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# USER FRUSTRATION WITH TECHNOLOGY IN THE WORKPLACE

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## Abstract

*When poorly-designed computers frustrate users, their productivity, mood, and interactions with co-workers deteriorate. To learn more about the causes and effects of user frustration with computers in the workplace, modified time diaries were collected from 50 workplace users. This research-in-progress paper will discuss the research methodology, as well as preliminary findings.*

## Introduction

Information technology holds much promise for society, however, users face many challenges in reaching their task goals. Computer interface design does not happen by accident—with a better understanding of the problems that users face, many interfaces could be improved to make users more productive and satisfied. These problems don't occur in a vacuum. Problems that users face not only cost money (the value of the user's time), but also can influence the interaction with other people during the day. Ideally, all information systems should be designed so that they are easy to use, for all user populations, regardless of age, disability, or computer experience (Shneiderman 2000). While universal usability (ease of use for all) is a noble goal, there are many preliminary steps that must be taken to make computer interfaces easier to use. It is important to first learn about the frustrations that users face, the time lost due to these frustrating experiences, and how these frustrating experiences impact the user's day, and their interactions with others. With a better understanding of the frustrations that users face, it is possible to design and test improvements in interface design, and then influence all stakeholders to improve their interfaces.

## Literature Review

While much of the early work on usability and interface design took place in university and government labs, many corporations are now embracing interface usability as a way to improve the productivity of their workers, and increase sales on their web sites. Many well-known companies, such as IBM, Staples, the National Football League, and Macy's, do focus on improving their interface design, which leads to measurable improvement in the bottom line (Clarke 2001; Tedeschi 1999). For instance, when Macy's made their web site search engine easier to use, the conversion rate (the rate at which site visitors are "converted" into buyers) went up 150% (Kemp 2001). Staples.com used feedback from users to improve their online registration pages, to make them easier to use. After improving the usability of the registration pages, the registration drop-off rate (the number of people who begin registering but fail to complete the registration) decreased by 53% (Roberts-Witt 2001). After losing market share, AOL yielded to customer complaints and removed a majority of the pop-up advertisements from their service (Hu 2002). Companies

that have re-designed interfaces for log-on screens and for user forms have seen improvements in employee productivity that can be measured, in tens or hundreds of thousands of dollars (Nielsen 1994). There is a measurable benefit to improved usability of user interfaces (Bias and Mayhew 1994). The Technology Acceptance Model identifies usefulness and ease of use as the two biggest influences on the user acceptance of technology (Davis 1989). This model suggests that, even with a computer application that is not easy to use, the users will persevere in their attempts to reach a task goal if it is important to them. In addition, many users do not have a choice—they must use certain applications as a part of their job responsibilities. When trying to use an application that is very useful, but hard to use, users then encounter frustration! By ameliorating the source of frustration, users can become more productive, and more satisfied with their work.

Users face high levels of frustration with computer technology. Applications are designed with interfaces that are hard to use, and features that are hard to find. Even government web sites, which are supposed to provide easy access to government information for all citizens, are frequently hard to use and produce high levels of user frustration (Ceaparu 2003; Hargittai 2003). Frustration with technology can lead to wasted time, changed mood, and troubled interactions with colleagues. When users in a workplace are frustrated with their computers, it can lead to lower levels of job satisfaction (Murrell and Sprinkle 1993). In some cases, user frustration with technology can even lead to increased blood volume pressure and muscle tension (Riseberg et al. 1998).

A previous study found that computer users waste nearly half their time, due to frustrating situations, many of which could be eliminated with better interface design or systems management (Ceaparu et al. 2003). The most common causes cited for user frustration were confusing error messages, dropped connections, freezes, and long download times. The applications causing these frustrations were primarily web browsing and e-mail. The limitation of that research project was that the subjects were primarily students. The causes of frustration, the applications, the levels of frustration, and the time wasted, may differ for users in workplace settings. Not only that, but the bottom line in a workplace setting is the cost of the user frustration. Previous research has linked improved interface design to actual cost savings for an organization (Bias and Mayhew 1994). In a related manner, lowering the time lost due to user frustration (through improved interface usability) directly relates to cost savings for an organization. If poorly-designed user interfaces mean that employees waste 40% of their time on the computer, this is wasted time to the organization, and it makes the employees less productive.

## **Research Methodology**

To learn more about user frustration with technology in the workplace, data was collected through the use of modified time diaries. With a modified time diary, users record data about their frustrations as the frustrations occur. Surveys would not be an appropriate data collection methodology for this research, since users trying to recall frustrations from their past experiences might over-estimate or under-estimate the level of frustration and the time wasted (Fowler 1993). In addition, data logging cannot effectively measure frustration, since data logging would only work for system errors, or other occasions when the computer system indicated an error state (Lazar and Norcio 2000). There are many events that are frustrating for users (such as spam or pop-up advertisements), and occur when the system is operating in a correct state.

Subjects in this experiment were encouraged to perform their typical work-related tasks, and record, as a part of their time diaries, any frustrating experiences. Tasks are not pre-assigned to subjects, because user frustration is correlated to the importance of the task, as predicted by the Computing Frustration Model (CFM) (Bessière et al. 2003). While poorly-designed interfaces are the root cause of user frustration, the CFM predicts that the severity of the frustration is impacted by 6 factors: self-efficacy, severity of interruption, strength of desire, computer anxiety, mood, and cultural/societal influence. When tasks are important to users, users report higher levels of frustration than when tasks are not important. Pre-assigned tasks would therefore not accurately model the user frustration in an average workday. The following protocol was used:

1. Fill out demographic information (age, gender, computer experience, etc.)
2. Fill out a pre-session survey (noting current mood)
3. Perform work-related computer tasks of their choosing, for a minimum of one hour total.
4. Fill out frustration experience forms, whenever the subject feels frustrated. These forms describe the cause, nature, and severity of the frustrating experience.
5. Fill out a post-session survey (measuring frustration after the session ended)
6. After completing the post-session survey, subjects fill out a reimbursement form and return all of the materials via snail-mail to the researchers.

## Current Status of Research

There were 50 subjects that took part in this data collection effort. All of these subjects were full-time workplace employees, and none of these subjects were undergraduate students. The workplaces represented in this study include healthcare (15), law (3), education (8), information technology (11), non-profit-other (5), for-profit-other (2), government (3), and 3 subjects did not indicate their workplace. All subjects were paid \$25 for their participation. The average age of subjects was 35.94 years (range of 23 years to 76 years). The average experience with computers in the workplace was 2.38 years.

Data analysis is just beginning. We expect to have completed data analysis at the time of the AMCIS Conference. Some preliminary findings follow. The subjects reported 149 frustrating experiences (with subjects individually reporting between 1 and 6 frustrating experiences). Users reported the biggest application sources of frustration to be word processing (34 frustrating experiences), E-mail (28 FE) and web browsing (17 FE).

Levels of frustration were very high. On a scale of 1-9, where 1 is the least frustrating, and 9 is the most frustrating, 106 frustrating experiences were reported to have frustration levels between 7-9, with 50 frustrating experiences reported to have a frustration level of 9. Another interesting finding is that users rarely consult manuals (1/149 frustrating experiences) or consult online help (2/149 FE). Instead, users are much more likely to use solutions that they have previously used (35/149 FE), reboot their system (29/149 FE) or find an alternative way to complete their task (20/149 FE). The time lost due to frustrating experiences is worrisome. The average workplace user wasted 43.7% of the time spent on the computer, due to frustrating experiences. More findings related to the specific causes of frustration, and the impact of the frustration on the user's mood and interaction with colleagues, will be presented at the AMCIS 2003 conference.

## Summary

With a better understanding of what causes users to be frustrated with computer technology in the workplace, it is possible to improve user interfaces, making the user more productive, and more satisfied with their workplace. Only when all users can effectively utilize computers will society be able to reap the benefits of information technology. This study is a step in that direction.

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