Social drivers of technology adoption and use in the workplace productivity context

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In a usability test of a pre-commercialization product designed to minimize interruptions, we examined the ease of use and intuitiveness of the product through lab testing, while also surveying test participants on their perception of interruptions in the workplace. The results suggest that despite high ratings of ease of use and tool intuitiveness, participants were uncertain about likelihood of use in the office context. This discrepancy indicates usability is perhaps a necessary but insufficient driver of adoption, and other factors, such as the establishment of a receptive context and supportive social norms, are also important considerations when predicting new technological adoptions.

INTRODUCTION

Technology adoption-diffusion theories largely focus on two crucial elements assumed to be essential drivers: apparent need and the ease of use of a new technology (Davis, 1989; Rogers, 1995). While these factors appear to be necessary, increasingly nuanced views of this complex process of adoption indicate that these elements may not be sufficient and other factors may be involved.

Analyzing several theories of technology adoption, Straub (2009) suggests that social influence is a crucial factor in technological adoption. Deepening our understanding of the interaction between social norms and adoption behaviours further, the Theory of Planned Behaviour offers insights into the antecedent causes of behavioural change. Within this typology, attitudes, perceived control, and social norms are all precursors to the intention that leads to behavioural change (Ajzen, 1991). This sentiment is emphasized in the Theory of Reasoned Action, which suggests a positive correlation between the strength of a social norm and the intention to act (Ajzen & Fishbein, 1980). These theories have received support from subsequent technology adoption studies that have found that social context and norms provide support for the adoption of new communications technologies (Wilson Green, 1998; Schmitz & Fulk, 1991).

Furthermore, as suggested by Lu et al. (2005), social norms may additionally impact traditionally defined drivers of technological adoption. In a study of wireless Internet adoption, it was found that favorable social norms positively impacted the perceived usefulness of new technologies. Given this relationship, social norms may create positive feedback cycles of supporting adoption, which consequently reinforces the normative strength for its further proliferation.

This paper explores the importance of social context and norms as drivers in the adoption of new technology. Through a multi-faceted usability test of a composite software and hardware product that has been designed to reduce interruptions in the office context, the study examined the relationship between usability and predicted adoption. Our research suggests that in the context of the workplace, social factors are a crucial component in a product's successful uptake.

METHOD

The data presented in this paper were collected in the fall of 2011 in a controlled laboratory environment and comprised the usability study component of a broader pre-commercialization project phase. The research team was testing the design and potential for uptake of a composite hardware and software productivity enhancement tool. Testing took place in a lab context at the University of Toronto through one-on-one sessions with a study administrator.

Participants

The usability test consisted of 16 participants, who

were representative of two groups: eight of the 16 participants were human factors engineer 'experts' (employed in academia or industry), while the other eight were 'non-experts' with the occupations mirroring those of the product's target demographic. This distinction was chosen in order to test whether the feedback on the system differed between the two groups, as well as to provide insight from both a critical perspective, along with end-user feedback. Overall, there was variation in occupational responsibilities of the participants, spread across seven options provided, although analytical (87.5%) and technical (81.3%) responsibilities were most prominent (Figure 1).
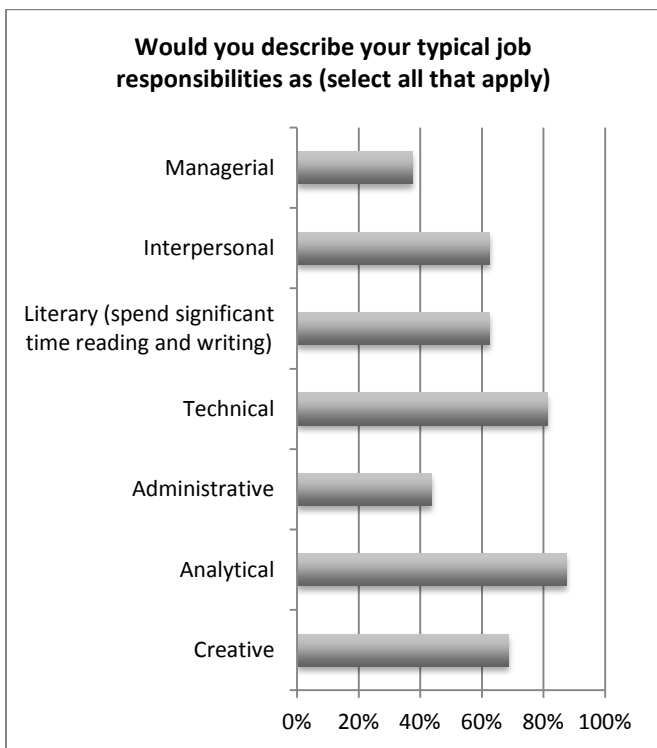
Would you describe your typical job responsibilities as (select all that apply)

Figure 1. Participant responses with respect to their job responsibilities.

Despite this variation in responsibilities, a majority of participants (73.3%) indicated that their office environment is composed of a combination of individual offices and either open concept or shared spaces (Figure 2).

These two defining characteristics are relevant factors when considering the product designed to reduce interruptions within the workplace. Due to the relatively small number of participants in this study, we have not cross-tabulated our analysis with these distinctions. We do, however recognize that the type of work for which an individual is responsible and the type of workspace he or she occupies impacts perceptions about interruptions and office social contexts.
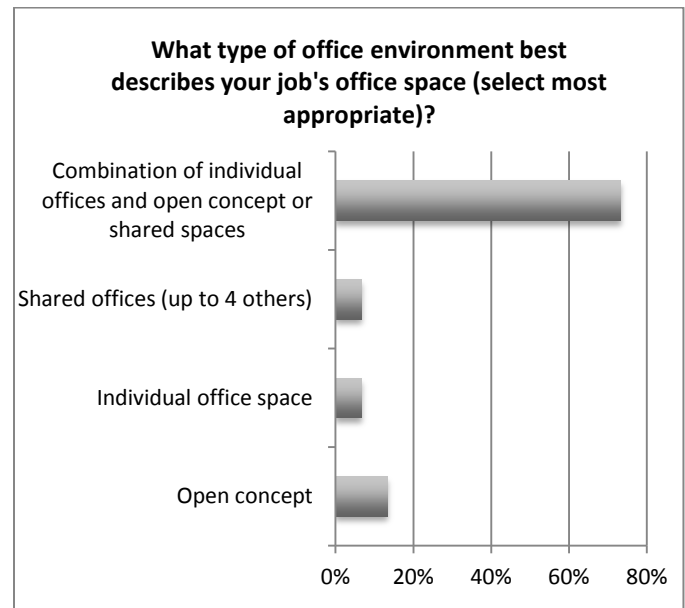
What type of office environment best describes your job's office space (select most appropriate)?

Figure 2. Participant responses with respect to the physical layout of their office environment.

Procedure

Product testing consisted of three distinct phases designed to gather information on both general workplace trends, as well as specific feedback on the tool and its concept. Participants first completed a confidential, web-based survey on workplace interruptions, and were then exposed to the product as part of a 'usability test.' This usability component was designed to allow each participant freedom to explore the software component and comment on features found to be challenging, intuitive, or otherwise notable in the functionality of the tool. In this exploration, each participant was encouraged to comment on the various components of both the hardware and software portions of the product. Notes were taken throughout the test with each participant and were codified after the completion of all participants' tests.

After exposure to the tool, participants were asked to complete a second survey component that sought overall feedback on the product, including design commentary as well as expected effectiveness and rate of use in each participant's office context. These questions were presented in two formats: some as a five-point Likert scale, while others were open questions that allowed participants to write more detailed responses and provide qualitative feedback. The data presented in this paper are drawn from both of these types of questions in the survey component of the usability test. Some comments

on the usability of the tool have been further compiled from the informal interview component of the test to augment survey data.

RESULTS

Usability of Tool

Through the product testing and surveying on overall product feedback, participants overwhelmingly indicated that the tool is both easy to use and that its navigational features are intuitive.

Product intuitiveness can be determined by a variety of factors, and in the case of an unfamiliar product it is often achieved through relating to an analogous design or a similar tool (Blackler, Popovic, Mahar, 2006; O'Brien, Rogers, & Fisk, 2008). Given the variability among participants based on previous experiences, the definition of intuitiveness was left open to interpretation by participants. After the participants had been exposed to the product, they were asked to indicate how intuitive the navigation features of the tool are on a five-point Likert scale. The question received positive responses, emphasizing the tool's intuitive and simple design (Figure 3).

The usability of the tool was further proven through the responses to the question "How easy to use is the tool?". In response to this question, all participants except one felt that the tool was either easy or very easy to use (Figure 4).
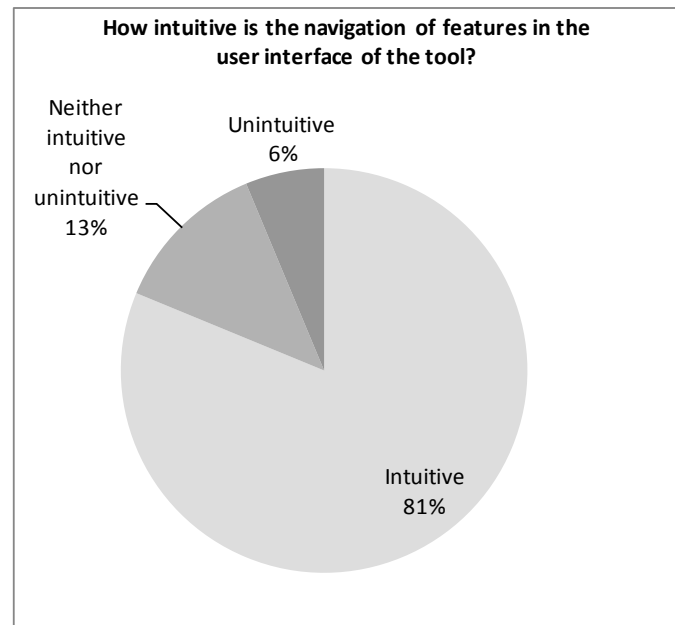

Figure 3. Interface intuitiveness.

Overall, experts appeared to be more critical, to respond in more detail, and to provide more suggestions for enhancing usability compared to non-experts. However, the differences between the two groups' usability ratings were minimal.
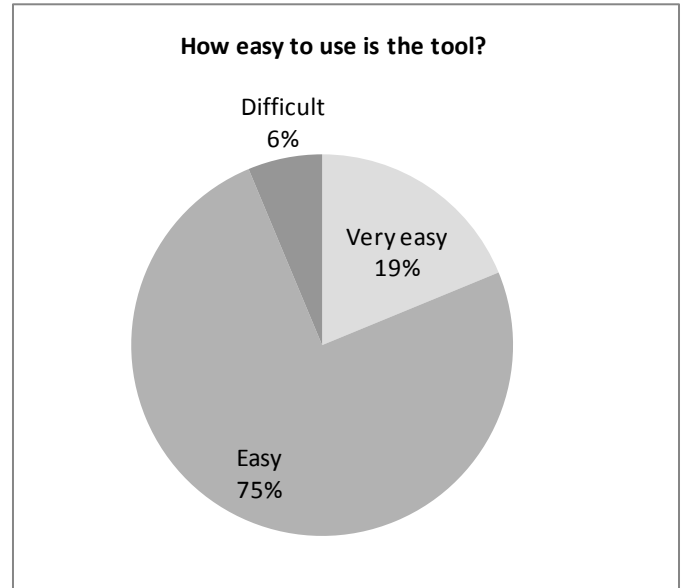

Figure 4. Ease of use.

Interruptions and Social Norms

In the first survey component of the test, questions were designed to understand participants' attitudes, and the perceived attitudes of their co-workers, towards interruptions in the workplace. Inquiring into perceived attitudes of co-workers was used as a proxy to better understand the perceived social norms of each participant. These multi-part questions were intended to provide insight into the workplace dynamics that may influence the ability of a technological solution to effectively minimize unwanted workplace interruptions. Participants were asked to respond to each question on a five-point Likert scale (1 being "strongly disagree" and 5 being "strongly agree"). For the purpose of presentation and analysis, the scale was collapsed into a three-point scale in Figure 5 (agree, disagree, and neutral).

The survey found a 25% disparity between participant's stated importance for focused time at work and the perceived importance of focused time for their colleagues, suggesting that participants consistently believe that focused time is more important to them than to their colleagues. The gap between stated attitudes and perceived social norms discovered here suggests that an under-stated social norm devalues the importance of focused time at work.
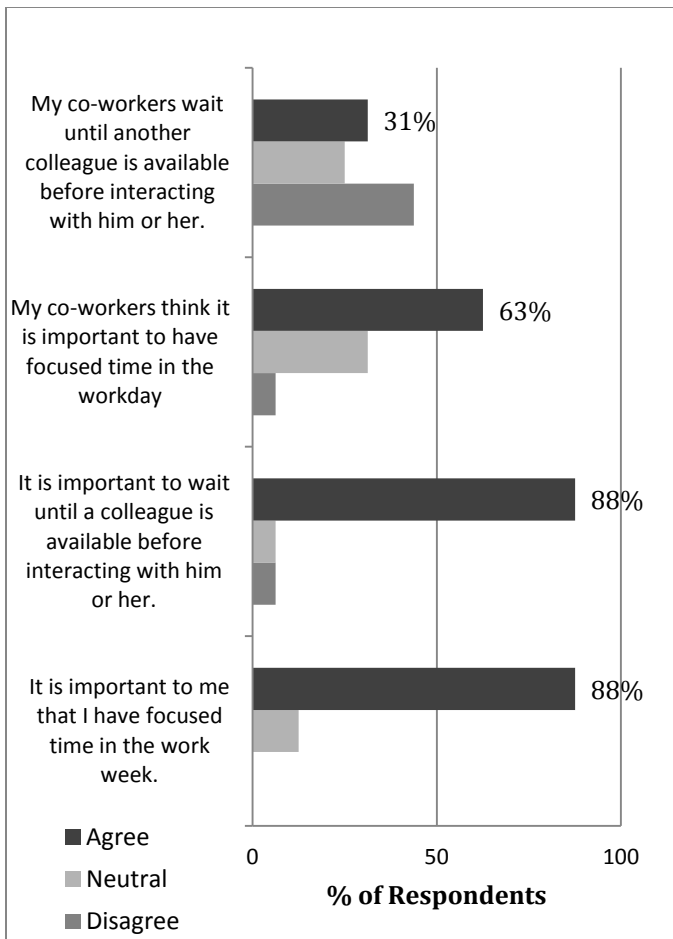
Figure 5. Attitudes and social norms of focused time.

Consistent with this finding, the survey further revealed a 57% difference between participants stating that it is important to wait for a colleague to be available before interacting (e.g., do not interrupt) and the reported actions of colleagues, who more frequently than not, do not wait until their co-workers are available. This result indicates that the social norm for not interrupting co-workers at work is quite low, and considerably lower than what individual participants feel is appropriate.

These findings suggest the absence of a social norm to support focused time and non-interruption. While these results are preliminary, they underscore the need to understand workplace social dynamics that can impact behaviors and attitudes towards change.

Tool Effectiveness and Likelihood of Use

At the conclusion of the usability test, participants were asked to rank their likelihood of using the tool, and whether or not they felt it would be effective at achieving its stated aim of improving workplace productivity. Despite the overall positive response to the

product design that has been previously cited, participants were neutral about these questions about end-point use and efficacy (Figure 6). These results are given context by qualitative responses to open questions, which suggested that social factors within the office would also play a role in the adoption of the tool. One respondent wrote that the "usefulness of this tool is strongly dependent on the organizational culture where it is implemented" a sentiment that was mirrored in other responses.
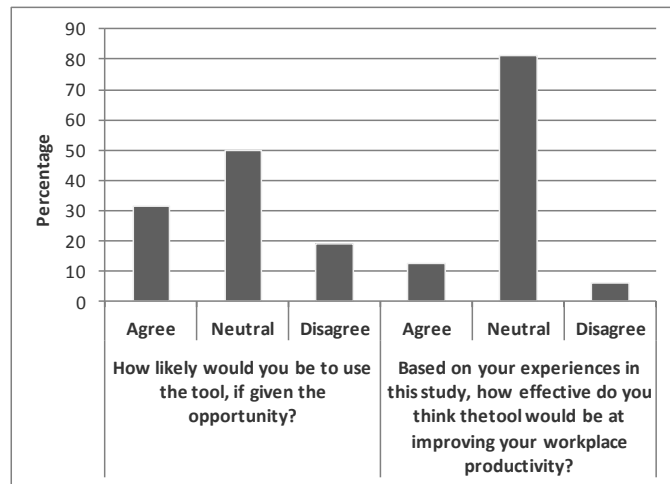

Figure 6. Likelihood of future use and perceived effectiveness.

DISCUSSION

Results from this study suggest that product usability and perceived need are not the only drivers essential to technology adoption. Survey results indicate that although the tool is easy to use and has intuitive features, participants were uncertain about both its effectiveness in the office context and the likelihood of use. The research team suggests that part of the reason for this discrepancy is the under-developed social norms surrounding non-interruptions in the workplace that were reported by participants. Given the unfavorable social context surrounding interruptions and focused work time, participants were likely to discount the efficacy of the tool. In more detailed responses, some participants indicated that they felt the tool could only be effective if it is respected by co-workers, a factor some were wary of as evidenced by the perception of weak norms for focused time.

The impact of subjective norms on technology adoption has been documented by previous studies (Lu et al., 2005; Green, 1998; Schmitz & Fulk, 1991). This normative factor has particular salience in the social

context that defines workplaces, which were targeted by the productivity tool. Because of the shared space and organizational structures that define office contexts, each often has a uniquely developed structure of norms that influences the behaviours of individuals within. These social norms are one of the antecedent factors in altering behaviour (Ajzen, 1991). A negative norm surrounding productivity within the office could serve to hinder the proliferation of technology in this context, while positive social norms could serve to support the adoption of a new technology.

Understanding these specific office cultures is an important part of ensuring the successful uptake of a product, particularly those that focus on the multi-faceted topic of productivity. Furthermore, as workplace structures shift to become more flexible, open concept, and collaborative, it is crucial to examine the social structures that dictate office interactions to respond to their needs.

Examining the ways in which individuals interact in the office setting is an important step in the deployment of work-enhancing products, supplementing the usability testing procedure. The importance of social norms revealed in this study, indicates that further research into the potential for norm creation could support the introduction of new technology into the office context.

Although our research generated interesting findings, statistical analysis was not conducted on the data due to the relatively low number of observations, which is a limitation of this study.

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