | Behavioral approach |
| Problem solving process | Theory-based approach | Process approach | Process approach |
| Social and communicative aspect of information seeking | | | Communication approach |

## Methodology

### *Samples*

Fifty top business schools were sampled from the 2006 annual business school rankings published by U.S. News and World Report (U.S. News and World Report, 2006). At each business school's website, the author looked for 1) a separate business library website generally maintained by a physically separated business library, or 2) when a separate business library website was not available, a dedicated webpage for a business collection as a part of a main library's website. Not considered was a main library website in which business resources are

mixed with those of other disciplines. Thirty eight business library/collection websites were judged eligible for this study. Their homepage addresses are listed in Appendix 1. Because this study was undertaken during December 2005 and January 2006, the library websites reviewed might have changed their design at the time of publication of this paper.

### *Identification of Organizational Schemes*

From the homepages of the sampled websites, every web page that listed information resources in certain forms was identified. The identified organizational schemes of information resources were analyzed by three aspects: access point, the order in which information resources are presented, and annotation.

The first step was to record the labels of access points leading to information resource pages. Access points labeled such as Databases or Research Guides are critical entrances from which users begin their navigation to get to appropriate resources. Access points are closely connected to the level of resource integration. In most cases, the access points were presented on the first level of the library websites, but in some cases, on the second or deeper level depending on the designs of the websites. Those access points leading directly to a search engine or interactive devices other than explicitly visible organizational schemes are discussed separately. When inconsistency exists between a link label and an actual heading in the linked page, a link label was recorded as an access point because it is what users see first and what makes them decide whether to pursue their searches.

In the next step, the author recorded the way information resources were presented under each access point. Mostly, actual information resources were linked immediately on the next level of access points, for example, clicking a link labeled 'Databases A-Z list' opens a webpage that lists databases in alphabetical order. The access point and the order of information resources were recorded using colon, in this case, 'DB: Alpha'. In addition, when one access point contains multiple sub-items and subsequently, multiple organizational schemes, for example, a Course Guide page lists 5 classes and each class guide presents its own organizational scheme, all the schemes extracted from the five classes were recorded for that access point, Course Guide. The order of information resources determines how useful an organizational scheme is for quick information access or instruction.

Finally, for each organizational scheme, the type of annotation offered, if any, was recorded as one of the values of database description, search tip, and domain knowledge. Together with the order of information resources, annotations show what users can learn from each organizational scheme.

Lastly, the author grouped related access topics and counted organizational schemes for each access point.

## Results

### *Access Points*

The examination of the business libraries/collections websites identified a variety of access points to information resources. As demonstrated in Table 2, the access points are indicative of resources types provided (e.g. Databases, Websites), content types in resources (e.g. Articles), or guide types (e.g. Course guides), etc.

Table 2. Access Points

| Rank | Access Points | No. of Libraries | Percent (n = 38) |
|---|---|---|---|
| 1 | Research Guides/Topics | 35 | 92 % |
| 2 | Databases | 34 | 90 % |
| 3 | E-Journals | 17 | 45 % |
| 4 | Course Guides | 16 | 42 % |
| 5 | Articles | 11 | 29 % |
| 6 | Websites | 9 | 24 % |
| 7 | How do I? | 7 | 20 % |
| 8 | Reference Resources | 6 | 16 % |
| 9 | Electronic Resources | 5 | 14 % |
| 10 | Top Resources | 4 | 11 % |

According to the data, research guides and databases are the most common access points. Out of thirty eight business libraries/collections, thirty five (92%) provide either access points labeled as Research Guides/Subject Guides/User Guides under which a set of business topics are presented or direct links to particular business topics. The specificity and number of the topics provided greatly vary from one website to another; Some provide a few broad business topics such as Company, Industry, and International Business, and others provide more fine-

grained topics such as Accounting, Advertising Industry, Business Cultures, and Business Plans, etc. in a fairly long list. The second most common access point (90%) is Databases, top-rank among resources types. Compared to Websites that only nine libraries (24%) have as a separate access point, databases seem to be perceived as the most valuable and productive resources by librarians. In addition, almost half of the library websites arrange information resources under E-Journals (45%) and Courses Guides (42%). Across particular topics and resource types, Articles (29%) helps students find a specific article when a bibliography is given or gather articles on a broad topic and FAQ/How do I? (20%) offers a quick solution to frequently asked questions. Though minor, some library websites provide Reference Resources (16%), Electronic Resources (14%), and Top Resources (11%).

### *Presentation Order of Information Resources*

Table 3 summarizes the presentation order of information resources by access points. The notation consists of an access point followed by the order in which resources are presented.

Table 3. Organizational Schemes of Information Resources by Access Points

| **Access Points** | **Presentation Order of Information Resources (notation)** | **Times Found** | **Total** |
|---|---|---|---|
| Top resources | Resource type (Top: Res) | 4 | 4 |
| Websites | Alphabetical (Web: Alpha) | 3 | 10 |
| | Topic (Web: Topic) | 7 | |
| Databases[1] | Alphabetical (DB: Alpha) | 31 | 59 |
| | Content type (DB: Content) | 5 | |
| | Topic (DB: Topic) | 14 | |
| | Top databases (DB: Top) | 9 | |
| E-Journals | Alphabetical (EJ: Alpha) | 17 | 17 |
| E-Resources | Alphabetical (ES: Alpha) | 4 | 7 |
| | Topic (ES: Topic) | 3 | |
| Articles | Alphabetical (Art: Alpha) | 4 | 11 |
| | Resource type (Art: Res) | 4 | |
| | Instruction process (Art: Ins ) | 3 | |
| Reference Resources | Alphabetical (Ref: Alpha) | 3 | 6 |
| | Resource type (Ref: Res) | 3 | |
| How do I?/FAQ | Instruction process (FAQ: Ins) | 7 | 7 |
| Research Guides/Topics[1] | Alphabetical (RG: Alpha) | 10 | 71 |
| | Resource type (RG: Res) | 18 | |
| | Topic (RG: Topic) | 19 | |
| | Topic + Resource (RG: Topic+Res) | 12 | |
| | Instruction process (RG: Ins) | 12 | |
| Course Guides[1] | Alphabetical (CG: Alpha) | 2 | 28 |
| | Resource type (CG: Res) | 7 | |
| | Topic (CG: Topic) | 8 | |
| | Topic + Resource (CG: Topic+Res) | 4 | |
| | Instruction process (CG: Ins) | 7 | |
| Total | | | 203 |

With respect to Database lists, the most frequently used order is an alphabetical list by database titles (31 out of 34) and the second is by topics (14 out of 34). A majority of the alphabetical listings by database titles (24 out of 31) include brief annotations (database description and access information), but nine contain no annotation at all. The brief annotation or lack of annotation allows for users' quick access to specific databases without being distracted by languages surrounding the links to databases. Another nine library websites provide top databases that are most popular or most recommended, listed usually in an alphabetical order by titles, but a few listed in a priority order. Short enough to see popular databases at a glance, Top Databases is the quickest way to access databases. Another way of organizing databases is by content type or type of information needs. The following example is a list of content types by which databases are grouped in a library website.

Table 4. Resource Arrangement: Databases by Content Type[2]

| |
|---|
| Analyst & Research Reports |
| Articles |
| Biographies |
| Company Financials & Filings |
| Company Information |
| Country Information |
| Country Statistics |
| Financial Markets Data |
| Industry Information & Statistics |

As opposed to a wide range of the order in which databases are presented, 'Websites' are presented either by topics or in alphabetical order by titles with the former dominant (7 out of 10). This is probably because the number of Websites lists identified (10) is not big enough to show various schemes and because librarians do not regard websites as primary resources for information seeking.

'E-journals' are all listed in alphabetical order by e-journal titles. Often, clicking a label 'e-journals' goes to a main library's e-journals page, forcing users to either browse a long list of e-journals in all disciplines or search by keyword. Only seven out of seventeen e-journal lists are business-specific.

'Electronic Resources' that integrate databases and websites under one heading is an independent access point in five libraries. Among the five, three have neither a database list nor a website list separately. This may be because the website developers/librarians do not feel that users access or should access each type of resources separately. On the other hand, one website contains a database list and a website list as well. No dominant organizational scheme was found in the Electronic Resource lists; Alphabetical order by titles in four websites and by topics in three.

'How do I?', 'FAQs (Frequently Asked Questions)', or 'Research FAQs' appearing in seven websites is another way to present information resources. Rather than arranging resources in a pre-fixed manner, FAQs generally narrates the desired order information resources should be consulted to answer a frequently-asked question or problem (See Table 5). In this scheme, recommended resources are not confined to a single type instead, the level of resource integration is high involving any types of resource that could possibly contribute to answering the question. Also, in contrast to the above-explained access points whose annotations are generic resource descriptions, FAQs elaborate on location information and search strategies customized to each resource.

Table 5. Resource Arrangement: Business FAQ[3]

| |
|---|
| *Question*: How can I find a directory of high tech companies? |
| *Answer:* Go to the Virtual Business Library's Company & Industry Info page and do an SIC code search using D&B's Million Dollar Database. Another option is to use Hoover's and browse companies arranged by industry. You can also come to the 6th floor of Bobst Library, and use the book High Technology Market Place Directory, located under the call number HC110.H53, on Index Table B. |

Research Guides, also called Subject Guides, User Guides, Information Guides, and Tutorials are short descriptions that give generalized information on how to find information on a particular topic. Although seemingly synonymous, pathfinders are regarded differently, giving more targeted information about how to locate specific resources. Accordingly, a user may visit a research guide to learn generally about a topic at first, and afterwards visit a pathfinder to quickly know where and how to find a specific resource (Hook, 2002). In reality, however, ten research guides out of seventy one (14%) list information resources simply in alphabetical order of their titles with no or minimum annotation for resource description, which makes it hard to name them research guides in a true meaning. Only twelve research guides (17%) give instruction on how to conduct a search about a topic. A research guide shown in Table 6 helps users go through a step-by-step process for company research in which information resources are inseparably embedded where relevant. This type of research guides is naturally long including instructional information on a topic as well as database information and search tips although prevalent annotation is database description (28 out of 34).

Table 6. Resource Arrangement: Research Guide for Company Information[4]

| |
|---|
| I. For a U.S. Company |
| 1. Determine whether the U.S. company is PUBLIC, PRIVATE, or a SUBSIDIARY of a public company. |
| The directories below will list the stock exchange and ticker symbol for a company that is publicly traded. If not found, the company may be private or a subsidiary. [See Directory of Corporate Affiliations "Who Owns Whom" Master Index - Alphabetical Index (RD)]. |
| 2. If the company is PUBLIC, you can obtain the following: |
| A. General directory information. |
| 1. Standard & Poor's Register of Corporations. (RD) |
| 2 .D& B Million dollar database |

The most popular scheme found in nineteen research guides (27%) is by topics. A series of sub-topics, either arranged in a meaningful way to reflect the knowledge structure of a topic domain or seemingly in a random way, are presented along with related information resources. The following example is a selected set of subtopics for Company Information in a library website.

Table 7. Resource Arrangement: By Topics for Company Research[5]

| |
|---|
| Company Profiles |
| Company Structure |
| Competitors |
| Company History |
| Financials |
| Investment Analysis |
| Law Suits and Claims |
| (omitted hereafter) |

Another popular organizational scheme appearing in eighteen research guides (25%) is by resource type. The following example is the table of contents for Company Information. The scheme is not topic-specific, actually applicable to any other topics.

Table 8. Resource Arrangement: Research Guide by Resource Type[6]

| |
|---|
| Library Catalog |
| Databases |
| - Web-based |
| - CD-ROM and local installation |
| - Databases for Management & Business |
| E-Journals |

While this sample scheme encourages users to adhere to a conventional way of consulting information resources - using books first through the library catalog and then, turning to electronic resources, another sequence found puts databases on the top followed by websites and then, print materials. The latter pattern seeks to bring in users' preference for electronic resources reported in recent research into the design of the organizational scheme to better address users' actual searching behaviors whether or not the behaviors are desirable from the perspective of library instruction.

Course guides are designed to serve specific courses and their curricular needs. Offering customized content for homework and projects assigned in a particular class, a course guide assists students not only with their research for that class, but also with search strategy development as evidenced in seven library websites that provide search tips. Some librarians and researchers including Reeb and Gibbons (2004) argue that for students who do not understand traditional subject categorization or organization, course-level subject guides would better

fit their mental models in seeking information. However, the order of information resources identified under each course guide vary greatly as they did for research guides and thus, it is difficult to say all course guides fit students' mental models well. In this study, two course guides out of sixteen (7%) adopt the alphabetical order to provide course-related information resources. Seven libraries (25%) present resources by resource type, eight (28.5%), by topics, and four (12.5%), by combination of topics and resources. Another seven (25%) offer resources along with an instructional process as shown in Table 9. This type of course guides requires extensive collaboration between the faculty and librarians in developing the instructional process and suggesting ways that the featured resources are utilized.

Table 9: Resource Arrangement: Course Guide for Financial Reporting[7]

| |
|---|
| Identify Corporations in an Industry |
| Information about Companies: Finding Financial Reports |
| History of the Corporation |
| What do Financial Analysts Report about the Company or Industry? |
| Find Financial Ratios for the Industry |
| Find Industry Profiles: Sources to Help You Analyze Industries |
| Find Journal or Magazine Articles on a Corporation or Industry |

Some course guides are built around academic areas or disciplines combining similar classes instead of specific classes, for example, accounting, finance, human resources, and marketing, etc. Such course guides are more analogous to research guides whose topics are fine-grained.

Regarding six Reference Resource lists, half organize resources in alphabetical order by titles and the other half, by resource type. 'Articles' that gives instruction on how to find articles sometimes appear as an independent access point or other times, as one access point within research guides. When presented as an independent access point, information resources are organized in alphabetical order by titles (4 out of 11), by resource type (4), or by instruction process (3), whereas as a research guide, mostly by an instructional process. Finally, four libraries provide top resources or most popular resources by resource type.

### *Organizational Schemes in New Forms*

Though still uncommon, some libraries are moving beyond the above-mentioned textual schemes towards new forms to organize information resources. The advent of new forms on the Web depicts how libraries are now experimenting and where they are heading for the future to support users in finding appropriate information resources. In this study, four new forms were identified: Database selection aid system, FAQ search engine, Interactive browsing, and Illustration.

A database selection aid system asks a user to choose options to describe his/her information need from drop boxes, for example, a research area and an information type, and returns a list of databases that match the chosen options (MIT Library available at http://libraries.mit.edu/guides/subjects/business-databases/). Only when a user can precisely predict the database characteristics needed, which is feasible only through a solid understanding of his/her own information need, this system produces the optimal result. As opposed to the database selection aid system in which no search feature is available, a FAQ search engine allows for typing in a keyword or phrase and pulling up a list of matching questions and associated answers that explain which resources should be used in which order (Lippincott Library available at http://faq.library.upenn.edu/recordList?library=lippincott).

On the other hand, interactive web pages enable a user to frame his/her information need by exercising options interactively through a couple of cycles until he/she drills down to a few good resources. For example, Quick Assist Guide provided in Thomas J. Long Business & Economics Library at the University of California, Berkeley (available at http://www.lib.berkeley.edu/BUSI/quickfind.html) asks a user about the type of information needed at first. Clicking Financial Markets, for example, among seven topics, generates two options - U.S. or Non U.S. Information. Selecting U.S. Information shows a list of subtopics and clicking one of them presents a few databases and websites that help start one's research. Such an interactive device surely works well for the users facing difficulty in putting their information needs into words. Finally, illustration is a visual approach to depict the knowledge structure of a topic and interrelations among information resources. Clickable illustration is easy to use especially for visual learners and benefit the users who want to get an overall picture of a topic area.

## Discussion

### *A Typology for Organizational Schemes*

This study suggests a typology with which each organizational scheme is placed in the context of others for the purpose of assisting in assessing existing organizational schemes and developing new ones.

The typology suggested consists of three dimensions (See Figure 1):

- Resource integration dimension
- Resource/User orientation dimension
- User approaches dimension

In Figure 1, the resource integration dimension signifies the extent to which different types of resources are combined under a single heading. The organizational schemes that provide resources in a single type, whose notations start with Web, DB, and EJ, are located at the lowest end of the dimension, whereas RG:Ins and CG:Ins that mingle a full range of resources such as databases, print materials, and websites are located at the highest end. Including only electronic resources with print materials left out, the schemes starting with ES are higher than DB, Web, and EJ, but lower than RG:Ins/CG:Ins. RG:Res/CG:Res are placed lower than RG:Ins/CG:Ins because although they provide the same spectrum of resource types, the former groups resources discretely by type. For the same reason, Top:Res is placed on the same level as RG:Res/CG:Res. Integrated resources in one place are useful because they enable users to find information on a topic without being concerned with which format the needed information is in (Kirkwood, 2002). This does not imply, however, that high integration is always superior to low integration. Each level of integration is useful for a certain purpose: High integration is good for acquiring a comprehensive list of needed resources and low integration for accessing specific resources quickly.

The resource/user orientation dimension signifies the extent to which resource arrangement is resource-oriented or user-oriented. An alphabetical order of resources is a highly resource-oriented scheme giving no hints about information needs users bring to the library websites or the contexts in which the users work. Clarification of one's information need and selection of appropriate resources is the burden that a user must bear. Top Databases and Top Resources are more user-oriented than the alphabetical lists because they are chosen by frequency of use or priority. In contrast, an instructional process is most user-oriented because information resources are introduced to support students' research on a topic and thus, the resources stripped from the instruction process are pointless. In this scheme, users do not need to express their information needs explicitly to find appropriate resources, instead all they have to do is follow the flow of the research process and encounter relevant resources. Resources organized by content type are next to the Top Databases/Top Resources on this dimension. In this study, only databases were found grouped by content type. The content types, which roughly stand for information needs, help users clarify their needs. Matching one's information need with one of those topics presented is a user's job. Resources grouped by topics are more user-oriented than those by content type and less than the instructional process. When a series of sub-topics are arranged in such ways that they lay out the whole knowledge structure of a broader topic, the organizational schemes by topics can reach a similar level of instructional impact RG:Ins/CG:Ins has, but many of those schemes currently spread the sub-topics as if they are disconnected. Resources grouped by type are less user-oriented than resources by topics because users must guess the resource format rather than topics they need to know about.

While an individual organizational scheme occupies a spot between the two dimensions, the third dimension projects diagonally to represent user education approaches. A source approach is placed at the lowest end on both resource-integration and resource/user orientation dimensions, a process approach at the highest end, and a behavioral process in between.

In the source approach, the focus is on information resources. Individual resources are arranged in isolation with no relationship among them known to users. Representative organizational schemes that belong to this approach include DB: Alpha, Web: Alpha, and EJ: Alpha. To take advantage of this type of organizational schemes having a low integration level, a user should decide in advance which resource type to use and which specific resources to select. This approach is most suitable for users with well-defined search tasks and knowledge of resources. Search strategies and location information are often offered as a brief annotation together with information resources on the same page or in a separate window only when requested by users. An annotation that describes the knowledge structure of the domain, however, is rare in this approach. Hence, users might be able to learn the scope of information resources available from these organizational schemes, but instruction is not a main goal of this approach. To sum up, this approach is the best way for quick access to specific information resources for users who have precise information needs and familiarity with the resources. A

search engine that enables users to type in a specific resource name and pulls up a direct link to that resource could complement the navigational organizational schemes by saving users from multiple clicks and scrolling.

In the behavioral approach, the focus is still information resources, but the highlight is set on a "correct" sequence of resources users should follow rather than on individual resources. RG:Res/CG:Res, and FAQ:Ins belong to this approach while the former offers a generalized order resources should be used regardless of topics, for example, starting from books through databases in local libraries to outside resources, the latter offers a shortcut to the most appropriate resources for a specific question. Customized search strategies and resource descriptions are a ubiquitous type of annotation in this approach and relationship among resources is depicted either explicitly or implicitly in the process of suggesting the resources. Therefore, users could learn about the characteristics of individual information resources, relationships among them, and how to search each resource. This approach is helpful for the users with well-defined information needs and no knowledge of best resources because upon selecting one's information need as in the forms of frequently asked questions, topics, or course names, appropriate resources are subsequently provided. Conversely speaking, the success of the schemes is contingent on how well a set of information needs with which users can match their own needs are prepared and presented to the users. Though not explicitly visible organizational schemes, the database selection aid system and the FAQ search engine fall into a behavioral approach because they require users to know exactly what their information needs are and to be able to articulate them using the system features.

In the process approach, the focus has shifted from information resources to an instructional process. As exemplified in RG:Ins and CG:Ins, this approach intends to seamlessly blend instruction on a business topic and a series of appropriate resources into one with annotations about domain knowledge as well as search tips. This approach is best for the users with poorly defined information needs and lack of knowledge of best resources because users go through step-by-step guidance in researching the topic as well as in selecting appropriate resources and implementing specific search strategies. Although returning users can bypass the instruction part and go directly to links to resources in a research guide/course guide, the main goal of this approach is not to provide quick access to resources, but to encourage users to learn about or explore the topic. Because an advantage of using interactive browsing and illustration is learning about the knowledge structure of a topic and the resource integration level is very high, both forms fall into a process approach.

This typology does not state that a process approach is better than other approaches; instead each approach serves a certain user group having a certain search task. The bottom line is that a library website should be able to accommodate different types of users having different search tasks, preferably providing organizational schemes in all three approaches. According to the data in this study, only one library website does provide all three approaches. In this way, the suggested typology can aid in assessing existing organizational schemes of information resources individually or as a whole by the resource-integration level, by the resource/user-oriented level, or more holistically, by the user education approach types to determine how suitable an organizational scheme is for a quick information access or instruction. Besides, the typology is expected to shed light on the creation of new organizational schemes including non-textual methods.

## Future Work

Recognizing the potential of classification in information retrieval, one panel session at the 2005 ASIS&T conference discussed the use of traditional classification schemes and web-based classification-like schemes (e.g. Yahoo directory) in information seeking (Lee, 2005). The questions explored in the session can extend from subject-oriented classifications to embrace a variety of organizational schemes found in this study. The questions include; 1) How does each organizational scheme identified facilitate information searching in various information environments? 2) Are users taking advantage of each type of the organizational schemes in searching? 3) How do they navigate the organizational schemes? What are their challenges? 4) How do users benefit from these organizational schemes, as opposed to searching by keyword?

The point is that we need empirical validation for the actual use of the organizational schemes compared with the intended use or developers' expectations. To know how users really use and benefit from each organizational scheme will inform interface designers and librarians as they craft more effective organizational schemes to assist users in finding the right information resources.

## Conclusion

Library websites are supposed to serve seemingly conflicting missions: providing quick access to information resources and providing instruction for a domain and search strategies. For the former mission, library websites should arrange search paths as succinctly as possible so that users can easily focus their search and target the

most appropriate resources. For the latter mission, on the other hand, they should convey knowledge about a domain and information searching skills as educational as possible so that users can easily assimilate the knowledge. Therefore, the organizational schemes of information resources on library websites should be analyzed and assessed by the levels of both pedagogical impact and effectiveness the websites have.

To that end, this paper suggests a typology in which the organizational schemes are placed on three dimensions: resource integration and resource/user orientation, and the user education approaches dimension. While using this typology as such will contribute to the assessment of existing organizational schemes and creation of new ones, empirical tests are required to answer the questions about users' information searching behaviors as they relate to these organizational schemes.

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**Notes**

[1] Multiple schemes applied for one library website.

[2] From http://www.library.hbs.edu/databases/by_content_type/index.html (Retrieved June 16, 2006)

[3] From http://faq.vbl.nyu.edu/recordDetail?id=6285&action=&library=nyu_business&institution=NYU (Retrieved June 16, 2006)

[4] From http://gethelp.library.upenn.edu/guides/business/companyinfo.html (Retrieved June 16, 2006)

[5] From http://www.vbic.umd.edu/company.shtml (Retrieved June 16, 2006)

[6] From http://libraries.mit.edu/guides/subjects/company/ (Retrieved June 16, 2006)

[7] From http://courses.lib.umn.edu/page.phtml?page_id=126 (Retrieved June 16, 2006)


**ACKNOLEDGEMENT**

This study was part of the work done for the VBIC project (Virtual Business Information Center, http://www.vbic.umd.edu/) at the University of Maryland as Dr. Eileen Abels and I tried to identify ways to present our resources at UMD. I would like to thank Dr. Eileen Abels for her guidance and other VBIC team members, Dr. William J. DeWitt, Lily Griner, and Zaida Diaz for their support.

Appendix 1. List of Business School Library Websites/Collections Examined

| **University** | **Library's URL** (all lastly accessed January 15 2006) |
|---|---|
| Harvard University | www.library.hbs.edu/ |
| Stanford University | www.gsb.stanford.edu/library/ |
| Univ. of Pennsylvania (Wharton) | www.library.upenn.edu/lippincott/ |
| MIT | libraries.mit.edu/dewey/ |
| Northwestern University (Kellogg) | www.library.northwestern.edu/reference/ksm/ |
| Dartmouth College | www.dartmouth.edu/~feldberg/feldberg/feldberg.shtml |
| University of California–Berkeley | www.lib.berkeley.edu/BUSI/ |
| University of Chicago | www.lib.uchicago.edu/e/busecon/home.html |
| Columbia University | www.columbia.edu/cu/lweb/indiv/business/ |
| University of Michigan | www.bus.umich.edu/KresgeLibrary/ |
| Duke University | www.lib.duke.edu/fsb/ |
| University of California – Los Angeles | www.anderson.ucla.edu/library.xml |
| New York University | www.nyu.edu/library/bobst/vbl/ |
| University of Virginia | www.darden.virginia.edu/library/ |
| Cornell University | www.library.cmu.edu/Research/Business/ |
| Carnegie Mellon University | www.library.cmu.edu/Research/Business/ |
| Emory University | business.library.emory.edu/ |
| University of Texas Austin | www.lib.utexas.edu/subject/business/index.html |
| University of Washington | www.lib.washington.edu/business/ |
| Ohio State University | fisher.osu.edu/library/ |
| Purdue University | www.lib.purdue.edu/mel/ |
| University of Minnesota | busref.lib.umn.edu/ |
| University of Rochester | www.lib.rochester.edu/index.cfm?page=236&CFID=646039&CFTOKEN=27048906 |
| University of Southern California | www.marshall.usc.edu/web/Library.cfm?doc_id=2016 |
| Georgetown University | www.library.georgetown.edu/bic/ |
| Indiana University | www.libraries.iub.edu/index.php?pageId=77 |
| University of Illinois–Urbana-Champaign | www.library.uiuc.edu/bel/ |
| University of Maryland – College Park | www.vbic.umd.edu/ |
| Michigan State University (Broad) | www.lib.msu.edu/coll/branches/business/ |
| Washington University in St. Louis (Olin) | www.olin.wustl.edu/acadres/kopolow.cfm |
| Pennsylvania State University–University Park (Smeal) | www.libraries.psu.edu/business/ |
| University of Iowa (Tippie) | www.lib.uiowa.edu/biz/ |
| University of Wisconsin–Madison | business.library.wisc.edu/ |
| University of Florida (Warrington) | web.uflib.ufl.edu/cm/business/ |
| Wake Forest University (Babcock) | pcl.wfu.edu/ |
| Tulane University (Freeman) | www.freeman.tulane.edu/turchin/ |
| Vanderbilt University (Owen) (TN) | www2.owen.vanderbilt.edu/walker/ |
| Boston University | www.bu.edu/library/management/ |

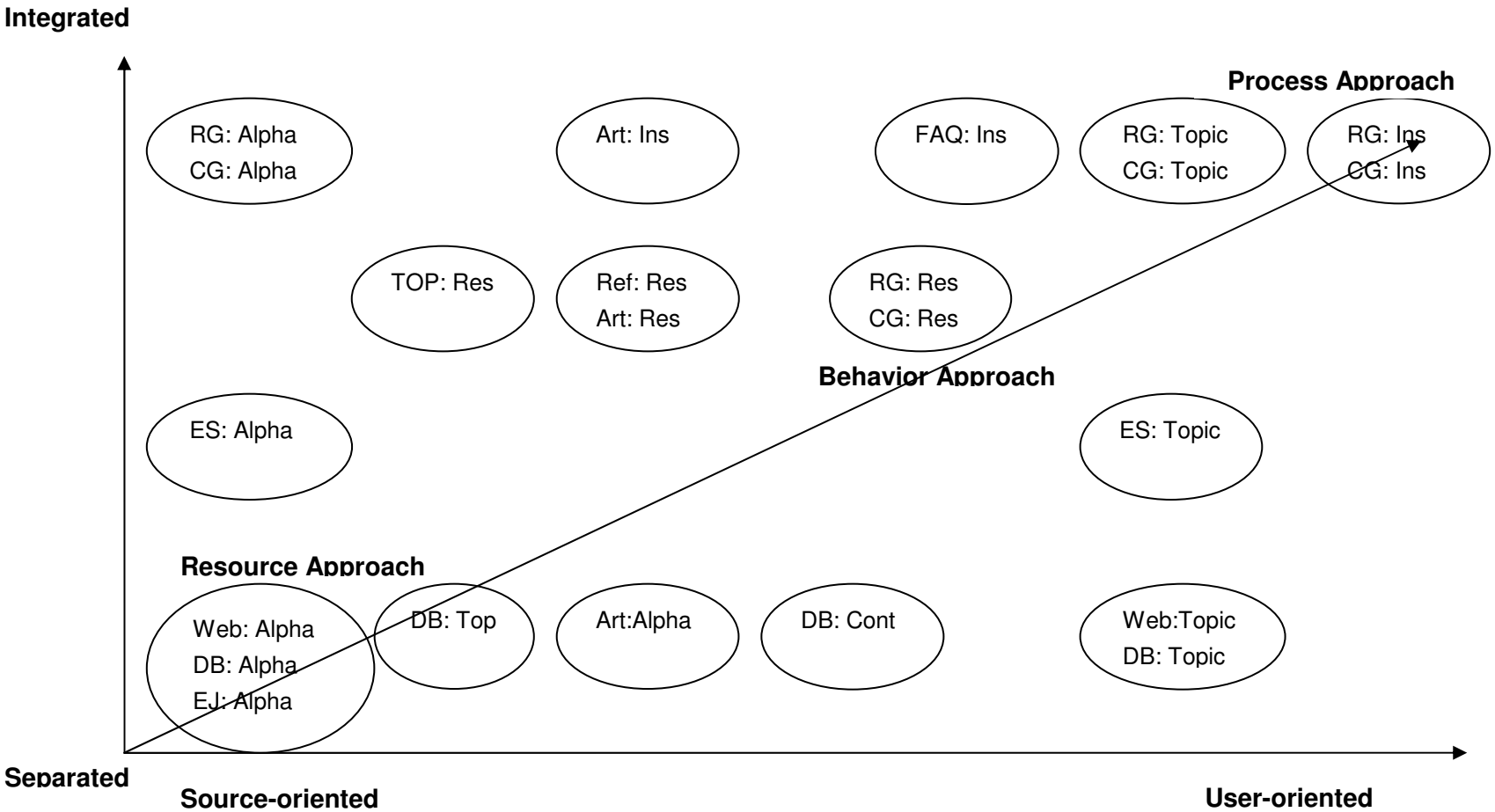


Figure 1. Typology for Organizational Schemes of Information Resources

| Access point | Presentation order |
|---|---|
| Art – Article<br>CG – Course guide<br>DB – Database<br>EJ – Electronic journal<br>ES – Electronic resource<br>TOP – Top resources<br>RG – Research guide<br>Web – Website | Alpha – In alphabetical order<br>Cont – By content type<br>Ins – By instructional process<br>Res – By resource type<br>Top – Top databases selected by frequency of use or priority<br>Topic – By topic |