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User Profiling for Search Engines' Help Systems

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87F. User Profiling for Search Engines' Help Systems

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Abstract

The Help Systems information provided by search engines can facilitate or hinder its user's information seeking process. This paper reports a study in how users would like to see search engines' Help Systems to be organized and presented. Six aspects of Help Systems, including navigation, design elements, technical help, conceptual help, terminological, and strategic aspects, were used as the framework to develop questionnaire for further study in stereotyping search engine users. Overall users do not expect animations, videos and speech as part of a search engine's Help System, technical help is desirable, and the navigation to find Help page and relevant content is important.

Key Words

Help Systems, Human Computer Interaction, Search Engine, Online Help, User Study, Taxonomy.

1. Introduction

Increasingly, Information Retrieval systems provide users with intelligent interfaces that represent some of the knowledge and functions of a human intermediary to help interactive information search formulation and refinement (Belkin & Marchetti, 1990). This aims to make IR process easier and more convenient for the end user. Oftentimes the Help Systems may be the only resource that users can consult when they face problems during searching process.

Every user of web search engines may need help at one time or another, whether to find directions when they're lost or to learn about how a particular search feature works. For a web search engine to be considered successful, the Help Systems must serve users' needs in an effective and efficient manner. Therefore, the design of its content, layout, and navigation scheme should be taken into serious consideration.

In computer-based environments, help seeking is an essential, important and complex part in terms of self-regulated learning (Grayling, 1998). To be able to retain their web traffic and popularity, most search engines improve their search performance by

providing assistance features such as clustering, to find relevant information, advanced search pages, search by language, search within, etc. However, non-expert users usually use limited simple search assistance features, which indicate their lack of knowledge of those advanced assistance features and how to use those (Dillon & Gabbard, 1998).

Since Help Systems become a standard feature of almost all IR systems, the effective use of these tools has been subject to extensive debate where recent research shows an inefficient use, complexity (Greifeneder, 2008) or even ignorance of Help Systems (Dworman & Rosenbaum, 2004). While many studies have been done with general IR systems, there has not been a comprehensive investigation in the search engines' Help System in spite of its importance.

The focus of the paper is scoped around the analysis of Help functionality in terms of how users preferences for the organization of the features and content of Help Systems. The result of this research should benefit both search engine users and developers by shedding some light on current search engines' help mechanisms from users' prospective.

2. Related Study

Today's web search engines provide various features to assist users looking for relevant information. Studies have reported that most users usually do not use special search features, in which more criteria can be specified to narrow down search results such a the desired currency of web pages, specific domain, or the file format for image retrieval (Spink & Jansen, 2004). People look for images may not click on 'Image' search; instead, they type the text 'image' into the query box. While search engines may have different algorithms to effectively retrieve text, images, videos, or audios, and often open up different query windows for different media type, users often utilize the main search pages only (Grayling, 1998).

Few studies have been done related to help functions of search engines. Spink and Jason found that users sought more systems assistance when looking for images and videos (Spink & Jansen, 2006). Similar to other types of help mechanism,, the design of search engines' help mechanism should promote its assistance as a process of the "self-regulated learning" (Aleven, 2006). Therefore, in our study, ease of navigation, available content of information and interface design are considered important factors affecting whether users can find information or they are willing to use the help system at all.

Our study focuses on the instructions and explanations of search engines' Help Systems. It is easy to see that instruction should be given before a search process is initiated. Explanations should be included in the search results so that users have an opportunity to refine their query, search strategies if the result is not satisfactory.

3. Methodology

Questionnaire was used to solicit information about users and their perceptions of Help Systems in six aspects, including navigation, design elements, technical help, conceptual help, terminological, and strategic aspects (Brajnik, Mizzaro, and Tasso, 1996). There were four types of different dimensions in our study which are grouped according to the users' explicit characteristics and previous usability knowledge of computer and search engines. The following diagram (Figure 1) described the user models/stereotypes of four dimensions which were grouped depending on the users' education and professional status, users' computer skills and experience with search engines

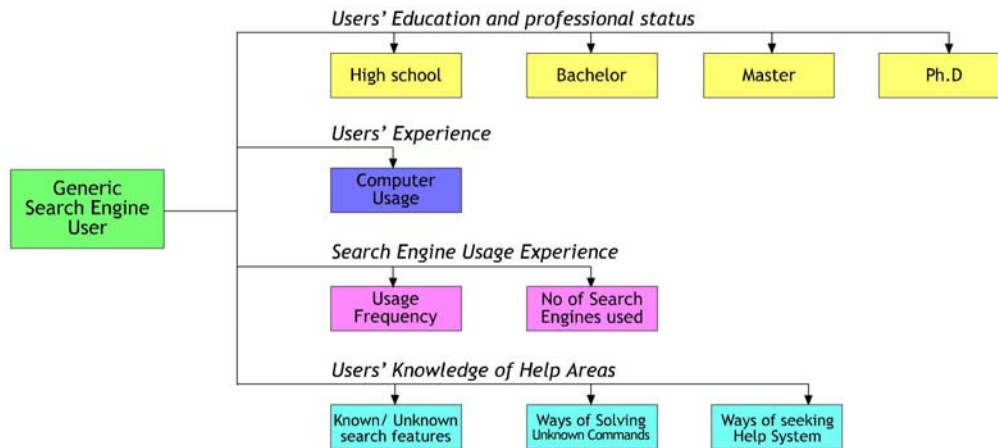
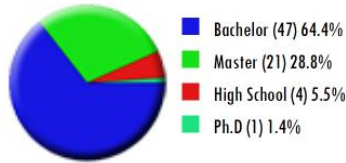


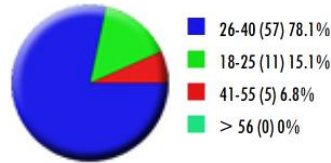
Figure 1. User Stereotype of IR Help Systems

BACKGROUND INFORMATION

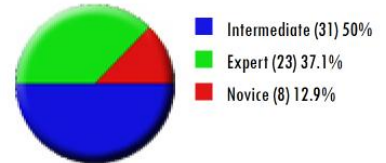
1) What is the highest level of education you have completed?



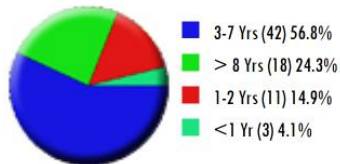
2) Which age group do you belong to?



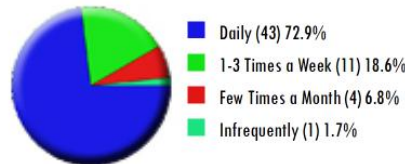
3) How would you describe your skills in using computers in general?



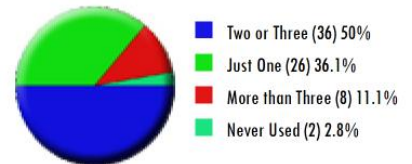
4) Years of experience with search engines?



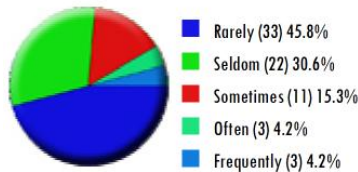
5) Frequency of search engines usage.



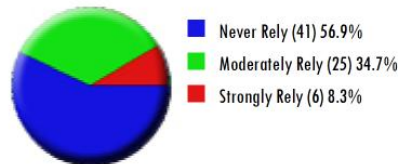
6) How many different search engines do you use on a regular basis?



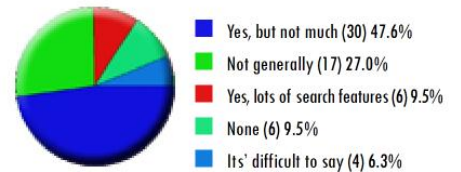
7) How often you use HELP systems when using a search engine?



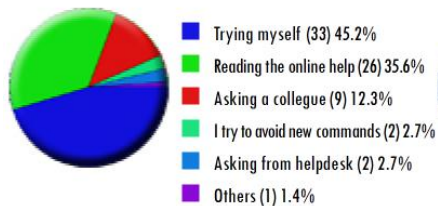
8) How much do you rely on HELP systems in search engines as a way of finding information? .



9) Do you have a feeling that there are features offered by search engines that you don't know how to use?



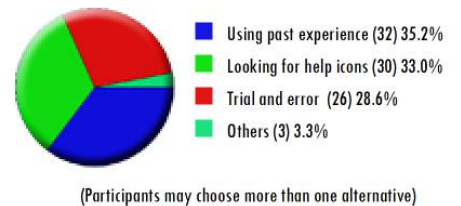
10) Which of the following is your FIRST choice when learning to use a command you haven't known before?



11) How do you normally seek for help when you encounter problems while using search engines?



12) How did you learn about HELP systems on a particular search engine?



13) If you have never used HELP systems in search engines, what are your reasons for not using it?

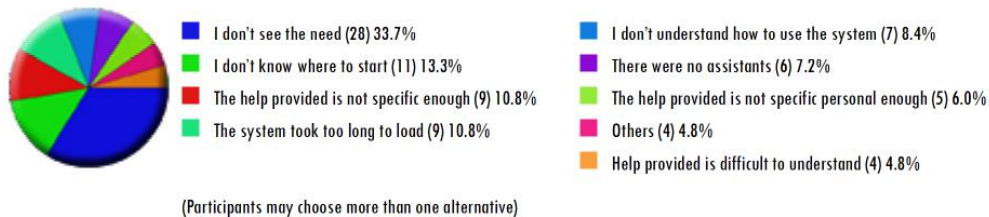


Figure 2. Distribution of participants' education levels, search engine usage, and help seeking behavior.

Seventy two participants responded to a survey: 64.4% of the participants' have completed their bachelor degrees, 28.8% finished master program, 5.5% finished high school, and one (1.4%) has finished Ph.D student. The majority of the participants are aged from 26-40 (78.1%). Classification on the participants' experience by means of computer usage, half of the participants (50%), considered themselves as intermediates, while the rest of (37.1%) are considered as experts and the rest (12.9%) are regarded novices. Other data about users is shown in Figure 2.

4. Results

4.1 Users' Perception on Today's Search Engines' Help Systems

Users' perceptions of current search engines are described in a chart to get a clear understanding of the surveys' results. Due to the limited space, detailed results can be seen in Figure 3.

4.2 Users' Expectation on Search Engines' Help Systems

The survey results show that there are many requirements that the users' expect from the current search engines' Help Systems. (See Figure 4)

The participants mostly chose Technical support (41.0%) as they want to see in the Help Systems' content and they preferred Search Tips (44.0%) as their most preferred help feature. Surprisingly they do not want demonstration and it is the least preferred feature. Most of the participants would like to get help with concise instructions (24.7%), they also want to have automatic program that try to reach them in case of assistance (54.9%) and interactive dialogues as a part of the search engines' Help Systems (49.3%).

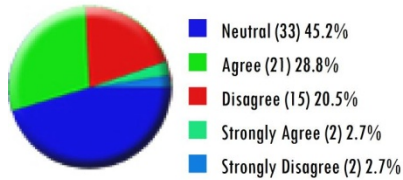
There are some majority choices in no longer need situations in accordance with incorporating animations as part of search engines' Help Systems (53.2%), videos (60.5%), and speech as part of search engines' Help Systems (50.7%). Most of the participants are willing to have more graphics in the Help Systems (46.5%) and describing new information about new features automatically presented for the first time use (63.4%).

Moreover, the majority of users would like to have the Help Systems identified within a search page as a picture image (59.7%) and they want Help Systems to be found at the top right hand side of the page (81.7%). By the time the users using search engines' Help Systems, most of the users (48.1%) prefer to use only a mouse as a medium well as most of the participants want brushing and linking (44.8%) as the visualization technique.

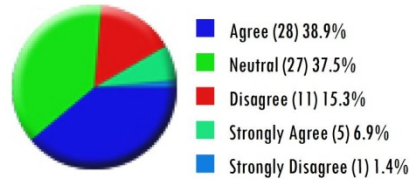
There are some participants' expectations over how they would like to see the assistant when the search engines offer automatically. Most of them expect to see pop-up window styles, icon descriptions but there are some second runners that do not want auto assistant at all. Most of the users would like to see 3 lines as maximum of instruction texts that they normally want to read from the screen.

PERCEPTION ON TODAY'S SEARCH ENGINES' HELP SYSTEMS

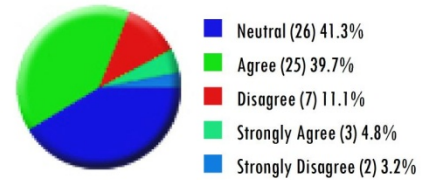
1) Help icons can easily be found on most today web search engines.



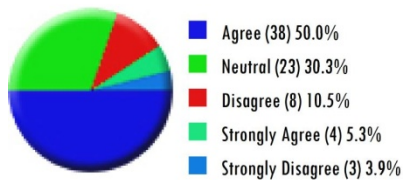
2) Most search engines provide assistance on the screen after your receive search results.



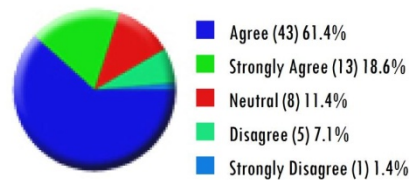
3) Information is organized in a logical manner in most search engines' HELP systems.



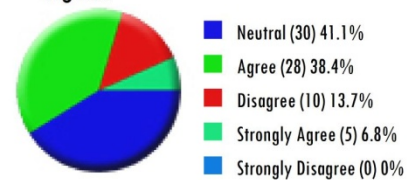
4) The layouts of most search engines' HELP systems are easy to use.



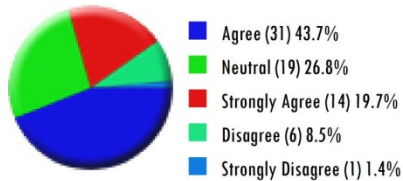
5) The inclusion of graphics, such as screen shots, is beneficial to the understanding of the text.



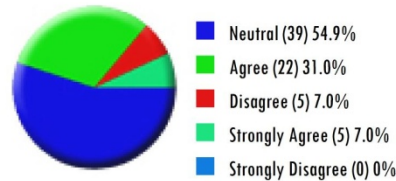
6) It is easy to navigate the HELP systems to find the right information in most today's search engines.



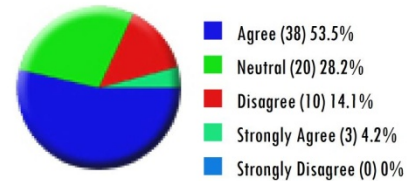
7) Most people do NOT utilize all the commands/controls available in current HELP systems in today's search engines.



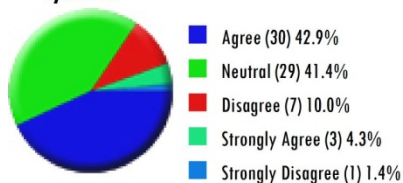
8) There are few technical jargons in the instructions of today's search engines' HELP systems.



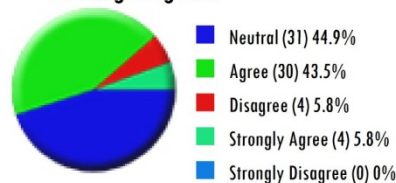
9) It is easy to understand instructions provided by today's search engines' HELP systems.



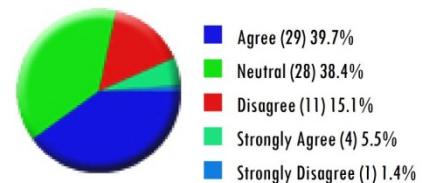
10) Important tips related to search functions are placed in the obvious place in HELP systems.



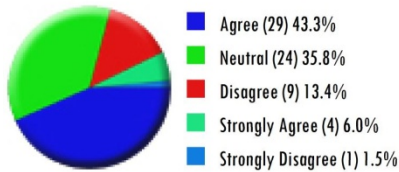
11) Existing navigational structures of search engines' HELP systems is easy to follow without getting lost.



12) The contents in search engines' HELP systems are printer friendly.



13) Online Help index is available for searching the desired keywords in most current search engines HELP systems.

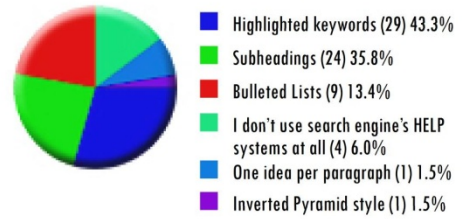


(Participants chose more than one alternative)

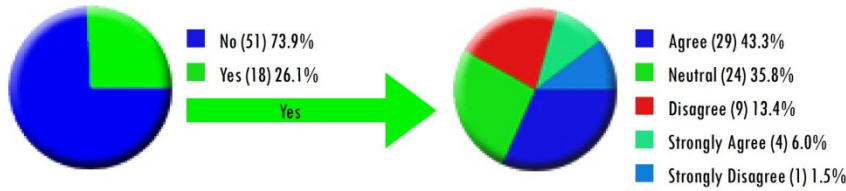
14) How do you feel about the speed of loading HELP systems pages in general?



16) Which of the following current HELP facilities in search engines enable you to scan through the contents in HELP systems easily?



15) Do you ever view search engines' HELP systems using different kinds of browsers? If Yes, the structure and arrangement of the HELP systems still remain in alignment despite viewing those HELP systems with different browsers. (Platform/ browser independent)



(Participants chose more than one alternative)

17) Please rate the following aspects of HELP systems on a scale of 1 to 5. (1=POOR, 5=EXCELLENT)



Page Layout



Readability



Graphic



Ease of Use



Ease of Navigation



Information Flow



Level of Details



Technical Content Accuracy



Clarity of Instructions

Figure 3. Users' perception of today's search engines' Help Systems

USER EXPECTATION ON SEARCH ENGINES' HELP SYSTEMS

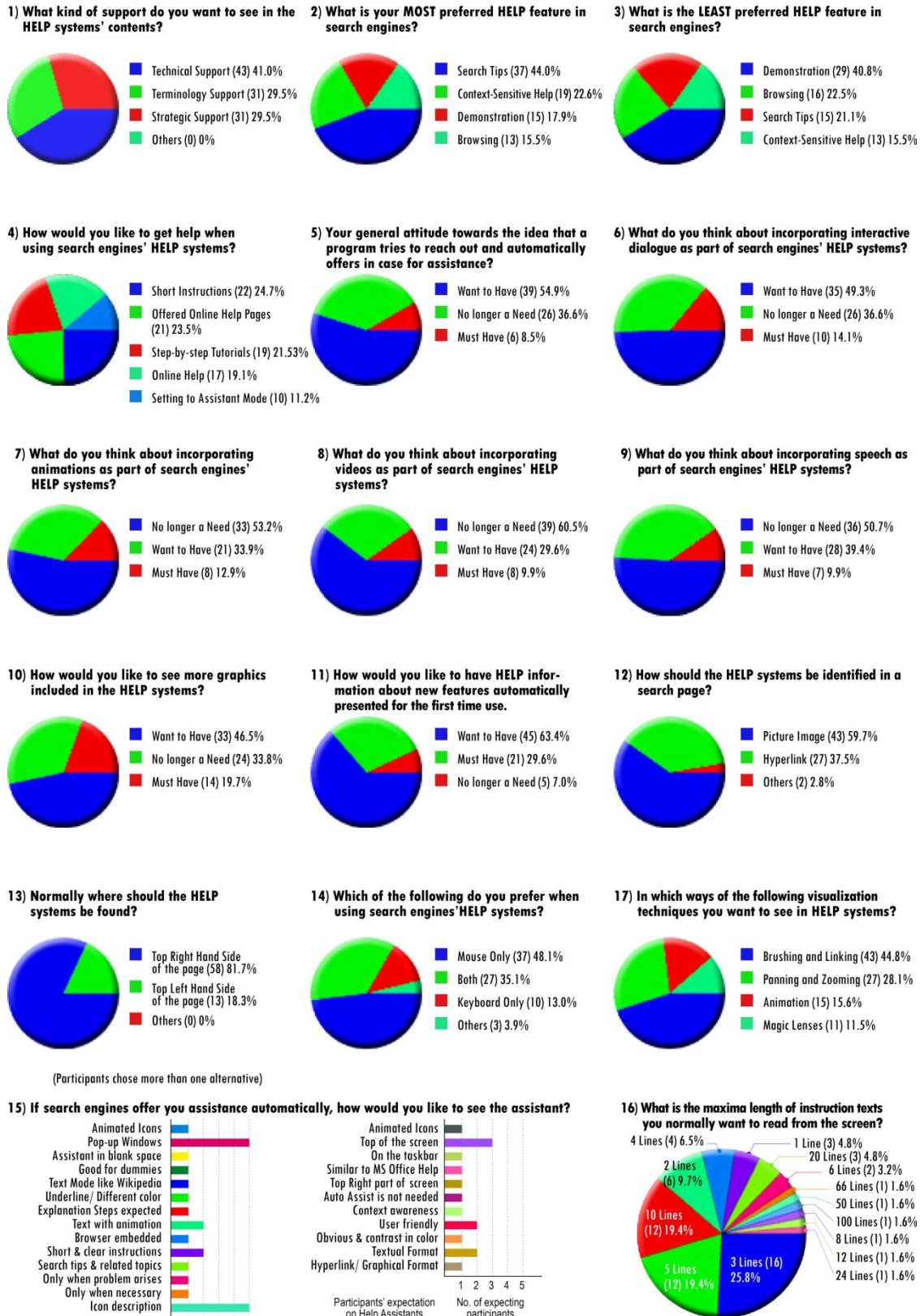


Figure 4. Users' expectation of search engines' help systems

5. User Models

A close study has been made in each type of user and their behaviors. Users' behaviors are outlined from the collected survey data by using the four dimensions: the users' education and professional status, users' computer experience and search engine knowledge, users' search engine usage experience and users' knowledge on the help areas.

5.1 Users' Education and Professional Status

High School. High Schoolers (50%) describe themselves as intermediate computer skilled users that use search engines daily. Half of them never rely on Help Systems due to the lack of need. They think that there are functions in search engines that they don't know the number of these functions is limited. They usually try themselves to learn commands of the Help Systems. They use their previous experience and also look for a help icon to learn about particular search engines. Technical support is the feature they want to see in the Help Systems' contents. They preferred search tips and don't care about demonstration features. They like to be assisted by online help. They believe a picture image and hyperlinks are the ways to identify Help Systems. Most of them want to see help in top left hand of the page and to use a mouse only when using help tools. They also prefer brushing and linking as the visualization technique.

Bachelor Degree. Nearly half of bachelor degree holders indicate themselves as intermediate computer skilled who use search engines daily. Similar to high schoolers, fifty percent of this user category never relies on Help Systems. They think they don't know some features offered by search engines, but these are not too many. Nearly half of them ask colleagues for a help of they have problems while the other half uses online assistance. These participants look for help icons, and they do not know where to start and they think help provided is not personal enough. More than two thirds of bachelor participants think highlighted keywords made them easy to scan through the contents. These participants want Technical help as a support and the majority of them prefer search tips followed by Context sensitive help. Most of the bachelor participants mention demonstrations as the least preferred help feature. Most of them prefer to get concise instructions, while some prefer step by step tutorials. Most of them like to see a picture image as an identifier to Help Systems. Almost all of the bachelor participants agree that Help Systems should be on top right hand side of the screen and their mouse and keyboard preferences are equally divided. Most of them prefer brushing and linking as a visualization technique.

Master Degree. More than half of them describe themselves as intermediate skilled computer users. They use Help System 1-3 times a week and nearly half of them use search engines daily. They never or moderately rely on Help Systems. Most of them agree that there are some help features that they don't know about, but they are limited. Most of them try by themselves to learn about a new command. They normally use online help in case of problems. Most of them use past experience to learn about Help Systems while some of them never use it due to difficulty of understanding how to use the system and the Help Systems take time to load. They choose subheadings as a facility that enables them to scan easily through the contents. They want Terminological support.

They choose search tips as the most preferred help features and demonstration as the least preferred. They want to see help in top left or top right hand corner of the page. Most of them prefer to use only mouse where as some prefer to use keyboard. Most of them prefer panning and zooming as visualization technique.

PhD. This user specified himself as a novice in using computer who uses search engines daily and moderately relies on Help Systems. This person mentioned that there are no features offered by search engines and doesn't know how to use. This user tried by himself to learn commands that never used before. Online help is the place where he seeks for help when problems are encountered. To learn about Help Systems, this user tried to search for help icon believing that there is no useful information in Help Systems. It seems this user doesn't use some of the search engines. The option called bulleted lists is the first choice which seems to help that user to scan through help pages easily. Strategic help seems to be the most supportive help to be included in the Help Systems for that particular type of user. The most preferred help feature is demonstration and the least preferred Help Systems are search tips. This user thinks hyperlinks should be identified in Help Systems , should be located on top right hand corner of the page. Using mouse is the most preferred way for that user while using the Help System. Panning and zooming is the preferred visualization technique.

5.2 Users' Experience

Novice. Some novice users use search engines daily and some use 1-3 times a week. Most of them never rely on Help Systems. Some think there are some features that they don't know but not many, and some think there are no features that they don't know in Help Systems. Some try themselves to know about a command in search that they never use before. Equal amount of people ask their colleague to learn about the commands. They normally use online help to seek for help when they encounter problems. Half of the novice users depend on past experience to learn about help mechanism in a particular search engine. Some didn't use help mechanism because they think it is not useful. They think bulleted lists are a feature in search engine enables them to scan through the contents in search engine. They want to see other kind of support rather than Strategic, Terminological and Technical support. Some prefer search tips as a help feature as well as some mentioned browsing as the preferred help. Some also mentioned that demonstration as the least preferred help. They would like to get help by using online help when using a search engine. They prefer a hyperlink as an identifier to a search engine. They wants help icon on top right hand and left hand side of the page. Most of them want to use mouse only when using help mechanisms. Panning and zooming is the visualization techniques they want to see in future help.

Intermediate. Thirteen out of twenty three users reply that they use search engines daily. Another nine users responded that they use search engines 1-3 times a week. Most of them said they never or moderately rely on Help Systems. Majority of users agree that there are some help functions that they don't know but these kinds of help functions are limited. They try themselves and use online help as their first choices when learning about a command that they never used before.

They use trial and error methods and past experience to learn help features. Some never use Help Systems because they think they are useless. They mention that subheadings and search tips are the features that enable them to scan through the contents in Help Systems. Most of them prefer Terminological help followed by Strategic help. Some also like Context sensitive help. Demonstration and browsing are the least preferred help for this type of users. They choose a picture image as an identifier for Help Systems. Top right hand side is their most preferred place to see a help icon, some also want to see on top left hand side. More than 50% of this user model prefers to use mouse and brushing and linking are preferred visualization techniques.

Expert. Expert users use a search engine daily and don't rely on help mechanisms. They feel that there are some features they don't know but they are limited. They prefer trail and error methods and online when problems are encountered. Relying on their past experience, they look for a help icon to learn about Help Systems on a particular search engine. Some of them never use help because they do not know where to start and they also feel that Help Systems are too slow to load. The most preferred feature to enable them in scanning through the contents of the search is choosing highlighted keywords. They prefer technical support as Help Systems content while context sensitive help is the most preferred help feature followed by search tips and demonstrations as their least preferred help. Searching online help and concise instructions are preferred features. They refer an image as a way to identify the Help Systems that is located at the top left hand corner. Using a mouse only and brushing and linking as the visualizing technique are their preferences.

5.3. Search Engine Usage Experience

The users who sometimes use search engines. Among this user type, most of them moderately rely on Help Systems and some never rely on Help Systems. It seems like this type of users believes that some features that they do not know are not important to them. Most of them try themselves to learn a command in Help Systems that they never know before. Among these users, online help is also used to solve problems during using search engine. They use past experience to learn help mechanisms for particular Help Systems. Some of them never use Help Systems because they don't know where to start. Subheadings help them in scanning through the contents in Help Systems. Strategic help and Terminology help are preferred support for Help Systems.

Search tips seems to be the most preferred help features in a search system while demonstration is the least preferred help feature for them. Using online help and offering online help pages related to user's current task are preferred ways of obtaining help from Help Systems. Hyperlinks are the most demanded elements that wanted to be seen as identifiers for Help Systems. Some also preferred an image as an identifier. Most of them preferred to see a help icon on top right hand corner, furthermore, the use of mouse is the most wanted medium in using Help Systems. Panning and zooming is their preferred visualization technique followed by brushing and linking.

The users who seldom use search engines. According to the study, the users who use the search engines very seldom do not seem to rely on Help Systems. They think there

are some features they don't know in search engines but not many of them. They want to try themselves as their priority option when learning about a command they never used before. The use of the online help or asking colleagues is their preferences. Learning Help facilities on Help Systems by using their past experience and looking for Help Systems' icon seem to be the first choice in the list. Some never use Help Systems as they think such systems are useless and they take time to load. Highlighting keywords and subheadings appears to be their main concern which enables them to scan through easily the content.

Strategic and Terminological supports are the most preferred features to be included in future Help Systems. They identify search tips as most preferred and browsing as their least preferred Help Systems features. Online help pages are the right choice for them to be included in Help Systems. The use of icon which can be seen in right top hand corner of the page is what most of the users of this type preferred. Using both mouse and keyboard is their favorite way to interact with Help Systems and the brushing and linking are their preferred visualization technique.

The users who rarely use search engines. Just like the users who use search engines very seldom, the users who rarely use search engines seem never rely on Help Systems. As some features that they do not know may seem to be existed for them but these kinds of features are believed to be not much for them as well. Using online help is their preference way to find out about commands in Help Systems that they have never used before. They normally try to use online help whenever they encounter problems in using search engines. Whenever they want to learn about help features of a particular search system, searching the help icon in the first place is the most general behavior for them. Some users think help provided in search systems are difficult to understand for them which forced them not to go for the use of help.

Some of them mentioned Help Systems are not useful. Highlighted keywords, technical support and search tips are the most helpful features for them to scan through help contents. Demonstration is the least preferred help feature. Showing context sensitive information related to current user's task or showing concise instructions are features they want the most to include in Help Systems. Using images at the top right hand corner of the search pages are their preferred ways in identifying Help Systems. Their only favorite medium for interaction with the Help Systems is the use of a mouse. For visualization technique they want brushing and linking.

5.4. Users' Knowledge of Help Area

The users who read online help. Most of them never use Help Systems because they think it is useless. Highlight keyword technique is the best way for them in scanning through the help contents. Majority prefers to include Technological support but some prefer Strategic support. Search tips are their most preferred help but demonstration is their least preferred help. Getting help by reading comprehensive step-by step tutorials is their preferred way. They prefer to have images as Help Systems' identifiers to be displayed on the top right corner of the page. They would prefer using a mouse as the

only way to use Help System. Brushing and linking is their most preferred visualization technique.

The users who try solving problems by themselves. Some users in this user model never use Help Systems. The reason behind is that Help Systems seem to be not so effective. For scanning through content many users think that subheadings and highlighted keywords can facilitate their scanning capability much better. Most of the users want Technological support followed by Strategic support. Search tips are the most preferred feature, when a demonstration is the least preferred feature. They would like to get help by searching from online help. They prefer an image on top right hand corner of page as a help identifier. The use of a mouse is also the only preferred way in interacting Help Systems. Brushing and linking are the preferred visualization technique.

6. Discussion

Almost half of the users expect to see Technical support rather than terminology and Strategic support. The system has mostly shown as the technical support by means of search tips as the main category and the rest are just sub-categories of technical help menu. Many of the participants preferred those search tips over context sensitive Help, demonstration and browsing. It also suggested that the search tips in the question and answer forms for technical explanation is preferable. Majority of the participants had chosen short instructions as the one they like to get help when using search engines' Help Systems. The users like to see the maxima length of those instructions not more than 3 lines, as a result. The users would click text links like "more details" or by clicking over the text sentences of a paragraph to read a detail explanation.

More than 50% of the participants have agreed that they want a program that tries to reach out and offer assistance. Therefore, when a novice uses Help Systems for the very first time, the program should try to reach out automatically and give the user some search tips and provide some user guide. For the consecutive usages over that Help Systems, the user can manage to customize whether the program to give the hint or not for the future. We suggest breadcrumb to be provided in a system to help the users know where they are. An interactive dialogue that can be visual or text should be a part of the search engine's Help System. Pop-ups for explaining function of buttons whenever the mouse is moved over and also multiple windows to help manage user's attention may be helpful. Brushing and linking can be great visualization techniques in Help Systems.

It is clearly seen that the use of more graphic elements are wanted by the majority of the participants. More than half of the participants feel like there is no longer need incorporating animations, videos and speech as part of search engines' Help Systems. The help icon, which is three quarter of what the participants is preferred to locate at the top right corner of the page where everyone can see obviously. More than that, the users prefer the Help Systems' icons to be identified as images rather than text links. It should be clear, and its visibility should be more prominent for the users. Most of the participants preferred the convenience of using a mouse and some preferred the text links to have different colors.

7. Conclusion

All of the related research works have focused on users' capabilities, their normal behaviors and the interface design of Help Systems. Different kinds of user with different educational and different level of computer skills are being taken into account in this study but due to their availability most of the participants are undergraduate and graduate students. Future studies should try to include more members from general public with different educational and computer skills. The stereotyping techniques were used to build user models. Further studies can consider observing users' actual help seeking behavior directly.

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