

Association for Information Systems AIS Electronic Library (AISeL)

ECIS 2009 Proceedings

European Conference on Information Systems
(ECIS)

2009

The chiasmus of design: Paradoxical outcomes in the e-government reform of UK children's services

Bertta Sokura

Helsinki School of Economics and Business Administration, bertta.sokura@hse.fi

Virpi Kristiina Tuunainen

Helsinki School of Economics, virpi.tuunainen@aalto.fi

Anssi Oorni

Helsinki School of Economics, anssi.oorni@hse.fi

Follow this and additional works at: <http://aisel.aisnet.org/ecis2009>

Recommended Citation

Sokura, Bertta; Tuunainen, Virpi Kristiina; and Oorni, Anssi, "The chiasmus of design: Paradoxical outcomes in the e-government reform of UK children's services" (2009). *ECIS 2009 Proceedings*. 115.

<http://aisel.aisnet.org/ecis2009/115>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2009 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

THE ROLE OF TRAINING IN DECREASING ANXIETY AMONG EXPERIENCED COMPUTER USERS

Sokura, Bertta, Helsinki School of Economics, POBOX 1210, FI-00101 Helsinki, Finland,
bertta.sokura@hse.fi

Tuunainen, Virpi Kristiina, Helsinki School of Economics, POBOX 1210, FI-00101 Helsinki,
Finland, virpi.tuunainen@hse.fi

Öörni, Anssi, Helsinki School of Economics, POBOX 1210, FI-00101 Helsinki, Finland,
anssi.oorni@hse.fi

Abstract

Surprisingly, in addition to inexperienced computer users, also those who have used different software applications at least to moderate extent can have feelings of anxiety with their use of computers. This paper examines the role of training in decreasing anxiety among experienced computer users. More specifically, the role of training is studied in relation to computer anxiety, behavioral beliefs and self-efficacy, which are the key mental constructs training may impact. 96 adult and university students, who attended a CDL course on voluntary basis, participated in this longitudinal study. The results suggest that training is an effective tool to decrease anxiety and promote self-efficacy even among experienced users. In addition this study calls in the question of the relation of computer anxiety and ease of use.

Keywords: training, anxiety, Computer Driving License, ease of use, self-efficacy

1 INTRODUCTION

Personal computers have been on the market and on the desktops of employees already for a quarter of a century. Today PCs are also an essential domestic appliance with broadband channel connections. Although the ubiquitous role of information and communication technology (ICT) in people's everyday lives has grown significantly, average users' skills to exploit basic computer applications efficiently are still low, and many people feel nothing less than anxiety when having to use computers (Kohrman 2003; Tekinarslan 2008). Computer anxiety can be defined in terms of a psychological response, such as, computer phobia, or in terms of a cognitive reaction, that is, apprehension of using computers (Jancour, Sinclair et al. 1994). As our focus is on more experienced computer users, we will use the latter definition in this study.

Computer anxiety is widely thought to impact early perceptions about the ease of use of a new system (Venkatesh and Davis 2000; Chee Wei, Sutanto et al. 2006). Hence, computer anxiety influences indirectly also the intention to use the system. As computer anxiety exerts such a negative influence on intention to adopt information technology attenuating its effects should remain a high priority. It is commonly argued that training decreases anxiety, yet, empirical evidence on the effect of training is ambiguous. To better decrease levels of computer anxiety among average users, we should possess a clearer picture on the effects of our main tool, training, on anxiety, and that is, precisely, the aim of this study.

In this paper, we report the findings of a longitudinal study on the effect of training on computer anxiety and behavioural beliefs about use of the target system. The study explores remedying the impact anxiety exerts on the perceptions of ease of use and usefulness related constructs. We are especially interested in how training, in our case a CDL-course, influences these perceptions in the presence of anxiety. CDL, or Computer Driving Licence, is a standardized examination developed for providing basic computing skills. It is a hands-on test, including the most commonly used software, such as, word processing, spreadsheet, graphics, databases, and graphical operating systems.

Our main research questions are as follows: 1) How does CDL-training influence user acceptance of information systems among relatively experienced users? 2) Does CDL training decrease computer anxiety? We will also test the relative importance of self-efficacy, as it has been suggested to exert a stronger effect on computer anxiety than that of experience (Wilfong 2006)

The structure of this paper is as follows: In section 2, we introduce the key constructs of anxiety, training, self-efficacy, perceived ease of use, perceived usefulness and intention to use, and introduce our research model. In Section 3, we briefly describe the empirical data collection method, and then present the results of the analyses in Section 4. Summary and conclusions, as well as directions for future research, are discussed in Section 5.

2 ANXIETY AND TRAINING

The rapid development of new computer applications and continuing software upgrading require lifelong learning. Many users remain uncomfortable using new applications, and often revert to using traditional methods to accomplish tasks that could be performed quicker or more efficiently with some software or software features. Because of feelings of uncertainty or anxiety, users remain unaware of many useful computer applications on the market and software features of the applications in use.

In the following, we will review earlier literature on computer anxiety and constructs that have been found to have effect on it, and formulate our research hypotheses based on the earlier research.

2.1 Anxiety (ANX)

We understand computer anxiety in terms of a cognitive reaction that manifests itself as apprehension of using computers (Jancour, Sinclair et al. 1994). In practice, this means that people experience uncertainty, and they are a little uncomfortable working with computers. Anxiety, then, can be viewed resulting from the beliefs an individual holds, rather than as an antecedent to these beliefs (Saade and Kira 2007)

Overall, results of many studies indicate that computer anxiety is an important predictor of the use of technology (Czaja, Charness et al. 2006; Tung and Chang 2007). Although the results of the earlier studies regarding interdependencies between anxiety and behavioral beliefs (discussed in more detail in section 2.4) are inconsistent, anxiety clearly seems to have negative effects on performance of the users.

2.2 Training

It is commonly agreed that training decreases anxiety (Igbaria 1990; Torkzadeh and Angulo 1992; Popedavis and Vispoel 1993; Torkzadeh and Koufteros 1993; Martocchio 1994; Shelley 1998; Beckers and Schmidt 2001). Effects training has on anxiety have been studied both in mandatory and voluntary settings, focusing mainly on particular new technologies, and users with limited experience. Earlier studies have found that increasing computer experience may help reduce computer anxiety (Igbaria 1993; Chang 2005), and that anxiety level decreases also while computer knowledge increases (Kay 2008). On the other hand, it has also been argued that computer self-efficacy beliefs have a stronger impact on computer anxiety than computer experience or use do (Wilfong 2006). Thus, we posit that training will decrease computer anxiety also among experienced users, whose earlier computer training is limited or missing, and we formulate our first hypothesis as follows:

Hypothesis 1 (H1): CDL training will decrease individual computer anxiety level.

2.3 Self-efficacy (SE)

Computer self-efficacy beliefs are expected to have a greater impact on computer anxiety than computer experience and use (Wilfong 2006). Self-efficacy has been defined as “people’s judgments of their capabilities to organize and execute courses of action required to attain designated types of performances” (Bandura 1986, p. 391) . This means that self-efficacy is concerned not with the skills one has, but with judgments of what one can do with whatever skills one possesses (Bandura 1986). Thus, self-efficacy is simply the person’s confidence in performing a particular behaviour. In the context of computer use, self-efficacy has been defined as a judgement of one’s ability to use a technology (e.g. computer) to accomplish a particular task (Compeau and Higgins 1995a). A number of researchers agree that computer anxiety and computer self-efficacy are negatively related (Bandura 1977; Henderson, Deane et al. 1995; Igbaria and Iivari 1995; Compeau and Higgins 1995a; Fagan, Neill et al. 2003; Chang 2005). Hence, we formulate our second hypothesis as follows:

Hypothesis 2 (H2): Reduced computer anxiety will increase computer self-efficacy.

2.4 Perceived ease of use (PEOU) and perceived usefulness (PU)

According to Davis’ technology acceptance model (TAM) (Davis 1989; Davis, Bagozzi et al. 1989) user acceptance of a new technology can be explained by two salient beliefs: perceived ease of use (PEOU) and perceived usefulness (PU). Perceived ease of use has been defined as the degree to which a person believes that using a particular system would be free of effort (Davis 1989). There is a strong negative interdependence between anxiety and PEOU (Venkatesh 2000). However, PEOU’s impact on intention is expected to decrease when experience increases (Davis, Bagozzi et al. 1989).

Computer anxiety has been offered as one of the anchors that determine early perceptions about the ease of use of a new system and it is modeled as an indirect determinant of intention (Venkatesh 2000). In particular, computer anxiety has been found to be an antecedent of perceived ease of use (Venkatesh 2000; Chee Wei, Sutanto et al. 2006). Computer anxiety has been found to have a strong negative effect on perceived usefulness (Igarria 1993), and also resistance to change is claimed to be a significant determinant of PEOU (Nov and Ye 2008). On the other hand, it has been argued that perceived ease of use and perceived usefulness of microcomputers have a direct inverse effect on computer anxiety (Ferguson 1997).

The nature of the anxiety-PEOU relationship is further complicated by the dispute over whether the relationship is direct or not. System experience has been found to be significantly related to perceived ease of use and the effect of experience fully mediated by computer anxiety (Hackbarth et al. 2003). On the other hand, some studies report that even though anxiety has no mediating role on the impact of computer experience on perceived ease of use, it has some moderating influence on the relationship (Saade and Kira 2007).

While the nature of the anxiety-PEOU relationship remains under dispute, there appears to be a general agreement that anxiety and the salient beliefs of computer use are related. We deem that the weight of the body of literature is in support of anxiety influencing behavioral beliefs. Accordingly, we formulate our third hypothesis as follows:

Hypothesis 3 (H3): Reduced computer anxiety will increase perceived ease of use (PEOU).

2.5 Intention to use (ITU)

Computer anxiety has also been found to have a strong negative effect on behavioral intentions (Igarria 1993), and only indirect effects on usage, mainly through perceived usefulness (Igarria and Iivari 1995). In the context of Web-based learning, anxiety has been found to have a significant negative effect on individuals' continuance intentions of technology usage, (Chiu and Wang 2008).

While some studies have found anxiety's impact to usage to be insignificant (Compeau and Higgins 1999), many studies have indicated that computer anxiety is indeed an important predictor of the use of technology (Czaja, Charness et al. 2006; Tung and Chang 2007). We thus formulate our fourth hypothesis as follows:

Hypothesis 4 (H4): Reduced computer anxiety will increase intention.

2.6 Proposed model

Based on the above hypotheses, we present our research model in figure 1:

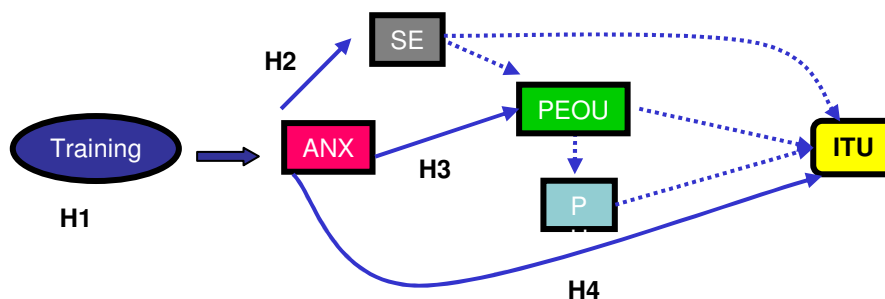


Figure 1. Research model

3 EMPIRICAL STUDY

The empirical data for our study was collected at the Helsinki School of Economics during 2004 – 2007, from altogether 243 students attending eight CDL courses. The duration of each course was seven weeks and the course was voluntary. The data was collected with two sets of questionnaires upon the completion of the first and the last laboratory session. Having a longitudinal set of data made it possible to investigate the possible changes in the level of anxiety and other key constructs.

Our sample consists of fairly experienced users of computer technology. The software applications in question are those included in the widely used Microsoft Office package of software, that is, word processing (MS Word), spreadsheet (MS Excel), graphics (MS PowerPoint), and database applications (MS Access), and the Windows operating system.

All the constructs in our model were validated by previous research (see Appendix 1). The question items were measured using a seven-point Likert scale, with 1 anchored at totally agree and 7 anchored at totally disagree. The detailed measures used can be found in Appendix 1.

4 RESULTS

In this longitudinal study, we explore anxiety's impact on the perceptions of ease of use and usefulness of computer applications, our particular interest being in how training, in our case a CDL-course, changes these perceptions.

4.1 Descriptive statistics

We analyzed 96 respondents in our first and second data collection. The participants were 50 adult students and 46 university students, of which 25 were males and 71 females. The average age of the respondents was 32 years, and their work experience varied between 0 and 40 years, the average being approximately 9 years. The respondents had on average 10 years of earlier experience with computers (range: 0 - 24 years). The respondents used computers on average for about 3 hours a day. Computer skills prior to the CDL course were acquired mainly (66 %) at work or through self study. Forty percent of the respondents reported having no prior formal computer education (for more details, see Table 1.).

	Total (N)
Adult / University students	50/46
Men / Women	25 (26 %) / 71 (74 %)
Age in years (average/ median/ min-max)	32.2 / 29 / 19-60
Work experience in years (average/median/ min-max)	8.7 / 5 / 0-40
Computer experience in years (average/median/ min-max)	10 / 10 / 0 - 24
Computer daily use (average/median/ min-max)	3.3 / 2 / 0-10
Computer weekly use	7 / 7 / 1-20
Earlier computer skills (at work or self study/no prior computer education)	66 % / 40 %

Table 1. Descriptive statistics of the respondents.

4.2 Data analysis

We estimated the instrument's validity in terms of internal consistency, and convergent and discriminant validity (Straub 1989). Internal consistency was tested using Cronbach's alpha. In both rounds of data collection, all constructs except intention to complete training, displayed an alpha value higher than 0.7 indicating reliability on the common acceptable level (Nunnally 1978) (see Appendix 2).

The instrument's discriminant and convergent validity was evaluated using a principal component factor analysis of Orthogonal varimax with Kaiser normalization rotation. All measurement items showed high loadings on their respective factors, thus proposing the instrument exhibited satisfactory convergent and discriminant validity (see Appendix 2.)

The summary constructs (mean) of each original construct before and after training are below in Table 2:

		Before training				After training			
Descriptive Statistics									
Variable	N	Min.	Max.	Mean	Std. dev.	Min.	Max.	Mean	Std. Dev.
ANX	96	1.67	7.00	5.65	1.32	2.67	7.00	6.02	1.04
ITU	96	1.00	7.00	2.10	1.17	1.00	5.00	2.00	0.80
PEOU	96	1.00	5.75	2.78	1.20	1.00	5.50	2.28	0.99
PU	96	1.00	6.00	1.85	0.92	1.00	6.00	1.96	0.92
SE	96	1.00	5.17	2.69	0.97	1.00	7.00	2.73	1.24
Valid N (listwise)	96								

Table 2. Descriptive statistics before and after training

Before training, computer anxiety (ANX) was not very high (5.6), and after training it was not high at all (6.0). PEOU of basic pc tools changed from being 2.8 before training to being 2.3 after training. The changes of these two construct (ANX and PEOU) were also statistically significant, measured by partial t-test. The other measured constructs did not change significantly. Directions of changes are presented in Table 3 below.

	N	Minimum	Maximum	Mean	Std. Deviation
ANXc	96	-4.67	1.67	-0.37	1.13
ITUc	96	-2.50	4.50	0.10	1.12
PEOUc	96	-2.50	4.50	0.50	1.05
PUc	96	-4.33	4.33	-0.11	1.16
SEc	96	-5.92	2.83	-0.04	1.24
Valid N (listwise)	96				

Table 3. Direction of change

The results show that computer anxiety decreased with training, as expected. However, a lot of variance can be observed. Perceived ease of use increased the most, while perceived usefulness decreased slightly.

		ITUc	PEOUc	PUc	SEc	ANXc
ITUc	Pearson Correlation	1.000	.415**	.596**	.308**	-.295**
	Sig. (2-tailed)		.000	.000	.002	.004
	N	96	96	96	96	96
PEOUc	Pearson Correlation	.415**	1.000	.215*	.290**	-.174
	Sig. (2-tailed)	.000		.036	.004	.090
	N	96	96	96	96	96
PUc	Pearson Correlation	.596**	.215*	1.000	.167	-.128
	Sig. (2-tailed)	.000	.036		.104	.214
	N	96	96	96	96	96
SEc	Pearson Correlation	.308**	.290**	.167	1.000	-.222*
	Sig. (2-tailed)	.002	.004	.104		.030
	N	96	96	96	96	96
ANXc	Pearson Correlation	-.295**	-.174	-.128	-.222*	1.000
	Sig. (2-tailed)	.004	.090	.214	.030	
	N	96	96	96	96	96

Table 4. Correlations of change constructs

Our first hypothesis (*H1: CDL training will decrease individual computer anxiety level*) was supported. Training significantly influenced anxiety by decreasing it. Anxiety level before training was 5.6 and after training 6.0, and t-test showed the change to be significant. These results confirm the findings of earlier studies (Igbaria 1990; Torkzadeh and Angulo 1992; Popedavis and Vispoel 1993; Torkzadeh and Koufteros 1993; Martocchio 1994; Shelley 1998; Beckers and Schmidt 2001). Also our second hypothesis (*H2: Reduced computer anxiety will increase computer self-efficacy.*) was supported. The change in the level of self-efficacy before and after training was very low and not statistically significant, but when we look at the correlations of these changes, it can be seen that changes of anxiety and self-efficacy correlate significantly at the 0.05 level (-.222) (see Table 4). The negative correlation between computer anxiety and computer self-efficacy confirm the results of earlier studies (Bandura 1977; Henderson, Deane et al. 1995; Igbaria and Iivari 1995; Compeau and Higgins 1995a; Fagan, Neill et al. 2003; Chang 2005), but our study demonstrates the relationship also in context of longitudinal training.

Our third hypothesis (*H3: Reduced computer anxiety will increase perceived ease of use*) was, however, not supported. Even though the measurements of anxiety and ease of use showed significant changes after training, the change for ease of use being the strongest, the correlation between the changes of anxiety and ease of use was not significant. A possible explanation to this might be that the users did not experience that the lower anxiety level results in ease of use but instead in use of new features, i.e. the lower the anxiety level, the more prone the users are to learn more advanced functions. This finding is in contrast with earlier studies that have argued a strong relationship between ease of use and anxiety (Venkatesh 2000; Chee Wei, Sutanto et al. 2006; van Raaij and Schepers 2008).

Our fourth hypothesis (*H4: Reduced computer anxiety will increase intention*) was, again, supported. The negative correlation (-.295) between changes on computer anxiety and intention was significant at the 0.01 level. This means that reduced computer anxiety could increase intention to use, and that anxiety, in general, can have a negative impact on intention to use. There are contradicting findings for this in earlier research (Igbaria 1993; Compeau and Higgins 1999; Kluwin and Noretsky 2005; Chiu and Wang 2008), clearly calling for future research on the issue.

We hence conclude that training decreases computer anxiety and increases perceived ease of use. Training was found to influence user acceptance of information technology, decreasing anxiety and increasing perceived ease of use. There is a negative relationship between computer anxiety and self-efficacy also after training. Contrary to earlier research, there was no relationship between the changes of levels of computer anxiety and ease of use. In addition, anxiety seems to impact intention to use technology.

Our results can be summarized as follows (see Figure 2): Firstly, training, or a CDL course in our study, decreases individual anxiety level (ANX). Secondly, reduced anxiety has a positive impact on self efficacy (SE). Thirdly, anxiety does not correlate with perceived ease of use (PEOU), which might mean that users do not experience that the lower anxiety level results in ease of use. Fourthly, reduced anxiety increases intention (INT). We have included in our model also the relationships between self-efficacy and intention, self efficacy and perceived ease of use, perceived ease of use and perceived usefulness (PU), perceived ease of use and intention, and perceived usefulness and intention, but these were not hypothesized, nor tested, in this study, but left for future research.

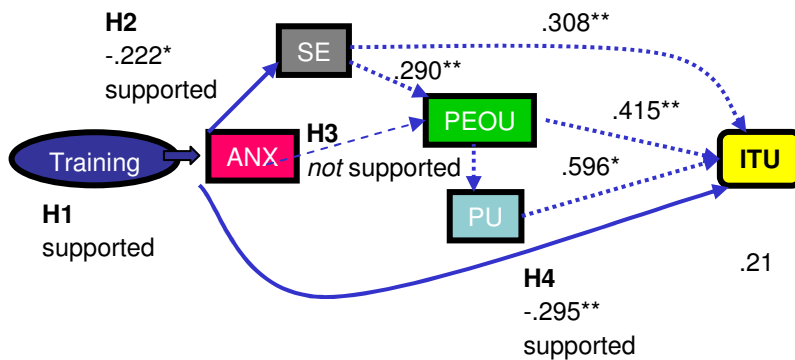


Figure 2. The research model and hypotheses testing results

5 SUMMARY AND CONCLUSIONS

In this study, we examined how CDL-training influences user acceptance of PC tools among relatively experienced users. It also answered the question if CDL training decreases computer anxiety. In addition the role of self-efficacy was addressed. Our empirical study was based on two longitudinal surveys on 96 students who attended CDL course at the Helsinki School of Economics. Using key constructs on user acceptance of information systems adopted from earlier research, the measurements were made before and after training. Our main interest was on the role of CDL training in decreasing computer anxiety among relatively experienced computer users.

Our findings suggest that training significantly decreases computer anxiety, and at the same time, increases perceived ease of use among relatively experienced computer users. This means that training has a clear positive influence on user acceptance of these computer applications, Microsoft Office tools in our case. In addition, training seems to strengthen the negative relationship between computer anxiety and self-efficacy. The most surprising outcome was that the relationship between computer anxiety and perceived ease of use was not clear. After training changes in both constructs were statistically significant, perceived ease of use increased and anxiety decreased, but the changes did not correlate. Some scholars argue that anxiety is an anchor of perceived ease of use (Venkatesh 2000; Chee Wei, Sutanto et al. 2006) or vice versa (Ferguson 1997). Furthermore, anxiety has been suggested to be a result of the beliefs an individual has, rather than an antecedent to them (Saade and Kira 2007). While we found that changes at the levels of anxiety and ease of use do not correlate, the

findings of our study indicate that the relationship between these constructs needs deeper investigation. Our results also demonstrated a strong relationship between computer anxiety and intention to use technology.

While our study provided interesting findings about the relationship between anxiety and ease of use the study has a few limitations. Our study examined and reported anxiety's impact only on perceived ease of use, self-efficacy, and intention. More research is needed to test anxiety's impact on other user acceptance related beliefs such as perceived usefulness, subjective norm, job-relevance and compatibility.

References

- Bandura, A. (1977). "Self-efficacy: Toward a unifying theory of behavioral change." *Psychological Review* 84(2): 191.
- Bandura, A. (1986). *Social Foundations of Thought and Action*. Prentice Hall, Englewood Cliffs.
- Beckers, J. J. and H. G. Schmidt (2001). "The structure of computer anxiety: a six-factor model." *Computers In Human Behavior* 17(1): 35-49.
- Chang, S. E. (2005). "Computer anxiety and perception of task complexity in learning programming-related skills." *Computers In Human Behavior* 21(5): 713-728.
- Chee Wei, P., J. Sutanto, et al. (2006). "Senior Citizens' Acceptance of Information Systems: A Study in the Context of e-Government Services." *IEEE Transactions on Engineering Management* 53(4): 555.
- Chiu, C. M. and E. T. G. Wang (2008). "Understanding Web-based learning continuance intention: The role of subjective task value." *Information & Management* 45(3): 194-201.
- Compeau, D. and C. A. Higgins (1999). *Social Cognitive Theory and Individual Reactions to Computing Technology: a Longitudinal Study*. *MIS Quarterly, MIS Quarterly & The Society for Information Mgt.* 23: 145.
- Compeau, D. R. and C. A. Higgins (1995a). "Computer Self-Efficacy: Development of a Measure and Initial Test." *MIS Quarterly* 19(2): 189.
- Compeau, D. R. and C. A. Higgins (1995b). "Application of Social Cognitive Theory to Training for Computer Skills." *Information Systems Research* 6(2): 118-143.
- Czaja, S. J., N. Charness, et al. (2006). "Factors predicting the use of technology: Findings from the center for research and education on aging and technology enhancement (CREATE)." *Psychology And Aging* 21(2): 333-352.
- Davis, F. D. (1989). "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology." *Mis Quarterly* 13(3): 319-340.
- Davis, F. D., R. P. Bagozzi, et al. (1989). *User Acceptance of Computer Technology: A Comparison of two Theoretical Models*. *Management Science, INFORMS: Institute for Operations Research*. 35: 982.
- Fagan, M. H., S. Neill, et al. (2003). "An empirical investigation into the relationship between computer self-efficacy, anxiety, experience, support and usage." *Journal Of Computer Information Systems* 44(2): 95-104.
- Ferguson, C. (1997). "The effects of microcomputers on the work of professional accountants." *Accounting & Finance* 37(1): 41.
- Hackbarth, G., V. Grover, et al. (2003). "Computer playfulness and anxiety: positive and negative mediators of the system experience effect on perceived ease of use." *Information & Management* 40(3): 221.
- Heinssen, R. K., C. R. Glass, et al. (1987). "Assessing computer anxiety: Development and validation of the Computer Anxiety Rating Scale." *Computers in Human Behavior* 3(1): 49.
- Henderson, R. D., F. P. Deane, et al. (1995). "Occupational Differences In Computer-Related Anxiety - Implications For The Implementation Of A Computerized Patient-Management Information-System." *Behaviour & Information Technology* 14(1): 23-31.

- Hu, P. J. and P. Y. K. Chau (1999). Examining the Technology Acceptance Model Using Physician Acceptance of Telemedicine. *Journal of Management Information Systems*, M.E. Sharpe Inc. 16: 91.
- Igbaria, M. (1990). "End-user computing effectiveness: A structural equation model." *Omega* 18(6): 637.
- Igbaria, M. (1993). "User acceptance of microcomputer technology: An empirical test." *Omega* 21(1): 73.
- Igbaria, M. and J. Iivari (1995). "The effects of self-efficacy on computer usage." *Omega* 23(6): 587.
- Jancour, N., K. Sinclair, et al. (1994). Computer anxiety, computer experience, and self-efficacy. Annual Conference of the Australian Association for Research in Education, New Castle, New South Wales.
- Kay, R. H. (2008). "Exploring the relationship between emotions and the acquisition of computer knowledge." *Computers & Education* 50(4): 1269-1283.
- Kluwin, T. N. and M. Noretsky (2005). "A mixed-methods study of teachers of the deaf learning to integrate computers into their teaching." *American Annals Of The Deaf* 150(4): 350-357.
- Kohrman, R. (2003). Computer Anxiety in the 21st Century: When You Are Not In Kansas Any More. ACR Eleventh National Conference: Learning to Make a Difference, Charlotte, North Carolina.
- Martocchio, J. J. (1994). "Effects Of Conceptions Of Ability On Anxiety, Self-Efficacy, And Learning In-Training." *Journal Of Applied Psychology* 79(6): 819-825.
- Nov, O. and C. Ye (2008). "Users' personality and perceived ease of use of digital libraries: The case for resistance to change." *Journal Of The American Society For Information Science And Technology* 59(5): 845-851.
- Nunnally, J. C. (1978). *Psychometric Theory*. New York, McGraw-Hill.
- Popedavis, D. B. and W. P. Vispoel (1993). "How Instruction Influences Attitudes Of College Men And Women Towards Computers." *Computers In Human Behavior* 9(1): 83-93.
- Saade, R. G. and D. Kira (2007). "Mediating the impact of technology usage on perceived ease of use by anxiety." *Computers & Education* 49(4): 1189.
- Shelley, J. O. (1998). "Factors that affect the adoption and use of electronic mail by K-12 foreign language educators." *Computers In Human Behavior* 14(2): 269-285.
- Straub, D. W. (1989). "Validating Instruments In Mis Research." *Mis Quarterly* 13(2): 147-169.
- Tekinarslan, E. (2008). "Computer anxiety: A cross-cultural comparative study of Dutch and Turkish university students." *Computers In Human Behavior* 24(4): 1572-1584.
- Torkzadeh, G. and I. E. Angulo (1992). "The Concept And Correlates Of Computer Anxiety." *Behaviour & Information Technology* 11(2): 99-108.
- Torkzadeh, G. and X. Koufteros (1993). "Computer User Training And Attitudes - A Study Of Business Undergraduates." *Behaviour & Information Technology* 12(5): 284-292.
- Tung, F. C. and S. C. Chang (2007). "Exploring adolescents' intentions regarding the online learning courses in Taiwan." *Cyberpsychology & Behavior* 10(5): 729-730.
- van Raaij, E. M. and J. J. L. Schepers (2008). "The acceptance and use of a virtual learning environment in China." *Computers & Education* 50(3): 838-852.
- Venkatesh, V. (2000). "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model." *Information Systems Research* 11(4): 342.
- Venkatesh, V. and F. D. Davis (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, INFORMS: Institute for Operations Research. 46: 186.
- Wilfong, J. D. (2006). "Computer anxiety and anger: the impact of computer use, computer experience, and self-efficacy beliefs." *Computers In Human Behavior* 22(6): 1001-1011.

APPENDIX 1: Measures Used in the Study

Computer Anxiety (ANX) (Drawn from the Computer Anxiety Rating Scale (Heinssen et al.,(1987):

1. It scares me to think that I could cause the computer destroy a large amount of information by hitting the wrong key.
2. I feel apprehensive about using computers.
3. I hesitate to use a computer for fear of making mistakes that I cannot correct.

Computer Self-Efficacy (SE) (Compeau and Higgins 1995a; Compeau and Higgins 1995b; Compeau and Higgins 1999):

I could complete my job using the technology if....

1. I had seen someone else using it before trying it myself.
2. someone showed me how to do it first
3. I could call someone for help if I got stuck
4. I had used similar packages like this one before to do the job.
5. I had a lot time to complete the job for which the software was provided.
6. someone else helped me get started

Perceived ease of use (PEOU) (Davis 1989; Davis, Bagozzi et al. 1989):

1. It would be easy for me to become skilful at using the system
2. Learning to operate the system is easy for me.
3. I believe that it is easy to get the system to do what I want to do
4. Overall, I believe that the system is easy to use.

Perceived usefulness (PU) (Davis 1989; Davis, Bagozzi et al. 1989):

1. Using basic PC tools makes it easier to do my job.
2. Using basic PC tools increases my productivity.
3. Using basic PC tools enables me to accomplish tasks more quickly.

Intention to use (ITU) (Hu and Chau (1999):

1. Whenever possible, I intend to use this basic software in my job/study
2. I intend to use this software versatility in my job/study

All items measured using a seven-point Likert scale (1=totally agree, 7=totally disagree).

APPENDIX 2: SIMPLE STATISTICS

Before training					After training				
Variable	N	Mean	Std Dev	Alpha	Factor loadings	N	Mean	Std Dev	Alpha
<i>Anxiety (ANX)</i>									
ANX-1	96	4.85	1.93	0.75	0.81	96	5.31	1.71	0.71
ANX-2	96	6.02	1.42	0.78	0.72	96	6.21	1.26	0.73
ANX-3	96	6.06	1.46		0.76	96	6.33	1.19	
<i>Intention (INT)</i>									
ITU-1	96	1.95	1.23	0.86	0.82	96	1.79	0.96	0.56
ITU-2	96	2.25	1.26	0.86	0.68	96	2.21	0.95	0.56
<i>Perceived ease of use (PEOU)</i>									
PEOU-1	96	2.57	1.38	0.92	0.83	96	2.18	1.24	0.88
PEOU-2	96	2.79	1.23	0.92	0.87	96	2.20	1.07	0.88
PEOU-3	96	2.93	1.33		0.87	96	2.46	1.08	
PEOU-4	96	2.83	1.41		0.91	96	2.30	1.22	
<i>Perceived usefulness (PU)</i>									
PU-1	96	1.57	0.93	0.85	0.85	96	1.60	0.90	0.82
PU-2	96	2.16	1.15	0.86	0.77	96	2.24	1.22	0.83
PU-3	96	1.82	1.07		0.91	96	2.03	1.07	
<i>Self-efficacy (SE)</i>									
SE-1	96	3.34	1.60	0.78	0.58	96	2.91	1.53	0.82
SE-2	96	2.41	1.33	0.78	0.77	96	2.59	1.48	0.82
SE-3	96	2.24	1.33		0.72	96	2.44	1.62	
SE-4	96	2.17	1.21		0.72	96	2.23	1.27	
SE-5	96	2.97	1.39		0.67	96	2.77	1.63	
SE-6	96	2.99	1.56		0.81	96	3.11	1.84	