

# The Analysis of Informational Structure and Labeling System of Academic School Websites

## 대학 웹사이트의 정보구조 및 레이블링 시스템 분석

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### ABSTRACT

In this study we proposed a new informational structure and category labels to fully support the functions of school websites as an access tool to its contents. The proposed model was divided into three main aspects. First, main menu structure was the primary guideline to access information embedded in a website. Therefore, The proposed main menu structure consisted of 9 categories that are commonly provided by 17 existing school websites. Second, first-level categories consisted of total 35 categories under 9 main menu categories. Each category was placed under certain categories in main menu based on the relationships with the meaning of the upper level categories. Third, the proposed model adopted general and comprehensive terms as category labels. The terms used as category labels were based on the analysis of existing category labels, and the most frequently used terms were selected from the current school websites.

### 초 록

본 연구에서는 효율적인 정보접근 도구로서의 대학 웹사이트 설계를 위한 정보구조 및 카테고리 레이블을 마련하기 위해 현재 미국 문헌정보학과 웹사이트 17개를 메인메뉴구조, 하부 카테고리, 레이블링을 기준으로 분석하였다. 분석결과 메인메뉴구조는 현재 17개 조사대상 웹사이트에서 모두 공통으로 제공하고 있는 9개 카테고리로 구성하는 것이 바람직한 것으로 나타났으며 둘째, 그 다음 수준의 서브 카테고리는 9개의 카테고리의 내용의 의미를 고려해서 35개 카테고리로 나누는 것이 바람직한 것으로 나타났다. 마지막으로 카테고리 레이블로 사용되는 용어는 17개 웹사이트에서 가장 많이 사용하고 있는 용어를 사용하는 것이 바람직한 것으로 나타났다.

Keywords : website, school website, informational structure, categorization, main menu, main menu structure, first-level categories, labels, category label  
웹사이트, 대학 웹사이트, 정보구조, 카테고리, 메인 메뉴, 레이블, 카테고리 레이블

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## 1. Introduction

### 1.1 Purpose of Research

Websites become more and more important in this current information age, because a website communicates with users and provides information that can meet the users' information needs. The rapid change of the information environment resulting from the development of information technology has been transforming the concept of a website from the repository of information to means of accessing information. That is, a website is not a static archive but a dynamic place for communication and interaction. However, current websites have many problems that make users face difficulties in searching information from the websites. These problems might be from the contents contained in websites and/or the informational structure adopted by the website. Because a website usually tries to contain sufficient information to serve its users, it may put too much information in it with less consideration of providing paths to access information. On the other hand, a website may not provide enough information or contain irrelevant information with the purpose of the website. In these cases, users likewise cannot find information that they want. To overcome these problems, the contents contained in a website has to be appropriate with the purpose of the website and the informational structure should be concrete. A website can provide sufficient information

to its users by organizing its information systematically. This aspect of a website might be more important to academic websites, especially universities' websites, because a university website usually contains a wide range of contents and various types of information.

Generally, a university is composed of many schools. However, there are big differences between the website of a university and that of a school. A website for a university seems to contain general information and lots of links to each units of the university. It functions as a bridge that guides users to specific information. On the other hand, a school website contains unique and school-specific information, although the school is a unit of a university. The intended user groups of school websites might be limited compared to other websites and the information contained in school websites might also be limited to a specific range of information closely related to the user groups and the field in which the school is included. Therefore, a school website should provide information in a user-centered ways and allow users to access the contained information easily and efficiently.

However, many school websites have some serious problems with usability. In most cases, the users who visit a school website are faced with difficulties in finding information. These problems might result from adopting inadequate informational structure and using inappropriate terms as category labels.

These can confuse users who try to find information and guide them to wrong information. In addition, these problems will be worsened when users visit several websites continuously or simultaneously to find specific information. Each school website puts the same information under different category labels, and, in some cases, the same category label contains different contents. These are some of the reasons that users face with difficulties in finding information during their navigation of a school website.

One of the solutions to solve these problems is that the informational structure of a website should guide users to appropriate categories that contain contents and information which the users want to find and help them easily select paths to access information. The menu structure and the terms used as category labels play important roles in selecting paths. Therefore, the menu structure should support users to choose right paths by systematically organizing the categories and representing contents and information in categories clearly.

In this aspect, this research investigates the informational structures and the terms used as category labels in current school websites. In addition, the contents and information embedded in school websites are also analyzed to identify important considerations of school websites. The required categories for school websites are extracted based on these analysis. By applying the results of the analysis to current school websites, a new informational

structure and appropriate terms for category labels are proposed as an ideal model of a school website.

## 1.2 Methodology

To construct an efficient and useful informational structure, it might be necessary both to identify the contents and information contained in the structures of current school websites and to analyze the terms used as category labels. This current research adopted three stages of analysis and two stages of applying the results of the analysis to current school website to propose a new informational structure of school websites.

To get reliable data set, 17 websites of schools in Library and Information Science and Information Science fields were selected. This is the first stage of this research.

The methods of collecting data can be divided into two ways : analysis of the informational structure/contents and terms as category labels.

Second stage is the analysis of the informational structure of the selected school websites. In this stage, the levels of hierarchical structure and the number of categories of each level were analyzed. The contents in each category were also extracted with the analysis of the structure. It could derive the range of the information provided by each school.

The terms as category labels to represent contents in categories were extracted from the current website structures. This could

be the third stage of the analysis. By analyzing the terms, the relationships among categories placed in different levels in the hierarchical structure could be identified. The result of this stage could be used as the foundation of reorganizing categories and contents of the websites.

From the second and third stages, common contents that most school websites seem to consider as important information and the representative labels used by current websites could be analyzed by identifying the frequencies of the terms used as category labels.

These results of the analysis were applied to construct a new informational structure. With the results of the analysis, the contents and information in current websites could be categorized into each group if they contain similar contents. In this stage, the main menu structure and the first-level categories could be constructed.

As the last stage of this research, the appropriate category labels for the structure were decided. This was mainly based on the analysis of the terms used as category labels.

### 1.3 Scope and Limitations

This research concentrates on the analysis of contents and terms as labels that compose informational structures of school websites. The aspect of website design will not be considered in here because it does not have close relationship with the contents and labels of

informational structures.

To analyze the characteristics of each school website, it is necessary to understand the policies of the target schools. This is because the policies of schools might affect the construction and maintenance of their website structures. However, the policies might be extremely different among schools and are not clearly represented on their websites. In addition, this research can be biased to the analysis of school policies if the analysis of the policies precedes analyzing the structures and labels of the websites. Therefore, this research focuses on the informational structure and terms as category labels as access tools.

The range of the target school websites is limited to schools related to Library and Information Science (LIS) and Information Science (IS). The reason is that it is difficult to combine most of the characteristics of each field because each school in a specific field may have unique characteristics of its own that cannot be shared with other fields. However, the characteristics should not be ignored, and it does not make any sense if a website structure unifies all the unique characteristics only for ease of use. Another reason for limiting the range into (Library and) Information Science is that most of the school websites in this field have sitemap in the websites. Sitemap shows the entire structure of the website and provides paths to access information in the website. It means that the website with a sitemap contains sufficient contents and information and has a concrete

informational structure with appropriate labels, because a poorly constructed website is unable to maintain a sitemap. By analyzing informational structures and labels from well-structured school websites, the proposed menu structure and labels can be more reliable.

## 2. Previous Research

Recently, researchers have conducted research about website design and construction. However, most of these researches concentrate on the website construction process, interface design, usability, and HCI (Human Computer Interaction). The target websites are also limited to general websites for companies or personal homepages, although these researches are related to information architecture that can be a foundation of constructing websites. There are a few researches that related to this current research.

Rosenfeld and Morville (1998) insist that technologies for accessing information and systematic organization of information are necessary in this current information environment that the number of dynamic information, such as Web resources, has been increased rapidly. Categorization and systematic organization of information in websites have been requested continuously. To make websites as efficient tools for accessing information, all the components of websites should be placed in appropriate location in the structure of websites and

users can find information easily and efficiently. Websites should be designed and constructed based on information architecture. In addition, they propose the importance of the category labels in terms of information retrieval from websites.

Toms (2000) discusses Information Interaction, which is the process that people interact with the contents of information systems. He elaborates the way how a user interacts with the contents of a website. He also explains the process of information interaction that can be divided into 6 stages : formulate goal, select category, note cues, extract information, integrate information, and evaluation. It is necessary to analyze users' behavior with a website and to construct appropriate information architecture according to the user analysis. This research concentrates on analyzing the procedures how a user uses websites and deals with how a user interacts with a website. It can also be helpful to understand the behaviors of users of school websites.

Fuller and Hinegardner (2001) describe several approaches to identify the problems of existing library websites with the reconstruction process of websites for Health Sciences and Human Services Library (HS/HSL) in University of Maryland. They insist that the function and the usability are the core elements of websites and give several examples how to identify users' propensity and information needs. They also show how to reflect the analyzed aspects on real websites.

Matsumoto, Yokoi, and Yasuda (2002)

provide a new and efficient model of an academic website and propose an ideal website prototype. To create the model and prototype, the authors investigated the problems of current websites, analyzed existing academic websites, collected users' suggestions, and extracted key elements of academic websites. They identified four elements (navigation, labeling, database system, and information structure) and five types of information (information, activity, research committee, monograph/product information, and other functions) of academic websites. However, they mainly concentrate on the methods of website design as well as information architecture.

Garrett (2003) puts emphasis on user experiences. He insists that user experience plays an important role in constructing effective and efficient website. If user experiences could be reflected in website construction process, the website can acquire better usability and interaction with its users. He also proposes five stages of constructing websites : surface plane, skeleton plane, structure plane, scope plane, and strategy plane. If these five stages could be harmonized during the construction process, user experience can be fully reflected in the website and it can be resulted in the higher levels of usability.

### 3. Analysis of Existing School Websites

A school website usually contains almost all the information related to the school, including general information, information needed to administrate the school, and additional information considered to be useful to its users. In the current information environment, schools usually provide information through their website, and the website also functions as a communication tool with its users. However, the real meaning of a school website is not the existence of the website itself but the contents and information contained in the website. Nobody would use a website that contains no useful information, and a website that has no user will be meaningless. Therefore, a good website is that many people use, that can provide sufficient and useful information to its users, and that users can search and find the contained contents and information easily and effectively.

The main menu structure of a website can function as a primary access tool to information contained in a website. The category labels of the main menu should represent the contents under each category. However, it seems to be difficult to standardize the menu structure and labels because of the diversity of the resources in school websites. Rather, it might restrict the diversity of the Web resources and characteristics of each school if we strictly standardize the informational structure. However, it would be ineffective and make

users confuse if each school website uses different structures and diverse labels for the same contents. With these reasons, it might be better for the menu structure and category labels to be capable of covering mental models of users and to keep consistency in its informational structure.

### 3.1 Criteria for Selecting School Websites

To analyze current school websites, seventeen LIS and IS school websites on the Web were selected (see Appendix A). To select these websites, this research adopted two criteria: reputation of each school and sitemap in the website. To identify the reputation of each school, USNEWS ranking report (2005) and Gourman Report Ranking (2005) was referred. USNEWS, provided by U.S. NEWS & World Report and Gourman Report Ranking, published by the National Education Standards organization, are annual rankings of colleges, universities, graduate and professional schools. The reports look at a variety of qualitative and quantitative sources for evaluation. They provide reliable rankings, based on the evaluations.

Top twenty schools that have sitemap on their website were selected from the ranking lists. A sitemap is a useful tool to clearly understand the informational structure of a website, because it usually provides the overview of the entire structure of the website. In addition, a sitemap

means that the website with a sitemap contains sufficient information and contents and has a concrete informational structure, because a poorly constructed website cannot provide and maintain a sitemap.

### 3.2 Websites Analysis

The analysis of current school websites can be divided into two aspects: the informational structures of school websites and the terms used as category labels used to represent contents and information in categories. School websites usually have more than two levels of hierarchical structure. General information is categorized in main menu or higher level hierarchies because people want to find general information more than specific or detailed information. General information is commonly provided across most of school websites, such as admission, faculty member, degree programs, and courses provided. However, specific information related to each school, which is categorized in lower levels of hierarchies, is quite diverse and unique. This is because lower levels of the hierarchies usually reflect the unique characteristics of each school. It might be difficult to extract common information from lower levels of categories.

Therefore, this research would only consider the main menu and first-level categories that usually provide relatively common and essential information and category labels. Another reason is that the main menu structure and the first-level categories are most frequently used as

access tools to embedded information, and some users do not want to go deeper than first-level even if they cannot find information through navigating main menu and first-level categories. Therefore, this research would only consider the main menu and first-level submenu that usually provide relatively common and essential information and the terms as category labels.

### **3.2.1 Analysis of Main Menu Structure**

#### **3.2.1.1 Importance of Main Menu Structure**

As mentioned above, a school website contains wide range of and huge amount of information related to the school. To help users to access the contained information, school websites provide hierarchical structures by categorizing these information. Generally, school websites have more than two-level hierarchies in the informational structure that consists of main menu and subcategories to provide access to its information. Users usually start searching information by accessing from general to specific categories, if they do not know the exact location of the information that they want to find. Therefore, the informational structure should be constructed from general to specific to guide the users efficiently.

The main menu should be categorized with general information because it is the primary access tool for users. Subcategories

in lower levels may contain specific information, including unique characteristics of each school. The terms used as category labels represent the information contained in each category. The category labels in main menu should be comprehensive because categories in main menu provide general information, whereas the labels for lower level categories may be specific.

A set of categories constitutes main menu structure and shows the whole range of contents of a website. Through the main menu, users can understand the entire structure of a website, and they would select one or more categories that contain information they want. Therefore, the main menu should be constructed in a way that users can easily understand.

However, some of the websites do not consider the general users' approach from general to specific. In some cases, they provide specific information in main menu. In addition, many websites have too many hierarchical levels in their informational structure. These can make users confused and face with difficulties to find information. The inappropriate uses of terms as labels also cause problems to represent contained information and contents.

#### **3.2.1.2 Result of the Analysis**

The result of analyzing the number of categories in main menu is in the range of 4 to 11 see <Table 1>. Most of the school websites usually provide 6 to 8 categories in their main menu structures. These



**<Table 1> Number of Categories in Main Menu**

Number of Categories	Frequency	Ratio
4	1	5.88%
5	1	5.88%
6	5	29.41%
7	4	23.52%
8	3	17.64%
10	1	5.88%
11	1	5.88%
Total	17	100.00%

numbers of categories may allow users to understand the scope and/or structure of the website at a glance and can cope with the future expansion of contents.

However, there are some categories that are not appropriate for being included in main menu, such as Sitemap and Contact Information. Although they play an important role in a website, it might be better not to be considered as category labels in main menu. A category label should have one or more sub-categories that contain specific information related to the category label. The categories that are too specific to be included in main menu can be placed in the lower levels of hierarchies.

### 3.2.2 Analysis of Terms as Labels

The terms used as category labels play an important role as access tools that users usually use for the first time when they visit websites. Users can identify the contents and information contained in each

category through the labels of the categories. Therefore, the labels should provide enough possibility to allow users to infer the contents embedded under each of the labels.

This research analyzed the terms used as labels to find out how many terms are used as labels. The total number of terms appeared in main menu is 137 and in first-level categories is 608. Those extracted terms can be grouped into 12 and 14 respectively. Among the terms, 45 terms in main menu and 167 terms in first-level categories have same or similar meanings. The other terms are those which used to represent unique meanings or used differently for the same contents. This shows that the current websites use too much terms to represent contents, even though the terms were extracted only from the main menu and first-level categories. It can confuse users if the same contents are represented by different labels.

〈Table 2〉 Terms Used as Labels in Main Menu

Terms appeared in category labels and frequencies				Total		
Research	9	Resources	5	Publications	1	21
Links	1	Institutes	3	Centers	2	
People	7	Faculty	3	Staff	3	21
Current students	2	For students	1	Students	2	
Prospective students	3					
Courses	16	Schedules	1			17
About	11	Introduction	1	School	1	13
Academics	2	Academic info	2	Academic programs	3	12
Degrees	2	Program	3			
Careers	3	Career services	1	Jobs	2	11
Internship	2	Services	1	Employment	2	
Admissions	10					10
News and Events	2	News	2	Events	1	7
Calendar	2					
Technology	1	Labs	2	Facilities	1	6
IT Support	1	Supporting	1			
Alumni	4	Alumni association	1			5
Organizations	1	Sponsor	2	Groups	2	5
Forms	2	Handbook	1			3
Other	1	Outreach	1	Graduation	1	13
Ethics	1	Diversity info	1	Certificates	1	
Affiliates	1	Advising	1	Learning	1	
Continuing education	1	Policies	1	Visitors	2	

### 3.2.2.1 Analysis of Terms in Main Menu

The main menu affects its users' navigating behavior because it comprehensively represents the whole range of its contents. Therefore, the main menu should clearly cover the entire contents of the website to allow users to

achieve their purpose of visiting the website. The terms used as labels in main menu are shown in 〈Table 2〉.

The extracted terms can be grouped with similar meanings. All the terms that cannot be grouped with meanings are categorized into one group. From the result of the analysis, we can identify the

contents that most of the school websites provide through the main menu structure: general information about each school, programs provided, admission information, people, courses provided, news and events, technology/facilities, career development, and research related information. These might be the contents that most schools consider as important information and major intended users usually want to find from the websites.

The characteristics of terms as category labels in main menu structure can be divided into two aspects. First, the terms used in main menu can be categorized into 12 groups. Among them, the case that represents similar meaning using over 5 kinds of terms is 3 times, 4 kinds of terms is 1 time, 3 kinds of terms is 5 times, 2 kinds of terms is 5 times, and using only 1 term is 2 times. Other terms that cannot be grouped appeared 13 times. Synthetically, school websites use different terms to represent same contents. For example, several schools provide a category related to technical support in main menu. But, they use different labels to represent the contents, such as IT Support, Technology, Labs, Facilities, etc. Among these terms, the general meanings of the terms, Labs and Facilities, are somewhat different from technical support. It is difficult to identify that the contents related to technical support are under the label, Labs or Facilities. Even worse, one school use the label, Supporting, to represent Funding, FAQ, and Faculty Profile. Although these contents can be placed under the meaning

of Supporting, there is no consistence with most of other websites. This may cause users' confusion when they select the category labels in main menu structures.

Second, groups of terms (categories in Table 2) that each school seems to consider as important contents appear frequently in main menu. For example, the group of terms related to research and people appears most frequently (21 times), followed by general information about school (13 times), degree programs (12 times), career services (11 times), admission information (10 times), etc. However, the order of arrangement of the groups of terms (categories) in main menu is greatly diverse. For example, some websites put the category related to news and events in 2nd place in main menu, whereas other websites 4th, 5th, and 7th. In many cases, the News category does not appear in main menu, but placed in first-level hierarchy. These different arrangements may depreciate usability and efficiency of finding information. Therefore, it might be better to rearrange the categories in main menu consistently from most frequently used categories to less used ones.

If a user uses only one school website and become familiar with the category labels and the menu structure of the website, these differences would not be problematic. However, users usually visit several school websites and they might be confused when selecting category labels from main menu if the menu structures are extremely different and the contents are represented using ambiguous terms as

category labels. To solve these problems, it might be desirable for each school website to adopt menu structure that general users can easily recognize the entire information structure of the website and easily find the location of the information and contents which they want. Also, the consistent use of general terms as category labels might be inevitable to support users to find information and contents.

### 3.2.2.2 Analysis of Terms in First-level Subcategories

Subcategories are located under main menu in the hierarchical structure of a website. Each of the subcategories is closely related to its upper-level category and the contents contained in subcategories are more specific and detailed than those of main menu. In addition, subcategories function as a bridge between upper level categories and specific information. It guides users from general to specific information. Therefore, subcategories should represent the contents more clearly and accurately than upper level categories. The terms used as category labels in first-level subcategories are shown in <Table 3>.

As shown in <Table 3>, the same problems as in main menu appear in the first-level categories. First, many terms are used to represent contents in categories, even though the represented contents are same. For example, many schools use the labels, Degree and/or Program, to represent the academic programs provided by schools, whereas some of other schools use the label, Certificates. In some cases, the term,

Certificates, is used in the category related to Resume or Carrier. In this case, the problem is that categories related to academic program and resume categories contain extremely different contents and information, but the same label is used for both categories. That means the structure misguide users and they can lose their way to find appropriate information.

Another problem of first-level categories is that the labels in categories are relatively longer and use more terms than labels in main menu, because the labels in first-level categories should represent their contents more accurately and in detail. However, the terms used to represent embedded information and contents seem to be too unique. It can make users feel uncomfortable to identify the contained contents in the categories. For example, nobody can easily understand what Progress Report, Master's Paper, or Accreditation mean, if the user is not familiar with the policies or academic programs of the schools that use the terms. If these terms are replaced with common terms, users can easily understand and identify the information and contents under each category.

In addition, some of school websites failed to provide and categorize academic information into one group. For example, the categories related to research or resources should contain academic information and references. However, most of the contents in the categories are related to how to use each school's resources, libraries, and grants/funding.

(Table 3) Terms Used as Labels in Main Menu

Terms appeared in category labels and frequencies				Total		
About	6	History	10	Mission	7	60
Vision	4	General information	1	Bulletin	3	
Contact us	8	Contact information	2	Address and phone	1	
Rankings	3	FAQs	5	Dean's welcome	4	
Welcome	5	Welcome message	1			
Maps	3	Area info	3	Directions	5	18
Location	4	City life	1	Visitor	3	
Admission	4	Application	6	Apply	4	93
Applying	5	Deadline	8	FAQs	6	
Financial aid	10	Financial award	1	Housing	4	
Tuition and fees	11	Student orientation	1	Requirement	12	
Transfer	2	Admission criteria	3	Application packet	4	
Information packet	2	Online apply	10			
Course	8	Course schedule	4	Course information	1	39
Course by semester	1	Course description	3	Course catalogue	4	
Course evaluation	1	Course registration	2	Distance course	1	
Registration	4	Course advising	1			
Degree	4	Program	6	Certificates	4	48
Master	16	Doctoral	10	PhD	7	
Nondegree program	1					
Employers	5	Employment	9	Internship	11	53
Posting resume	2	Post jobs	4	Resume	8	
Jobs	8	Career	4			
Update	1	Opportunity	1			
Computing lab	3	Facilities	5	Labs	7	49
Laptop requirements	3	Room	4	Technology	5	
Technical support	3	Equipment	6	Listserv	1	
Instructional technology	2	Online Tutorials	2	Reservation	4	
Database	4					
News	5	Event	10	Event calendar	7	27
Newsletter	3	Headlines	2			
Faculty	11	Faculty directory	3	Instructor	1	90
Staff	9	Staff directory	3	Committees	2	
Graduate students	4	Doctoral students	5	Phd students	4	
Students	3	Masters students	10	Undergraduate	4	
Scholarships	3	Dissertations	6	Requirement	5	
Alumni	15	Affiliate	2			
Association	2	Community	3	Groups	5	18
Organization	6	Research centers	1	Partners	1	
Policies	2	Advising	3	Administration	3	8
Conference	4	Research	9	Journals	6	80
Master's paper	2	Research projects	7	Resources	8	
Library	11	Publications	5	Reference	1	
Workshop	6	Preservation	2	Collaboration	2	
Grants	4	Awards	10	Funding	2	
Progress report	1					
Continuing education	2	Distance education	2	Distance learning	1	30
University	3	Forms	8	School administration	3	
Statement	1	Accreditation	2	Accounts	1	
Commencement	6	Info request	1			

Although this information is important and related to research, major users, such as master's and/or doctoral students, may expect more academic resources that can help their academic works, such as information about conferences and/or workshops. Even worse, similar contents are scattered throughout the entire categories although each category should be mutually exclusive. Similar contents should be grouped into one category and be located under the same category label to guide users to find information efficiently.

These problems are caused by each school's unique characteristics. In general, users are not familiar with the characteristics of each school. They keep general ways of searching procedures when navigating websites. Therefore, it might be desirable to guide users from general to specific information. To do this, the upper level categories, such as main menu and first-level categories, should use general terms and structure. The unique characteristics of each school can be embedded in second or lower level of hierarchies.

School websites categorize contents and information and provide informational structure to allow users to access those contents and information in the websites. The main menu and first-level categories are the primary access tool for users and they can identify the location of the contents by checking the category labels. However, too many terms are used as category labels to represent similar contents in the upper level categories. This might

result from each school's unique characteristics. If users do not recognize the unique characteristics of each school, they might be confused and faced with difficulties in finding information. If school websites keep reflecting their own characteristics in the upper level hierarchies and do not use commonly accepted terms as labels, the informational structure and category labels may not function well as access tools.

#### 4. Reorganization of Menu Structure and Labels

Most of school websites contains relatively similar contents (see Table 2 and 3), and the categories are also divided similarly. However, each website uses greatly different hierarchical orders in the structures and labels. In most cases, similar contents are represented by different category labels. In some cases, the same contents represented by the same category labels are placed in different hierarchical levels, and the labels do not represent their contents appropriately. Users might be confused when they try to find information through those websites if they are not familiar with the labels and hierarchical structure of the website.

Trying to solve these problems of school websites, this research reorganized the main menu and first-level categories structure based on the analysis of terms used as labels and the main menu and first-level structure. The proposed

structures reflect the expectation of the main intended user groups of school websites. In addition, this research proposes new category labels to clearly represent the contents in categories. The proposed terms used as category labels might be simple and accurate because this research concentrates only on the main menu and the first-level hierarchy.

This proposed main menu and first-level categories do not reflect each school's unique characteristics. Because the main menu and first-level categories may function as a primary access tool for users, it should be general and can cope with general users' searching procedures. The unique characteristics of each school can be embedded in lower level of hierarchy. This

approach from general to specific might be efficient when users select appropriate categories during their website navigation. The proposed informational structure and labels are shown in (Figure 1).

### 4.1 Main Menu Structure

As shown in (Table 4), the proposed main menu structure consists of 9 categories, and each category has 2-6 first-level categories. It grouped similar contents and information into each category and subcategory with mutual exclusiveness. The 9 categories are mainly based on the analysis of the (Table 2) that most of the schools provide through their websites. The terms used as category labels are based on

(Table 4) Categories in Main Menu Structure

Category Label	Description	Number of Subcategories
About School	General information related to each school	6
Academic Programs	Academic programs provided by each school	4
Admissions	Information related to admission processes	6
Career Service	Information related to career development, employment, internship, etc. Opportunities to post resume	3
Courses	Course information, including schedule, course description, and registration process	3
News and Events	News, event schedule, and newsletter	2
People	Information about faculty members, staff, current students, and alumni	4
Research	Conference information, ongoing academic projects, research grants, academic resources related to research. Information about libraries can be included.	5
Technical Supports	Information about facilities, technical services, and equipments, etc.	2

the analysis of category labels (see Table 2 and Table 3). For category labels, the most frequently used terms were selected from the current school websites, if the terms represent the categories clearly (e.g., Admissions, Courses, New and Events, People, and Research).

Some of the category labels are ambiguous to guide users. For example, users can realize that the labels, Career or Employment, may contain information related to jobs and internships. But the categories also provide information about student career development and employers. In this case, the existing category labels do not cover the entire contents in the categories. Therefore, it might be better to use broader terms as category labels to fully describe the contents and information contained, such as Career Services.

In other cases, some related information is scattered throughout the website. During the analysis, these scattered information were grouped into one category. For example, Technology, Labs, and Facilities are related with each other, because all of these categories contain information about physical facilities, equipment, or technical services. But, each information is categorized as separated category in main menu. In this case, these information can be grouped into one broad category (e.g., Technical Supports) and provides subcategories with specific contents.

The proposed categories in main menu structure are shown in (Table 4).

## 4.2 First-Level Category Structure

The proposed first-level categories consists of 35 categories under 9 main menu categories. This proposed hierarchical structure keeps Broad and shallow structure to cope with the future expansion of websites and/or allow flexibilities for each school's own preferences. The category labels in first-level categories are relatively longer than the labels for main menu, although those labels combine only two terms. This may be because the first-level categories contain more specific contents and some of the unique features of each school. To fully represent those contents, the labels use more specific terms compared to labels used in main menu (e.g., Laptop Requirements and Non Degree Programs).

The extracted contents from first-level categories can be grouped into 13 categories according to their meanings (see Table 3). Most of the categories are related to certain categories in main menu. As in the analysis of main menu structure, similar contents from first-level categories are also scattered throughout the websites. During the analysis process, the similar contents were reorganized into one group and placed under related categories in main menu as subcategories. In some cases, the contents were not appropriate to be first-level categories because they contain too specific or detailed information, although the information seems to be important and users may use it often. These information includes Community Connection, Publications, Equipment, and school-specific contents such as Continuing





⟨Figure 1⟩ Hierarchical Structure of Main Menu and First-Level Categories

Education. These categories are placed as second-level categories.

For category labels, the terms that most school websites are using were selected as category labels for proposed structure, if the terms represent the contents in categories clearly (e.g., Financial Aid, Tuition and Fees, Employment, Libraries, etc.). In addition, some category labels were created to represent the contents and information embedded in the categories clearly. In this case, the existing terms from current websites were combined (e.g., Tuition and Fees, Research Grants, etc.) or new labels were created (e.g., Current Semester and Community Connection).

This proposed structure concentrated on reflecting general searching procedures from general to specific information. Although this research proposes an informational structure to support main intended users of school websites, the structure can be expanded or contracted by the unique policies or characteristics of each school. The entire structure that this research proposes is shown in ⟨Figure 1⟩.

## 5. Conclusion

Generally, most of school websites might not meet all the expectation of the intended user groups. One of the reasons of this problem is because school websites do not sufficiently reflect users' mental model and strongly keep the schools' unique characteristics. To function well as an access tool, the main menu structure is

necessary to keep general structures that can support users to efficiently and easily find information from the websites. In addition, the terms used as category labels should be simple and clear to fully represent the contents and information embedded in each category and should be understood by the intended users.

This research proposed a new informational structure and category labels to fully support the functions of school websites as an access tool to its contents. The proposed main menu and first-level categories structure and labels may guide users to information and contents that they want. The proposed model can be divided into three main aspects.

First, main menu structure is the primary guideline to access information embedded in a website. Therefore, the categories included in the main menu structure should be comprehensive and contain the most general contents that can guide users to specific and detailed information. The proposed main menu structure consists of 9 categories that are commonly provided by 17 existing school websites. For some of the categories which are not used as main menu categories, scattered through the hierarchical levels from some existing websites, they were grouped together according to their meanings and placed in the main menu structure if they can contain general and comprehensive information and/or contents. It might be helpful to acquire accessibility and guide users from general to specific information.

Second, first-level categories consists of

total 35 categories under 9 main menu categories. Each category was placed under certain categories in main menu based on the relationships with the meaning of the upper level categories. Therefore, closely related information and contents could be grouped together and placed in different hierarchical levels according to the levels of specificity of the contents. This proposed hierarchical structure keeps Broad and shallow structure. It can also cope with the future expansion of websites and/or allow flexibilities for each school's own preferences. This proposed structure may also reflect the general searching procedures from general to specific information.

Third, the proposed model adopted general and comprehensive terms as category labels. The terms used as category labels are based on the analysis of existing category labels, and the most frequently used terms were selected from the current school websites, if the terms represent the categories clearly. In some cases, category labels were created to fully and clearly represent the contents and information embedded in the categories.

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## Appendix A : List of the Selected School (URLs)

University	School	URL
Indiana University	School of Library and Information Science	<a href="http://www.slis.indiana.edu">http://www.slis.indiana.edu</a>
University of Illinois	Graduate School of Library and Information Science	<a href="http://alexia.lis.uiuc.edu">http://alexia.lis.uiuc.edu</a>
University of Texas at Austin	School of Information	<a href="http://www.ischool.utexas.edu">http://www.ischool.utexas.edu</a>
University of Michigan at Ann Arbor	School of Information	<a href="http://www.si.umich.edu">http://www.si.umich.edu</a>
Syracuse University	School of Information Studies	<a href="http://istweb.syr.edu">http://istweb.syr.edu</a>
University of California at Berkeley	School of Information Management and Systems	<a href="http://www.sims.berkeley.edu">http://www.sims.berkeley.edu</a>
University of California at Los Angeles	Department of Information Studies	<a href="http://is.gseis.ucla.edu/">http://is.gseis.ucla.edu/</a>
University of Washington	Information School	<a href="http://www.ischool.washington.edu">http://www.ischool.washington.edu</a>
University of North Carolina at Chapel Hill	School of Information and Library Science	<a href="http://ils.unc.edu">http://ils.unc.edu</a>
University of Wisconsin	School of Library and Information Studies	<a href="http://polyglot.lss.wisc.edu/sliss">http://polyglot.lss.wisc.edu/sliss</a>
Rutgers University	School of Communication, Information and Library Studies	<a href="http://www.scils.rutgers.edu">http://www.scils.rutgers.edu</a>
University of Pittsburgh	Department of Library and Information Science	<a href="http://www.sis.pitt.edu/~dlis">http://www.sis.pitt.edu/~dlis</a>
Simmons College	Graduate School of Library and Information Science	<a href="http://www.simmons.edu/gslis">http://www.simmons.edu/gslis</a>
University of Maryland at College Park	College of Information Studies	<a href="http://www.clis.umd.edu">http://www.clis.umd.edu</a>
Florida State University	School of Information Studies	<a href="http://www.lis.fsu.edu">http://www.lis.fsu.edu</a>
Wayne State University	Library and Information Science Program	<a href="http://www.lisp.wayne.edu">http://www.lisp.wayne.edu</a>
Louisiana State University	School of Library and Information Science	<a href="http://slis.lsu.edu">http://slis.lsu.edu</a>