Chapter 12
Usability and Accessibility of E-Health Websites:
Enabling Nutrition and Physical Activity Education for Blind and Low Vision Internet Users

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ABSTRACT
This chapter describes a multi-group research study of the usability evaluation and consequent results from participants’ experiences with the MyPyramidTracker.gov Website application. The authors report on a study of a sample consisting of 25 low-income participants with varied levels of vision (i.e., sighted, low vision, and blind Internet users). Usability was assessed via both objective and subjective measures. Overall, participants had significant difficulty understanding how to use the MyPyramidTracker.gov Website. The chapter concludes with major recommendations pertaining to the implementation of Website design elements including pathway/navigation, search, links, text chunking, and frames layout. An extensive set of actionable Website design recommendations and a usability questionnaire are also provided that can be used by researchers in their future evaluations of Websites and Web services.

INTRODUCTION
According to the U.S. Department of Agriculture–Food and Nutrition Service’s report on the “Dietary Intake and Dietary Attitudes Among Food Stamp Participants (FSP) and Other Low-Income Individuals” (USDA-FNS, 2000), additional research is needed to address FSP participants’ “moderate” levels of nutrition knowledge and lack of awareness of key pieces of nutritional information. Nutrition education aimed at helping participants make more informed food choices may provide participants
with the tools and strategies to improve their nutritional intake and dietary quality.

However, most websites have not been designed with accessibility in mind. In fact, an empirical study found that 98.24% of the websites representing all types of firms, large and small, B2B and B2C, and profit-seeking and not-for-profit, did not meet minimal website accessibility standards (Milliman, 2002; Souza et. al, 2001). Another study by the Disability Rights Commission (Centre for HCI Design, 2005) found that 81% of websites (1,000 websites were evaluated) failed to satisfy the most basic requirements, and that characteristics of the sites make it very difficult, if not impossible, for people with disabilities, especially blind users, to use the website’s services. Sites with small fixed-size fonts and links, small button sizes, insufficient color contrast and color combinations, poorly coded data table layouts, mouse-based and/or dynamic scripting, and lack of audio captioning are usually inaccessible for people with various disabilities (Thatcher et. al, 2003; Slatin & Rush, 2003; Swierenga et. al, 2011).

Recognizing that more information and business is being conducted over the Internet, Congress mandated that the digital presence of all Federal agencies must be fully accessible in Section 508 of the Rehabilitation Act. Furthermore, the Web Content Accessibility Guidelines (WCAG) 2.0 are now the recognized standard for accessible web design and is approved as an International Organization for Standardization (ISO) standard: ISO/IEC 40500:2012. Thus, ensuring accessibility is no longer a premium or optional feature when designing websites. The benefits of meeting the guidelines are not limited to persons with disabilities, as accessible design increases product usability for everyone. Hence, our overall research questions are:

RQ1: What is the usability of e-health (nutrition and physical activity) websites when used by low-income, disabled (i.e., low vision and blind) Internet users?

RQ2: What is the impact of e-health websites on disabled Internet users’ nutrition and physical activity knowledge and behaviors following a longer term exposure?

This chapter describes a multi-group research study of the usability evaluation and consequent results from participants’ experiences with the MyPryamidTracker.gov website application. Specifically, we report on a study of a sample consisting of 25 low-income participants with varied levels of vision (i.e., sighted, low vision, and blind Internet users).

BACKGROUND

Usability studies have their roots as early as the 1970’s with the work of “software psychology.” “Software psychology dealt with the utility of a behavioural approach to understanding software design, programming, and the use of interactive systems, and to motivate and guide system developers to consider the characteristics of human beings” (Carroll, 1997). Evolving into the analysis of user requirements and the conception of Graphical User Interfaces (GUI), “usability engineering” arrived (Nielsen, 1993; Hermann & Heidmann, 2002). A later stage that would form a subset of usability engineering concentrated on interfaces and came to be known as “information visualization” (Hornbaek, et. al, 2003). The most recent exploration in the field of usability was coined “new usability” (Thomas & Macredie, 2002) or “ubiquitous usability” (Hassanein and Head, 2003). “Ubiquitous usability” is concerned with the context in which new products and services are being used. Varied situational contexts will result in emerging usability factors, making traditional approaches to usability evaluation inappropriate.

The corresponding research has produced extensive resources in the form of usability guidelines and standards for various domains. Still, research in the two areas of context of use and