A Structural Equation Modeling of Internet Bookmark Organizations

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ABSTRACT
The current study examined the impact of age, Web experience and Web ability across the adult's life span on the ways users managed their Internet bookmarks. It was hypothesized that Web ability would mediate the effect of age and Web experience on how the users managed their bookmarks. Six hundred surveys, sampled from the Project 2000 data, were used to examine this model. Using structural equation modeling technique, it was found that the effect of age on bookmark organization was fully mediated by Web ability. However, the effect of Web experience was not fully mitigated by Web experience.

Keywords
Aging, bookmark, structural equation model

INTRODUCTION
Having the facts that the Web now hosts something of interest to and is being used by computer users with various demographics and computer experience created a larger range of usability needs to be accommodated.

Previous literatures have pointed to age, education, computer anxiety, computer experience, computer interest and computer ability as some of the potential factors contributing to the patterns of Web usage [4].

As the Web grows and becomes more sophisticated and complicated, users also change and grow in their knowledge of Web’s structure and in ways to utilize the information provided by the Internet more effectively [2].

To help users deal with the growing information space of the Web, various aids have been created: compasses, filters, 2-D maps, bookmarks, etc. This study focuses on modeling how age, Web ability and Web experience affect the way users organize their Internet bookmark as a way to manage their personal information space.

Based on previous study [4], it was hypothesized that the effects of age and Web experience on bookmark organization would be mediated by Web ability.

METHODS
The data of the present study was merged data of the Project 2000 Survey and the user’s demographic data from the 7th WWW User Survey fielded by the GVU Center (http://www.gvu.gatech.edu) at the Georgia Institute of Technology.

Six hundred non-missing data with over-sampling of older respondents (all respondents aged 60 and above were included) were used in the analysis. The subjects ranged in age from 18 to 79 years (M = 42.08, S.D. = 14.99 years) and are predominantly male (68.3%).

Web experience corresponds to the number of years since the users first used the Web. Web ability is an eight-variable construct (α = .91): six variables are self-assessed statements with 9-point Likert scale and two are statements with 9 discrete points assessing bipolar opinions of how the users feel when they use the Web. Bookmark organization is a four-variable construct (α = .84). Each variable is binary with '1' means the subjects performed a particular bookmark organization manipulation and '0' means the subjects did not. The complete list of Web ability measures and bookmark manipulations is listed in Table 1 [5]. The age distribution of Web ability and Bookmark organization is listed in Table 2 [5].

ANALYSIS AND RESULTS
Table 3 [5] contains the bivariate correlation between age, Web experience, Bookmark organization and Web ability.

Structural Equation Modeling
In order to determine the relationship between Bookmark organization, Web ability, Web experience and age, structural equation modeling was employed [3]. All structural models were estimated using the LISREL VIII program. Models with $\chi^2$ less than two times the degrees of freedom, residual error less than .05 and overall fit indices above .90 were considered adequate fitting models.

Analysis began with the specification of a measurement model where the constructs are correlated to one another. The fitted measurement model included some correlated measurement errors of variables that represent the same constructs. Next, the hypothetical model was tested. In this
model, although the fit was adequate, it was significantly different from the initial measurement model. By observing Beta's modification indices, a modification was made (please see Table 3 [5] for the modification steps). The final model has adequate fit and is not significantly different to the measurement model. The final model is depicted in Figure 1 [5].

**Communality Estimates**

To determine predictive variance in Web ability that was unique to and shared among the other predictors, a communality analysis was performed in the latent space, by allowing the combinations of age and Web experience to predict Web ability. Table 4 [5] lists the shared and unique contributions of age and Web ability to Bookmark organization.

**DISCUSSION**

The current study attempted to examine the relationships between Bookmark organization, age, Web experience, and Web self-rated ability. The pattern of correlation relationships between age and the Web-related variables was congruent with our expectations and previous studies. Specifically, negative age-related differences were evident for the measures of Web ability and that Web experience was positively related to Web ability [1].

In previous studies, the organization of personal information space had been observed to be positively related to the level of expertise or level of ability, either in general world or in the Internet world [6]. The same trend was observed in the present study: the higher user’s Web ability is, the more manipulations are done on the Internet bookmarks. Similarly, Web experience has positive effect on Bookmark organization, both as direct link (0.18) as well as mediated through Web ability.

The finding of the present study that the effect of age on bookmark organization was mediated by Web ability was in line with our hypothesis and at the same time had a great implication. That is, contrary to the belief that old people are less effective and capable in using the Web or organizing their bookmarks. The result of the study suggested that the stereotype opinions that older adults are less likely to master the Web and to organize their bookmarks was not entirely true. The effort put in organizing bookmark is dependent on their Web ability and experience. This suggests that there is a great need to put more efforts in training older users to gain more experience on the Web in order to improve their Web ability, which will lead to effective bookmark organization.

**CONCLUSION**

The present study indicated that the strongest single indicator of bookmark organization pattern is Web experience, both directly as well as being mediated through Web ability. Age effect on bookmark organization was much less than Web experience, indicating that the less effort in bookmark organization is not largely due to the increase in age but more due to lack of both Web experience and Web ability.

Note that due to the cross-sectional nature of this study, statements regarding causality among the hypothesized factors can not be made. The limitations of using a convenience sample should be acknowledged. The model was with data from more long-term, sophisticated computer users than the general population. In addition, because of the over-sampling of older subjects, this sample does not exactly represent the general population of Web users.

**Implications for Practitioners**

The result of the study suggested that the stereotype opinions that older adults are less likely to master the Web and to organize their bookmarks was not entirely true. The effort put in organizing bookmark is dependent on their Web ability and experience. This suggests that there is a great need to put more efforts in training older users to gain more experience on the Web in order to improve their Web ability, which will lead to effective bookmark organization.

**REFERENCES**


