8-15-1997

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Abstract

In this paper, we used the theory of planned behavior as the premise to conduct a laboratory study to examine whether the beliefs and expected benefits of using a particular computer system can serve as motivational factors to improve training outcomes. Our results showed that while learning outcomes were not significantly improved, subjects left the training sessions with enhanced motivation to use the system.

Introduction

End user training and learning has received much attention in recent years. While traditionally, the learning outcome has been stressed (e.g., Bostrom et al., 1990), recent work has focused on the motivational aspects of training. Studies have looked at creating the right environment and process to motivate the trainees to learn (Webster and Martocchio 1992; Olfman and Bostrom, 1991; Campeau and Higgins, 1995). In general, this stream of work has examined the motivation of users to interact with the training effort during actual training.

Less well addressed has been, the motivational aspects in pre-training and post-training phases (Campeau et al, 1995). What would motivate trainees to attend the training in the first place? Secondly, the interaction between the knowledge and the motivational outcomes has also not been studied. Does higher motivational levels lead to a better understanding of the system? Does a better understanding of the system lead to higher motivation to use the system?

We propose that the theory of planned behavior (TPB) (Ajzen, 1985; Fishbein and Ajzen, 1975) is an appropriate theoretical framework to assess how motivational factors influence the end-user learning process. According to TPB, a person's behavior is determined by his or her intention to perform that behavior. The intention is related to the person's attitudes, subjective norms, and perceived behavioral control. If TPB is used in the context of end user training, it is reasonable to expect that users' beliefs and perceptions about what can result from being trained on a particular system may motivate them to perform more effectively in training sessions. (For a review of this line of argument, see Mathieson, 1991).

To examine this proposition, we conducted a laboratory study. We developed pre-training preview material that sought to manipulate the subjects' beliefs about the potential benefits of an e-mail system, and then measured the learning outcomes. The beliefs were earlier elicited from a pilot study questionnaire distributed to a peer group of the students. The control group did not receive this material. We then compared the learning outcomes of the two groups.

Research Framework

TPB can be applied in the context of end user training and learning as follows:

1. A trainee's learning (behavior) can be predicted from his or her intention to behave (to learn) in a specific manner.
2. This intention is a function of three basic determinants:

1. Attitudes - a learner's positive or negative evaluation of the outcomes of training. (the software will lead to specific outcomes and that these outcomes are of particular value to him or her)
2. Subjective norm - a learner's perception of social pressure to perform or not to perform. (learning the software will please or be approved by specific people whose opinion is important to him or her)
3. Behavioral control - a learner's perception of how much the behavior in question (learning and using the software) is within his or her control. (he or she will have available the resources perceived as facilitators to use the software)

Based on the above discussion, we formulated the following hypothesis:

Other things such as training method being the same, users trained on a system along with an exposition to induce strong levels of positive attitude, subjective norms, and perceived behavioral control about the system will exhibit higher levels of proficiency on the system at the end of training compared to those who did not get such an exposition.

Research Study

We conducted a laboratory experiment using Vax e-mail as the target system and employing a Solomon four-group design to test our hypotheses. Volunteer recruited from an introductory information systems course were randomly assigned to treatment or control groups. As part of the training materials, the treatment group read a two page description that stressed that knowing e-mail would (a) lead to desirable outcomes (b) approved by relevant peer groups and others, and (c) resources would be available to facilitate e-mail use. The control group read a two page document describing the history of computers. After this, a portion of the subjects in each group answered a survey questionnaire (TPB1) which measured their levels of attitude, subjective norms, and perceived behavioral control about e-mail. The remaining subjects in each group filled in a dummy questionnaire. This was done to control for the possibility that the very act of taking this survey, could bias subjects' attitudes towards e-mail and interfere with the treatment.

Next, all subjects were then trained using materials that contained conceptual models of the system and procedures to carry out various tasks.. After this they performed the experimental tasks. Logs of their interaction were captured and scored for accuracy of performance. They then answered a paper and pencil test which measured their knowledge of the e-mail system. All subjects then completed another TPB questionnaire (TPB2) that measured their levels of attitude, subjective norms, and perceived behavioral control about e-mail. The subjects were then thanked and dismissed.

Results

In all 180 subjects participated in the study. Terminal malfunction and other technical problems reduced the usable sample size to 156. Of these 81 were in the treatment group. Of them, 23 filled the dummy survey and 58 filled TPB1. The control group had 75 subjects, 23 of whom filled the dummy survey and 52 filled TPB1. All 156 filled TPB2. Prior to hypothesis testing, we conducted some preliminary analysis and manipulation checks. Based on these tests, we concluded that taking TPB1 did not bias the subjects and we could analyze effects of treatment over all the subjects.

Treatment effects - test of hypothesis

Since the dependent measures (accuracy of task performance and score in the test) were correlated as expected, we used MANCOVA, using prior-email experience and subjects' Grade Point average (GPA) as covariates. There was no significant treatment effect ($p > 0.5$). Subjects who received the treatment did not perform significantly better than those who did not receive the treatment.

Motivational effects

We conducted additional analyses to examine the motivational outcomes. The first test was to determine whether the treatment increased subjects' intentional factors about e-mail. We compared the TPB1 scores of the treatment and control groups. The treatment group scored significantly higher than the control group (82.3 vs. 77.8, $p < 0.004$). An interesting finding was that treatment subjects with prior e-mail experience had the highest TPB score. We next examined whether subjects' TPB scores increased after the training. To do so, we conducted pair-wise t-tests for the difference of the TPB scores for those 110 subjects who took both TPB1 and TPB2. The difference was significant (85.1 vs. 80.2); $p < 0.00$). These two findings indicate that the treatment had an effect in increasing motivation for the subjects. In addition, the training experience itself also increased subjects' motivation.

Discussion

The results show that high levels of beliefs about a particular system does not lead to high levels of system understanding in a training session. While our treatment was effective in increasing subjects' beliefs about e-mail, it was not effective in increasing their knowledge about the system.

Firstly, e-mail was perhaps not a good vehicle to test our hypothesis. E-mail is used widely in a university setting. Our student subjects probably already had positive perceptions about e-mail along all three determinants of intention. A more emergent phenomenon, such as the World Wide Web, or an enabling technology such as broadband access residential network, could possibly serve as a better target system. Secondly, all subjects received conceptual models of the system during training. Prior studies (e.g., Santhanam and Sein, 1994) had shown that good conceptual models lead to better understanding of the system. While our treatment may have led subjects to pay greater attention to the incoming stimuli (training tasks), the good conceptual models meant that there was little variance in actual assimilation of the new information.

From the theoretical perspective, we sought to link intention to use to acquiring knowledge. Possibly, there is an intermediate stage: "intention to learn". We did not measure that. A future research study should explicitly include this factor and examine its effects. Finally, it is possible that a high intention to learn may not lead to high level of understanding about the system. A more appropriate approach may be via proper training methodologies using conceptual models explicitly or through the interface.

Our study did reveal that motivational levels can be increased during the pre-training stages. It is another activity that should be included in the list suggested by Campeau et al. (1995).

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