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INLS 581

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1. **The number of minutes it takes to accomplish a particular task. A task can be defined by the needs of the study; some examples may include logging in to a website, checking notifications on a mobile app, reading an article, locating a post, using a search engine to find a document, etc.**

**RQ:** How do different information retrieval interfaces affect the time it takes to complete search tasks? (Note: This research question is meant to compare different styles of interfaces for information retrieval systems and see what impact, if any, the interface has on the time it takes to successfully complete a search task, thus impacting the search efficiency.)

**Citations**

Augustine, S., & Greene, C. (2002). Discovering how students search a library Web site: A

usability case study. *College & Research Libraries*, *63*(4), 354-365.

*Methodology*

Twenty tasks relevant to the library website were assigned to users, with a time limit of three minutes. The amount of time and completion rate for each task were measured to identify problem areas of the website.

*Variable from Article*  
“…time was only one measurement of user performance”

Carstens, D. S., & Patterson, P. (2005). Usability study of travel websites. *Journal of Usability*

*Studies*, *1*(1), 47-61.

*Methodology*  
Participants were tasked with finding a round trip flight on three different travel websites. The amount of time it took to accomplish this task on each site was recorded in minutes.   
*Variable from Article*  
“time”

**Outside Citation (Medical):**

Eysenbach, G., & Köhler, C. (2002). How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. Bmj, 324(7337), 573-577.  
*Methodology*

Participants were timed as they searched the Internet to find an answer for a health-related question they were given. There was a twenty-minute time limit on each question and each participant was given eight or nine questions total.   
*Variable from Article*  
“search time”

Jeng, J. (2005). Usability assessment of academic digital libraries: effectiveness, efficiency, satisfaction, and learnability. Libri, 55(2-3), 96-121.

*Methodology*  
Nine questions were developed to test typical uses of digital libraries. The amount of time it took the subjects to complete the task was recorded (if the task was completed under the time limit of four minutes).  
*Variable from Article*  
“Efficiency in this study is measured by 1) how much time it takes to complete a task correctly and 2) how many keystrokes/clicks (or steps/movements)”

Quinn, J. M., & Tran, T. Q. (2010, April). Attractive phones don't have to work better: independent effects of attractiveness, effectiveness, and efficiency on perceived usability. In Proceedings of the SIGCHI conference on human factors in computing systems (pp. 353-362). ACM.  
*Methodology*  
Users were given a variety of tasks to complete on a mobile phone, with a time limit of four minutes. The amount of time to complete each task was recorded, converted to a z-score, and averaged to measure overall performance.

*Variable from Article*  
 “Efficiency of Task Performance”

1. **The number or percentage of users that reported enjoying the app after using it.**

**RQ:** How much does perceived enjoyment of an educational AR/VR app impact retention of information? (Note: This question is meant to look as the unique educational opportunities offered by AR/VR technologies and see if perceived enjoyment impacts an app’s effectiveness.)

Crowther, M. S., Keller, C. C., & Waddoups, G. L. (2004). Improving the quality and effectiveness of computer‐mediated instruction through usability evaluations. British Journal of Educational Technology, 35(3), 289-303.  
*Methodology*  
Satisfaction, as a component of overall usability, was evaluated by observing users during a usability test and asking them open-ended questions after they explored the online course for the study.  
*Variable from Article*  
“Satisfaction - How much people enjoy using the application”

Fabri, M., Moore, D. J., & Hobbs, D. J. (2005, September). Empathy and enjoyment in instant messaging. In Proceedings of 19th British HCI group annual conference (HCI2005), Edinburgh, UK (pp. 4-9).  
*Methodology*  
Users used an instant messaging app to complete a task, either with an animated face that expressed emotions or without it, creating two contrasting groups. User enjoyment of the task was measured using a “validated 10-item mood adjective checklist.”   
*Variable from Article*  
“The **enjoyment** felt during the task.”

Haugstvedt, A. C., & Krogstie, J. (2012, November). Mobile augmented reality for cultural heritage: A technology acceptance study. In *Mixed and Augmented Reality (ISMAR), 2012 IEEE International Symposium on* (pp. 247-255). IEEE.  
*Methodology*  
A seven-point semantic differential developed by Chang and Cheung was used in four items in a questionnaire to assess perceived enjoyment of the application. It was administered as a continuous, web survey and a discrete, street survey.  
*Variable from Article*  
“perceived enjoyment”

**Outside Citation (Entertainment):**

Klimmt, C., Blake, C., Hefner, D., Vorderer, P., & Roth, C. (2009, September). Player performance, satisfaction, and video game enjoyment. In International Conference on Entertainment Computing (pp. 1-12). Springer, Berlin, Heidelberg.  
*Methodology*  
Users were given a questionnaire that included four questions meant to assess game enjoyment. They responded with a number between 1 (“do not agree at all”) and 5 (“I fully agree”). Users were grouped and compared by game difficulty.  
*Variable from Article*  
“game enjoyment”

Meldrum, D., Glennon, A., Herdman, S., Murray, D., & McConn-Walsh, R. (2012). Virtual reality rehabilitation of balance: assessment of the usability of the Nintendo Wii® Fit Plus. *Disability and rehabilitation: assistive technology*, *7*(3), 205-210.  
*Methodology*  
To determine if subjects enjoyed the Nintendo Wii Fit Plus, a questionnaire was administered that included open-ended questions, Likert-scale questions, a close-ended question, and a 1 to 10 scale asking subjects to rate how enjoyable the treatment was.   
*Variable from Article*  
“enjoyment”

1. **How long the user looked at a section of the interface. (This could be measured with an eye tracker.)**

**RQ:** How does the aesthetic design of the search results on the results page of a search engine affect fixation on the results? (Note: This question is designed to see if altering the aesthetics of a search engine can impact how much attention people pay to the results (for better or for worse.))

Aula, A., Majaranta, P., & Räihä, K. J. (2005, September). Eye-tracking reveals the personal styles for search result evaluation. In *IFIP Conference on Human-Computer Interaction* (pp. 1058-1061). Springer, Berlin, Heidelberg.  
*Methodology*  
Eye tracking was used to record fixations while users completed 10 different search tasks.  
*Variable from Article*  
“cumulative fixation duration”

Cutrell, E., & Guan, Z. (2007, April). What are you looking for?: an eye-tracking study of information usage in web search. In Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 407-416). ACM.  
*Methodology*  
Eye tracking was used to measure fixation on results displayed on a search results page during a task, as well as specific aspects like number of results, titles, snippets, and URLs. Snippet size was varied between short, medium, and long.  
*Variable from Article*  
“For our analyses, we relied on measures related to gaze fixations with a minimum threshold of 100 ms in areas of interest.”

Djamasbi, S., Siegel, M., & Tullis, T. (2010). Generation Y, web design, and eye tracking. International journal of human-computer studies, 68(5), 307-323.

*Methodology*  
Eye tracking was used to get fixation data. The data was applied to a heat map that represented where users fixated the most on 6 web pages (chosen using information from a prior study).  
*Variable from Article*  
“One type of eye tracking data that was collected was fixation, or how long the participant looked at something on the page… As in prior studies, fixation was defined as a gaze longer than 300 milliseconds (Djamasbi et al. 2007, 2008).”

Granka, L. A., Joachims, T., & Gay, G. (2004, July). Eye-tracking analysis of user behavior in WWW search. In *Proceedings of the 27th annual international ACM SIGIR conference on Research and development in information retrieval* (pp. 478-479). ACM.

*Methodology*  
Participants’ eye position was recorded with an eye tracker (using the Pupil-Center and Corneal-Reflection method) as they looked at the results page of a search engine. The time they spent looking at each result in the list was recorded.  
*Variable from Article*  
“Eye fixations are defined as a spatially stable gaze lasting for approximately 200-300 milliseconds, during which visual attention is directed to a specific area of the visual display.”

**Outside Citation (Psychology):**

Isaacowitz, D. M. (2006). Motivated gaze: The view from the gazer. Current Directions in Psychological Science, 15(2), 68-72.

*Methodology*  
Isaacowitz uses eye tracking (that works via infrared illumination) to measure how long users fixate on emotional visual stimuli. Fixation is used as the metric determine if a gaze on stimuli is significant.   
*Variable from Article*  
“…thus, here I use gaze to refer to where an individual fixates, but it could also be called the target of visual attention.”

“Fixations are defined as gaze within a small area for at least 100 milliseconds, allowing us to distinguish between saccades (fast eye movements between fixations) and gaze meaningfully fixated on stimuli.”

1. **The number or percentage of users that report whether or not they find the app or a specific aspect of the app easy to use  
   RQ:** What is the perceived ease of use for key aspects of the interface in a VR/AR application? (Note: Find specific application to focus on for testing, ideally one that exemplifies typical UI for VR or AR. Identify key aspects of that interface, and research perceived ease of use in order to understand what aspects of these types of interfaces may be difficult to use and creating barriers for potential users and what aspects are working well, thus giving users the benefits of high perceived ease of use.)

Calisir, F., & Calisir, F. (2004). The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end-user satisfaction with enterprise resource planning (ERP) systems. Computers in human behavior, 20(4), 505-515.

*Methodology*  
A questionnaire included 3 questions meant to assess perceived ease of use. Respondents were given a statement about the system and asked to select a response from a seven-point Likert-type scale ranging from strongly disagree to strongly agree.  
*Variable from Article*  
“perceived ease of use”

**Outside Citation (MIS):**

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.  
*Methodology*  
Fourteen seven-point (strongly agree/disagree) scale items (number chosen because of Spearman-Brown prophecy formula) were developed to measure perceived ease of use and were refined to ten items and then six after a card sorting pretest and a questionnaire study.   
*Variable from Article*  
“Perceived ease of use, in contrast, refers to ‘the degree to which a person believes that using a particular system would be free of effort.’ …(Radner & Rothschild, 1975)”

Gefen, D., & Straub, D. W. (2000). The relative importance of perceived ease of use in IS adoption: A study of e-commerce adoption. *Journal of the association for Information Systems*, *1*(1), 8.  
*Methodology*  
A questionnaire with a seven-point Likert scale with six questions designed to determine perceived ease of use (including a question asking if the website was easy to use) was given to respondents to study the variable.  
*Variable from Article*  
“perceived ease of use (PEOU)… ‘the degree to which a person believes that using a particular system would be free of effort’ (Davis 1989, p. 320)”

Kumar, R. L., Smith, M. A., & Bannerjee, S. (2004). User interface features influencing overall ease of use and personalization. Information & Management, 41(3), 289-302.  
*Methodology*  
This variable was operationalized by creating a variable called “overall reaction” and asking users how they reacted to the site overall with a five-point Likert scale that had options from “very hard to use” to “very easy to use.”

*Variable from Article*  
“ease of use”

Saadé, R., & Bahli, B. (2005). The impact of cognitive absorption on perceived usefulness and perceived ease of use in on-line learning: an extension of the technology acceptance model. *Information & management*, *42*(2), 317-327.  
*Methodology*  
This study used five questions designed to measure perceived ease of use, including “I find the ILS easy to use?” The responses were captured with a five-point Likert scale, with responses ranging from strongly disagree to strongly agree.

*Variable from Article*  
“Perceived ease of use (PEU) can be described as the degree to which a person believes that using a particular system is free of effort.”