

# Effects of Tasks on Users' Perceptions of the Content of a Web-based IR System

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## ABSTRACT

Finding relevant information is a major goal that motivates people to seek information using an IR system. Therefore, it is important to understand how people perceive the content of a system while interacting with it to solve specific problems. This article presents a preliminary study on users' perceptions of the content of a web-based IR system and the effects of tasks on their perceptions.

## Categories and Subject Descriptors

H.1.2 [Information Systems]: User/Machine Systems – *human factors, human information processing.*

## General Terms

Design, Human Factors

## Keywords

Information retrieval, information-rich web spaces, content, mental models

## 1. INTRODUCTION

Information retrieval (IR) is goal-oriented. People use various IR systems to seek relevant information to support decision making and problem solving [1, 2]. Therefore, information contained in the systems is of critical concern to users [3]. Users' perceptions of the content within an IR system could have a significant impact on how they use the system and whether they are likely to continuously use it. In this study, we explore users' perceptions of the content of MedlinePlus, a web-based IR system for consumer health information, and the effects of tasks on their perceptions.

## 2. RESEARCH METHOD

Thirty-eight undergraduate students (20 females and 18 males), majoring in non-medical-related areas participated in the study. The participants had an average age of 21 and had never used

MedlinePlus before the study.

After signing a consent form and completing a demographic questionnaire and a standard ETS VZ-2 test (measuring spatial ability), the participants were asked to freely explore MedlinePlus for five minutes and describe their impressions of the system. Then, half of the participants were asked to complete 12 simple tasks, while the others were asked to complete 3 complex tasks. Task complexity was determined by three factors: (1) the clarity of the information required to answer the question; (2) the distribution of the answer; and (3) the extent to which a high level cognitive activity, such as synthesizing information, was required to complete the task. Upon the completion of their corresponding tasks, both groups were asked to finish a concept listing protocol, using a web-based system. In the concept listing, participants submitted concepts related to the MedlinePlus system, in the sequence in which the concepts were recalled. Each concept was viewed as a node in a participant's memory concerning the system, and the list of concepts was viewed as the result of the participant's cognitive process of making sense of the system [4].

In total, the simple task group submitted 437 meaningful concepts, among which 255 were related to the content of MedlinePlus. The complex task group submitted 378 meaningful concepts, among which 202 were content-related. We analyzed the content-related concepts using constant comparison method [5]. A second coder coded 10% of the data and the inter-coder reliability was 95.7%.

## 3. RESULTS

A series of T-tests showed that participants in the two groups (simple vs. complex task group) did not differ in age, spatial ability, or experience with the web. Both groups spent approximately 20 minutes completing their corresponding tasks and the difference was not statistically significant.

In this section, we report common perceptions of the content of MedlinePlus shared by the two groups, followed by a discussion of the differences between the two groups.

### 3.1 Shared perceptions of the content

Both groups perceived the content of MedlinePlus in relation to the subject and form of the information in the system. The subject was represented at three different levels: general, topical, and specific. Concepts at the general level described the general MedlinePlus content and did not reveal the subject matter of the site, such as, information, data, articles, and sources. Concepts at

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the topical level described high level topics covered in the system, such as diseases, symptoms, treatments, and preventions. Concepts at the specific level were more specific than those at the topical level. They described specific diseases, treatments, or drugs, such as diabetic foot, finger pricks, and insulin.

The form of the content was represented in relation to three aspects: type, format, and presentation. Type referred to different types of information contained in MedlinePlus, such as dictionary, news, glossary, journals, and statistics. Format referred to the format of information, such as PDF, text, and image. Presentation referred to different ways in which the information was presented to the audience, such as overviews and summaries.

When perceiving and representing the objective features of the content, participants in both groups, simultaneously, formed opinions and expressed evaluations related to the content. These evaluations were in relation to five aspects: quantity, attributes (e.g., comprehensiveness, depth of information, currency, and objectivity), quality, utility, and specific sections of the content in the system. Participants in both groups agreed that MedlinePlus contained an overwhelmingly large amount of information. The content was seen as being factual, comprehensive, and current, but also sometimes superficial. The quality of information was high; particularly, it was accurate, reputable, consistent, and well-researched. The utility of the content had two aspects: whether the information was useful and whether it was usable. Both groups agreed that information in MedlinePlus was useful: it was interesting and informative. The information could be easily understood, but at times could be difficult to use.

### 3.2 The effects of tasks

The two groups also differed in their representations of the content of MedlinePlus. First, they differed in the amount of attention that they paid to the subject of the content at a specific level. The simple task group contributed 82 concepts to describe the specific content in the system, while the complex task group only contributed 16 ( $t(35) = 2.14; p = 0.04$ ). The content of these concepts differed as well. Second, the two groups differed in their representations of the types of information in the system. The simple task group identified information types, such as fact sheets, FAQs, reports, and what-to-do articles, while the complex task group identified scholarly and academic articles, clinical trials, and tutorials. Third, the two groups differed in their representations of the presentation of information in the system. Compared to the complex task group, which only listed one type of presentation form, overviews, the simple task group identified a wider range of presentation forms, such as overviews, specifics, diagrams, and figures.

At the same time, the two groups formed different opinions of the content. First, participants in the complex task group were more critical of the quantity of information in the system. Some of them noted that there were few scholarly articles in the system, the external sources were limited, exclusive MedlinePlus information was scant, and there was not a lot of simple information. Second, in evaluating specific sections of content in MedlinePlus, the simple task group focused on evaluating summaries, descriptions,

and overviews, while the complex task group focused more on evaluating the encyclopedia and tutorials.

## 4. DISCUSSION

When interacting with an IR system to solve tasks, users pay lots of attention to the content in the system and develop comprehensive perceptions of the content. They not only represent the objective aspects of the content (subject and form), but also formed judgments concerning the quantity, quality, utility, attributes, and specific sections of the content.

Several aspects of tasks could have significant effects on people's perceptions of the content of a system, including: (1) the number and descriptions of the tasks. In the study, the simple tasks outnumbered the complex tasks, which could lead to the fact that the simple task group contributed significantly more concepts to represent the subject of the content at the specific level. Examination of these concepts confirmed this speculation by revealing that participants tended to list terms that appeared in the descriptions of the assigned tasks; (2) the complexity of the tasks. Examination of the information types that each group listed showed that they were closely associated with the requirement of the tasks. The types of information that the simple task group identified, such as fact sheets and FAQs, were more useful for solving the simple tasks, which required mostly factual information. The types of information that the complex task group identified, such as academic articles and clinical trials, were more useful for solving complex tasks, which required more in-depth information and required participants to extract and integrate information from different sources. In evaluating the content, the simple task group consistently focused on evaluating summaries and descriptions, while the complex task group focused on encyclopedia and tutorials. The more critical view that the complex task group had concerning the quantity of information might also be attributable to the tasks: it was difficult to find answers for the complex tasks and the answers required participants to synthesize information from different sources.

In future studies, it will be worthwhile to explore the effects of other aspects of a task, such as users' familiarity with the subject domain, on their perceptions of the content of an IR system.

## 5. REFERENCES

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