The Analysis of Information Architecture in Mobile Web Design

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Abstract—The development and design of mobile web should lucubrate mobile users’ psychological perception, thinking patterns, and behavior habits, etc., namely, to look at the mobile web from the users’ points of view. In order to help users to save time and energy in the mission operation and reduce their cognitive load, Information Architecture, as an important part of the mobile web design, should accord with the users’ cognitive and behavioral patterns. This thesis applies algorithms to help organize and classify information so that the web’s organization system is optimized and even more concise and effective. Besides, it puts forwards a number of principles to establish an efficient information organization structure, and proves the operability and validity of this method by means of practical examples. Finally, it outlooks the Information Architecture design and researches of mobile web in future.

Index Terms—Mobile Web; Information Architecture; Algorithm; UCD

I. INTRODUCTION

The outbreak of the information revolution brings people into the life of the Internet; the real-time exchange of information has always been an important reason that people love the Internet life. Because of which, mobile Internet has achieved a fast development in recent years and smart phones naturally become the most active network terminal. The user needs to know the ins and outs of information through this terminal, this means the user is competent to confront and control information by the user interface as information presented in various ways. The mobile terminal is prone to get trapped by some objective conditions such as operation mode, operation environment, screen size, and running speed, so it become more difficult for user to have access to information, but the fact is the capacity of each individual to receive and load information is limited, when the user overload his cognitive, the gap of content between someone truly understand and expect would become significant, that is, the user’s "cognitive load" will affect their obtain and control of information. In consider of this, it should be the primarily considerable contents of mobile Internet design and development that how to “help users obtain the demanded information fast, comfortably and conveniently”.

Information on the mobile web is usually obtained by a text or graphical elements in combination, the composition and set of the elements would influence on the user to obtain and utilize information. The father of cognitive psychology in the Neisser search paradigm proposed that: human cognitive response is a linear function relationship between the time and the number of target, too much information entry, complex and unreasonably hierarchy would delay or hinder user processing information. Anthony J. Hornof who does research at University of Oregon showed that: when user searching for the information on the display, visual hierarchy of the page impact on the user's cognitive, clear and practical level would help users understand and get access to information by providing effective navigation for them. James Kalbach said: User often prefer to browse pages quickly, ignore useless information such as advertising and select the first option to meet the current demand when using the Internet, basing on these user’s behavior habits, the designer should make the elements of interface such as navigation bar, labels, icons, colors, descriptive text more reasonable and improve identification so that the information is easy to perceive and acquire, if the designer do all this, it would assist in reducing churn and improving the user’s operational efficiency. In addition, the study also found that users would spend more time on searching in the web which is very informative and has a strong visual impact, but the error rate and the degree of satisfaction of users remain stable. Liu Jie found that the interface design with good interface color, clear information layout and other wonderful features can obviously improve the efficiency of information processing. Li Ting, Ge Liezhong et al found that the diverse arrangement of web information has a significant impact on web usability by aid of eye tracking technology. From the above research, it is not difficult to find that the classification, layout and navigation of information in Web design are the key to improve the Web availability.

According to the characteristics of mobile terminal equipment, mobile terminal sites are supposed to have simple, intuitive user interface with quick response, in order to save users’ time and energy in the task operation, which is definitely making requests on how to create an efficient and orderly method of information organization and presentation. Because of this, it is a major research topic of providing a kind of service similar to the map point in the virtual space for user. Comparing to the researches mostly concentrated on the application and technology of mobile in the past, the systematic research
on the web design and the connection between design theory and application environment are still very scarce. Fatherly, research on the detailed modeling process which used to classify and organize the mobile web information is rare.

In design level, it contributes to user-friendly interface and reduction of learning efforts if the designer made good use of a unified interaction style. At the same time, interface interaction develops with time, which means design should adapt to current need. With the coming of mobile Internet era, designer needs to set a reliable Information Architecture, in order to create reasonable organization system to meet the goal of optimizing information classification and arrangement which offers users guidance in silence.

This paper studies mobile website information classification and architecture, using theories of Information Architecture and cognitive psychology, to find methods to make mobile website highly compact and arranged according to the context of mobile device. Finally, a model is raised to demonstrate these methods which build information organization system. Detailed using in the design practice explores and testifies that, this mobile website organization system contributes to the usability of website, helps users achieve and use information fast and accurately. The detailed design methods and principles raised in this paper could provide guidance for further design in mobile website Information Architecture.

II. ELEMENTS OF INFORMATION ARCHITECTURE AND CHARACTERISTICS OF MOBILE WEB

Information Architecture, IA for short, was born from the database design field. This noun was created by R.S. Wurman, and two library scholars—Louis Rosenfeld and Peter Morville published Information Architecture for the World Wide Web in 1998, presenting the basic principles and practical applications of Information Architecture to the public. Information Architecture is an organization way of information for users to search demanded information. It’s the focus of attention for Information Architecture that how to organize and mark the information contents in order to help users acquire demanded information faster. Specifically, it is manifested in information classification and navigation, including the structure and presentation ways of parts of the pages. Information Architecture theories are used and improved in certain constraint conditions and different circumstances with the development of internet. However, the study on enhancing mobile website usability by Information Architecture theories now seems to be obvious, the theories are over abstract and summary. It lacks the executable methods that can help build Information Architecture on drawing or screen. Information Architecture design should make information properly classified and effectively structured through an interdisciplinary perspective, construct information on website specifically, sort out cyber information space, build a visual smooth channel between information and users’ recognition.

Mobile web has strong web attributes. It has much in common with desktop terminal web on the Information Architecture patterns. However, it’s more of a process to reasonably organize and optimize information, whose core is to classify the massive amounts of information within the limited sight controllable range, and put it in a convenient, rapid and reasonable navigation system after labeled, in order to make information more well organized and understood, as well as build a friendly access between the users and designers want to express. A good Information Architecture is able to effectively reduce the difficulty of the interaction between applications and users, reduce users’ cognitive load, and facilitate the acquisition, management and customization of information for them, in order to help users acquire better usage of experience.

Unlike desktop Web, the mobile Web is used on mobile phones and other portable devices, so it has a special perception and usage scenarios. If the products of desktop terminal are directly transplanted to the phones terminal, the users will get stuck in a mire of information. Due to the limitation of screen size, the mobile terminal cannot provide as much information as traditional PC do one time, so the global navigation is no longer needed, which also means the information in applications of mobile terminals must possess self-evidence. And to achieve this goal, countermeasures should be taken in the Information Architecture of mobile web to form the organization and layout patterns that are suitable for mobile terminals. For example, reduce the crossover and overlap among the contents and information hierarchy, or adopt tab-style navigation.

III. ELEMENTS OF INFORMATION ARCHITECTURE AND CHARACTERISTICS OF MOBILE WEB

According to user information search of Berry-Picking Model put up by Marcia Bates, and the Pearl-Growing Model put forward by Markey and Atherton, the user’s information acquisition mode often starts from a point and keeps deepening in the process, which needs the introduction of a multi-level information framework to guide the users. The researches of Lindgaard and other researchers show that if a user’s first impression of an application or a website is negative, even if the designer would amend in the future design, it’s not possible for them to change the existing prejudices. Just like a shopping mall, if the overall layout is messy, commodity is randomly placed, and customers are left without a good guide, they are not possible to come back even if the products are good enough. Good Information Architecture, as a bridge between the users and the program contents, helps improve the availability of Internet products and affinity of products, as well as increase user stickiness. The organization of information is the key part inside Information Architecture of a product. Generally, information organization consists of organization system and the structure, which are both affecting the navigation of websites, tag naming, searching ways and other factors. The web information organization system used in mobile phones terminal is
affect by the screen size, usage scenario and other comprehensive factors, so the web Information Architecture should focus on the concision and high-efficiency in particular.

A. Appropriate Organization System

According to the laddered model put forwards by Jesse James Garrett, Information Architecture should be situated in the structure level and framework level of this five-level model, whose function is to plan the route for users to create the programs and help them know where it comes from, how and where to go. The strategy level and scope level ahead of structure level plan the contents and items that phones websites need, which are messy and blurry initially with a less clear classification line. As picture 1 shows, \(e_1, e_2, \ldots, e_r\) represent the contents and items that Internet products contain, while \(v_1, v_2, \ldots, v_7\) represent the group. The same item could attach to different groups in many situations, such as: Information Architecture is content of interactive design, also based on computer science. Information related to it either belongs to group “computer science” or “interactive design” group.

Figure 1. A diagram of the contents and items of phones websites

The first thing need to do in Information Architecture is to organize the searched necessary information, define the characteristics all the contents and items share, and logically group and classify the existing items and contents through their known common attributes in order to form an appropriate organization system. The mobile terminal devices should let users acquire the useful information to the greatest extent through the most intuitive way. Too much groups not only occupy screen space, but also affect users’ choices. The groups should include all the contents and items in a reasonable organization system, then the question “how many groups can cover all the contents and items at least” could be solved by the character and algorithm of establishing mathematical model diagram.

As the picture 1, it is a structure, which is marked \(G = (V, E, \Psi)\), consisting of vertex set \(V = \{v_1, v_2, \ldots, v_5\}\), frontier set \(E = \{e_1, e_2, \ldots, e_r\}\) and incidence relation \(\Psi\) determined by all the peaks and sides. Among those, \(\Psi(e_1) = v_1v_2\), \(\Psi(e_2) = v_2v_3\), \(\Psi(e_3) = v_4v_5\), \(v_1, v_2\) is the endpoint of \(e_1\), and \(e_1\) is the adjacent side of \(v_1v_2\). \(\Psi\) is usually left out for convenience and marked \(G = (V, E)\), \(e_1 = v_1v_2\). Here the diagrams are not those with geometric meanings, as long as keeping \(V, E, \Psi\) the same, the position of peaks, the length and straight of the sides are all optional freely. If represent picture 1 through matrix forms, then:

Incidence Matrix, \(R = (r_{ij})_{n \times m}\) (n is number of vertex, m is number of edges), thereinto:

\[
r_{ij} = \begin{cases} 1, & \text{if } v_i \in V: e_j = v_iv_k \\ 0, & \text{else} \end{cases}
\]

only when the adjacent side \(v_i\) as vertices is \(e_j\), \(r_{ij} = 1\). Correlation matrix of Fig. 1

\[
R = \begin{bmatrix}
1 & 0 & 0 & 1 & 0 & 0 & 0 \\
1 & 0 & 1 & 0 & 0 & 1 & 0 \\
0 & 1 & 1 & 0 & 0 & 1 & 0 \\
0 & 0 & 1 & 1 & 0 & 1 & 1 \\
0 & 0 & 0 & 0 & 1 & 1 & 1 \\
\end{bmatrix}
\]

Adjacency Matrix, \(A = (a_{ij})_{n \times n}\), thereinto:

\[
a_{ij} = \begin{cases} 1, & \text{if } e_k \in E: e_k = v_iv_k \\ 0, & \text{else} \end{cases}
\]

Only when \(v_i\) connected with \(v_j\) between edge \(a_{ij} = 1\), adjacency matrix of Fig. 1

\[
A = \begin{bmatrix}
0 & 1 & 0 & 1 & 0 \\
1 & 0 & 1 & 0 & 1 \\
0 & 1 & 0 & 1 & 1 \\
1 & 0 & 1 & 0 & 1 \\
0 & 1 & 1 & 1 & 0 \\
\end{bmatrix}
\]

Due to the group needs to contain all the information entry, set a group at each vertex obviously can achieve the purpose of covering all information entry, but it is not appropriate, it will increase the cognitive load of users. Remove the \(v_4\), set a group at \(v_1, v_2, v_3, v_4\) and \(v_5\) can also achieve the same purpose; Then, remove the \(v_1\), set at \(v_2, v_3\) and \(v_4\) and \(v_5\) can still achieve; Or set at \(v_1, v_3\) and \(v_5\) or \(v_2, v_4\) and \(v_5\). However, it is inappropriate to set group if you only choose 2 vertices, because at least you need to set up three groups. In the real world, information intersection and presentation won’t be that simple as shown in figure, so it tends get unreasonable figure only by simple calculation, we need to use the algorithm to solve.

First you need to study the relationship between vertices and edges; vertices need to cover all the edge. If the each edge of figure G has at least one endpoint in a subset K of the vertex set V, K is called the G coverage. It is allowed if a figure has a lot of coverage, like \(\{v_1, v_2, v_3, v_4\}\), \(\{v_1\} and v_1 and v_3\), \(\{v_2, v_3, v_4, v_5\}\), \(\{v_1, v_3, v_5\}\), \(\{v_2, v_4, v_5\}\), they are all covered G in figure 1. Containing the minimum number of vertices coverage is called the minimum cover, the minimum cover is not sole, such as \(\{v_2, v_3, v_5\}\), \(\{v_1, v_3, v_5\}\).
The number of vertices in minimum cover is called covering number, denoted by \( \alpha \), and it is the only one. Thus, we can conclude the group settings as "strives for minimum cover of figure".

Because correlation matrix can demonstrate the relationship between the vertices and edges, so we can use correlation matrix to seek for minimum coverage. Then a subset \( K \) of vertex set \( V \) is a coverage of \( G \), based on \( G \) is the incidence matrix of \( R \), if and only if the corresponding row of each vertex of \( K \) which is belong to \( R \), the each column at least has one element which is 1. Thus, we can find out a minimum coverage, take problems as example, steps are as follows:

1. Take the line which column just have two 1 in the matrix, such as \( v_3 \), Order \( v_1 \in K \), rule out \( v_3 \) and columns \( e_2, e_3, e_6 \) of \( v_3 \) which include element 1,

\[
\begin{bmatrix}
1 & 1 & 0 & 0
\end{bmatrix}
\]

Order \( v_2 \), Rule out \( v_2 \) and columns \( e_1, e_3, e_5 \) of \( v_2 \) which include element 1,

\[
\begin{bmatrix}
1 & 0 & 1 & 0
\end{bmatrix}
\]

Order \( v_1 \), Rule out \( v_1 \) and columns \( e_3, e_4 \) of \( v_1 \) which include element 1,

\[
\begin{bmatrix}
0 & 0 & 1 & 1
\end{bmatrix}
\]

Take the line which column just have two 1 in the matrix, such as \( v_3 \). Order \( v_1 \in K \), repeat the above steps.

2. Because \( v_1 \in V_1 \), (if for all \( j, r_{ij}=1 \rightarrow r_{ij}=1 \), \( v_1 > v_2 \)), rule out lines of \( v_2 \) to set group, \( X = \{ v_1, v_3, v_5 \} \), we can obtain the minimum coverage \( K = \{ v_1, v_3, v_5 \} \).

0 ~ 1 programming solver can be used to solve the above problem, establish \( x_i \) takes only 0, 1 two values, \( x_i = 1 \) to set group, \( x_i = 0 \) not to set group, and require \( S = x_1 \cdot x_2 \cdot x_3 \cdot x_4 \cdot x_5 \) to get minimum, each edge \( e_i \) must be covered, namely: \( x_1 \cdot x_2 \geq 1 \); \( x_1 \cdot x_3 \geq 1 \); \( x_1 \cdot x_5 \geq 1 \); \( x_2 \cdot x_3 \geq 1 \); \( x_2 \cdot x_4 \geq 1 \); \( x_2 \cdot x_5 \geq 1 \); \( x_3 \cdot x_4 \geq 1 \); \( x_3 \cdot x_5 \geq 1 \); \( x_4 \cdot x_5 \geq 1 \); thus problem equals to a programming problem as follows:

\[
\begin{align*}
\text{Min } S & = x_1 \cdot x_2 \cdot x_3 \cdot x_4 \cdot x_5 \\
\text{S.t. } & x_1 \cdot x_2 \geq 1 \\
& x_1 \cdot x_3 \geq 1 \\
& x_1 \cdot x_5 \geq 1 \\
& x_2 \cdot x_3 \geq 1 \\
& x_2 \cdot x_4 \geq 1 \\
& x_2 \cdot x_5 \geq 1 \\
& x_3 \cdot x_4 \geq 1 \\
& x_3 \cdot x_5 \geq 1 \\
& x_4 \cdot x_5 \geq 1 \\
& x_i=0, \text{ } i=1,2,3,4,5.
\end{align*}
\]

Above all, the concepts and algorithms of minimum cover completely solved the problem of the minimum group. When information organized on the mobile web, we need to set group as little as possible, but doesn't mean have to set a minimum group. Affected by the content of information entry, we can increase the number of groups where it is necessary, at the same time, we also can place an information entry in a number of groups, we can put information more than one location where expect to be seen, and allow group category boundaries overlap, which solve the chaos category in the reality well.

**B. Efficient Organizational Structure**

The organizational structure task is to build up the hierarchy. In the concept of hierarchy, the relationship between the content items is like the relationship between broad and narrow sense, namely extracted as more general group or disintegrated into more specific groups. Website hierarchy can be divided into flat type and cone type, the characteristics of the flat type is that the top-level category is more, but the number of levels is less, cone type structure has less the top-level category, but more levels. Cooper et al. research has shown that with the increasing of the jump pages, users expect level will gradually reduce. The use environment of mobile terminal equipment is complex, users are very concerned about page jump time and flow cost, at the same time, because the mobile terminal such as mobile phone can't use breadcrumb navigation, returning has to through layers and layers, page jumping is more complex than desktop web pages, each page jumping may cause damage to user experience. According to Apple's iOS Human - Interface Guidelines, when making the design of the organizational structure it has to balance its breadth and depth, combined with the characteristics of the mobile terminal equipment, considering the real situation of the users, such as those deep architecture design difficult to operate and not easy for users to understand is not suitable for mobile web pages.

In order to make web interface be accepted by users, reduce users' browsing and operating burden, we must accomplish: (1) try to use simple and narrow, or simple and broad organizational structure, and reduce the cross jumping as far as possible; (2) build fast passage for operation process, distinguish primary and secondary to reduce levels; (3) content is better than navigation, directly show users what they need at the top of the page; (4) provide users with good navigation, clear orientation perception, place navigation menu and search bar at the right place so that users can quickly complete task operation, such as top navigation on Facebook, hidden full-screen navigation menu on ESPN mobile web, allow the user to consider where to go next, stay on the current page and don't need to load a new page.

**IV. EMPIRICAL RESEARCH**

Web portal is a broad class of web pages used on the mobile terminal equipment, this kind of website information system has characteristics like more information categories, fine information granularity, and more levels, which lead to mobile web organization system needs a lot of classification standards, thus increasing the difficulty of website Information Architecture. Combined with characteristics of such websites users on the mobile terminal equipment, specific to a particular school website, carry on the optimization of Information Architecture, then conduct the user test, and evaluate test results.

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TABLE I. MOBILE WEB USERS INFORMATION DEMAND POINT

<table>
<thead>
<tr>
<th>Mobile web users</th>
<th>Information demand point</th>
</tr>
</thead>
<tbody>
<tr>
<td>school students</td>
<td>Academic research and teaching information, laboratory usage, recruitment of employment</td>
</tr>
<tr>
<td>GIC Vocational education students</td>
<td>All kinds of certificate class open time, content, fees, registration method</td>
</tr>
<tr>
<td>college entrance examination and graduate school exam student</td>
<td>College and major information, self-study examination recruitment information and consultation, graduate school exam information and consultation</td>
</tr>
<tr>
<td>outside personnel who want to know GIC</td>
<td>College and major information, jewelry quality testing, jewelry and design work</td>
</tr>
<tr>
<td>enterprise</td>
<td>College and major information, university-enterprise cooperation project communication, students capacity and proficiency level</td>
</tr>
</tbody>
</table>

TABLE II. INFORMATION ARCHITECTURE LEVEL OF A SCHOOL

<table>
<thead>
<tr>
<th>First layer</th>
<th>Second layer</th>
<th>Third layer</th>
<th>Fourth layer</th>
<th>Function description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gem faculty introduction</td>
<td>Gem faculty brief introduction</td>
<td>Brief introduction</td>
<td>Historical development</td>
<td>Gem faculty brief introduction could link some websites like GIA</td>
</tr>
<tr>
<td>faculty</td>
<td>Teaching staff</td>
<td>Professors and associate professors</td>
<td>Detailed introduction on each teacher</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other staffs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education and teaching</td>
<td>Undergraduate teaching</td>
<td>Training program</td>
<td>Excellent course</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Practice base</td>
<td>Teaching information</td>
<td></td>
</tr>
<tr>
<td>Gem faculty</td>
<td>Postgraduate teaching</td>
<td>Student worker information</td>
<td>Teaching information</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research trends</td>
<td>Excellent course</td>
<td></td>
</tr>
<tr>
<td>Experiment center</td>
<td>Laboratory brief introduction</td>
<td>Laboratory management regulations</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Open laboratory</td>
<td></td>
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<tr>
<td></td>
<td>Teaching laboratory</td>
<td></td>
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<tr>
<td></td>
<td>Laboratory regulations</td>
<td></td>
<td></td>
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<tr>
<td>Research and information announcement</td>
<td>Research Information</td>
<td>Seminar Information</td>
<td>Publication Information</td>
<td></td>
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<tr>
<td>Students Zone</td>
<td></td>
<td>Academic salons, students recreational and sports activities</td>
<td></td>
<td></td>
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<tr>
<td>Admissions information</td>
<td>Undergraduate admissions</td>
<td></td>
<td>Over years published scores</td>
<td></td>
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<tr>
<td>Graduate Admissions</td>
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<tr>
<td>Recruitment information</td>
<td></td>
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</tr>
<tr>
<td>Vocational education</td>
<td></td>
<td>Link Home page to the network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jewelry faculty</td>
<td>Home page</td>
<td>News</td>
<td>Jewelry faculty and the latest development of the industry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Education</td>
<td>Feature major</td>
<td>Introduce jewelry faculty feature courses and diversity of education mode. Excellent courses video can be listened online.</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Excellent courses Video</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exhibition</td>
<td>Teaching outcome exhibition</td>
<td>Show excellent student course work, collection work of jewel house</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teachers</td>
<td>Professional teachers</td>
<td>Introduce in-service teachers and part-time teachers, jewelry faculty hardware facilities and experimental teaching environment.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Professional studio</td>
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<td>Student work</td>
<td>Notice and Announcement</td>
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<tr>
<td>Employment information</td>
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</tbody>
</table>
### A. Information Architecture Design of One School's Official Mobile Webpage

For mobile web users, they are more concerned with information and tasks they want to quickly deal with. The users of school mobile web pages are mainly school students, GIC vocational education students, the college entrance examination and graduate school exam students, outside personnel and enterprise want to know GIC, from the TABLE I, we can find their information need points are not identical.

**TABLE II** is the main contents of Information Architecture hierarchy in Jewelry College of this university. Through the usage of this website in mobile browser, the Information Architecture can be found with following characteristics: 1) Navigation group categories at the top of home page are far too many, which leads to few display contents of home page displayed, and then users cannot obtain information directly; 2) The number of layers is too many and unbalanced, and users usually only can find the contents they need after multiple page transfers; 3) Necessary easy accesses are lacking, which makes those frequently-used information by students and teachers difficult to be gained directly; 4) Retrieval system is lacking, which cannot help users to finish their tasks directly and quickly.

### B. Usability Test of One School's Official Mobile Webpage

This test adopt questionnaire method, object respondent consists of local students, vocational high school students, high school students, college students, society people and business customers, spreading ways are Internet and hand-giving. Results 147 questionnaires were and 140 effective recalled, including 126 available questionnaires, so the recovery rate was 95.2% and the valid rate was 85.7%.

1. **Sample Survey**
   Sample survey contains Stratified sampling and Random sampling. Sample is split into five groups: Local Students; vocational high school students; high school students; society people; business customers. The questionnaires were randomly spread to target groups in certain rate.

2. **People Feature Statistics**
   126 valid questionnaires(62 for male, rate:49.2%, 64 for female, rate:50.8%). Both sexualities have a approximate rate which could reduce the deviation.

   - Target group ages: 5 people under 19; 45 people of aged between 19 and 21; 48 people of aged between 22 and 23; 21 people of aged between 24 and 26; 7 people over 26. The rate of each ages fit the normal distribution.

3. **The time distribution**
   The time distribution of target groups to use internet is as follows: 3 people Less than 1 year; 2~3 years: 21; 3~5 years: 27; Over 5 years: 75. It is quite distinct that most users have rich experiences surfing the Internet.
unsatisfied with the two lowest attitude exponents of this webpage, which need to be improved and optimized later.

4. Analysis Methods

The analysis tool used for questionnaires is SPSS17.0, analysis methods includes: Statistic Analysis, Multiple Response Analysis, and Correlation Analysis.

C. Usability Analysis of Mobile Websites Based on Information Architecture

1. Analysis of user group’s evaluation on this mobile website’s information organization

From Figure 2, the top three attitude exponents of User groups for usability evaluation of the current mobile Website’s information organization system are information format diversity, information readability and information timeliness, and the corresponding indexes are 3.8571, 3.8571 and 3.7143. While the two lowest attitude exponents are rationality of related information and speed of information loading, the corresponding indexes are 2.8571, 2.9444 and 2.6429. It could be inferred that user groups feel unsatisfied with the two lowest attitude exponents of this mobile webpage, which need to be improved and optimized later.

From TABLE III, it is inferred that male and female get the approximate attitude exponents of satisfaction to this webpage’s information organization system. They are both not satisfied with simplicity of information and rationality of related information. To simplicity of information, users deem that content information contains lots of unrelated information which impacts the efficiency and validity of true information. To rationality of related information, incorrect arrangement of information causes its low mark. Moreover, male scores the lower mark than female on the two attitude exponents; it indicates that male prefers concision than female to some extent.

2. Analysis of user group’s evaluation on this mobile website’s navigation system

From TABLE IV, the top three attitude exponents of user groups for usability of the current mobile Website’s navigation system are clarity, integrity and rationality of global navigation, and the corresponding indexes are 3.8810, 3.8095 and 3.6429. While the three lowest attitude exponents are the rationality of assistant navigation, the correlation of contextual navigation content and the visual hierarchy of local navigation, and the corresponding indexes are 2.7937, 2.8571 and 2.9444.

From Figure 3, the different Internet experience time has a bidirectional influence on the users’ attitude exponents to the mobile website navigation system.
Firstly, all user groups have little satisfaction with the correlation of contextual navigation and rationality of assistant navigation. They deem that there are so much irrelevant information exist that the contextual navigation gets a weak link; furthermore, the position of assistant navigation is obscure, and the information is irrational lead to poor application. Secondly, different ages give different evaluations on the other five usability exponents. Especially, the users only have one year experience on internet are distinguished from the other three groups, because they haven’t gotten enough knowledge to the availability of navigation system owing to their less Internet experience.

Through the appraisement and analysis of existing website, it can be known that coarsening information granularity is necessary while Information Architecture of its mobile websites, to reduce the quantity of category groups, reduce layers, provide favorable navigation and search and so on. Therefore, Information Architecture of website mobile terminal needs to be adjusted with the steps as below (as shown in TABLE V and TABLE VI):

Through user test, several following improvements of mobile webpage of Jewelry College can be found: 1. The top navigation gets clearer and items get less, and the space for specific webpage contents on screen home page has been increased. The improvement transfers the emphases to contents and information, rather than navigation, which help users obtain information or dispose tasks directly; 2. Through setting quick navigation and optimizing various levels of information, it is more convenient for users to operate and help to reduce page transfers for obtaining information; 3. Animation will get time extension of waiting for users, and reduce the kindness of website, while after eliminating, the loading rate of webpage gets faster, and data traffic that webpage loading needs gets less; 4. Relevant navigation appears in appropriate locations, which can get users lost and perform deeper visit; 5. The quick access to those frequently-used demand points can help to reduce selectivity of finishing key tasks for users, and offer helps to those users in exigency and non-ideal condition. These improvements conform to users’ demands of behavior pattern of mobile life, and can improve the user experience.

The webpage facing mobile end equipment should cooperate with usage mode of equipment, correspond to mental model of users, keep page distinct and concentrated and optimize information structure, to provide user interface with easy intelligibility and operation to users. The page should concentrate on the
design idea centering on users, and keeping improving user interface is the pursuing for every design research personnel. There will still exist in aspects that can be penetrated in our future design research and practice.

(1) Any design should coordinate with the service environment of mobile network, and naturally also need to adapt the needs of website’s real world. As mobile experience may be used in any sites and scenes, we need to consider how to get people feel it is user-friendly anywhere. Different categories of webpage have various functions, which means that we should figure out what is the true purpose provided for users for our website, and we need to finish Information Architecture of webpage through analyzing the process of finishing certain task for users.

(2) Center on users, let users customize page table from their own demands, keep continuous changes with the feedback of user behavior, try to reduce the restraints to users and give them those information they really want. Through catching the behavioral pattern and custom of users, make an analysis of them, and speculate the tasks users will finish next or the page transfers they want. Display them in existing pages, to provide quick accesses to users and reduce their operation complexity and thought load, think more for users, set up a favorable interaction feedback mechanism and design out humanized and customizable Information Architecture.

(3) We should design webs from users’ age, because different age groups of users may have different cognition habits. It is necessary to design webs from the age group of users. Research shows that, different with the youth, those older adults tent to plenty of words in webpage. Especially before clicking “next step”, they often will finish reading all words. These researches show that there exist in differences in various times of groups, and those future researches should pay more attention to this problem.

V. CONCLUSION

For the information interaction problem of website Information Architecture, Elaine G. Toms proposes that user experience includes system and aesthetics, these two methods, which generates expression form to support their tasks. As a part of information system, Information Architecture’s effects on user experience of mobile websites are incontrovertible. Therefore, we need to lucubrate the methods of Information Architecture, reasonably use arithmetic and other tools, and structure information system of explicit functions, concentrating on contents, being liable to perceive and high efficient service, to improve availability of website, help users find and use those information they need fast and efficiently and obtain favorable user experience.

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