Societal Transformation: Its Impact on Computer Usage in the Workplace

Michael B. Knight
Doctoral Student in Information Technology, Southern Illinois University, Cardondale, IL 62901, USA, mknight@siu.edu

Leon Crosby
Pleasant Plains, IL, ltvcrosby@att.net

J. Michael Pearson
Associate Professor of Information Technology, Southern Illinois University of Carbondale, IL 62901, jpearson@sba.siu.edu

ABSTRACT

As the changing demographics of the workplace affects organizations, the need to reexamine relationships between these demographic variables and their affect on the organization continues. This study provides an empirical examination of the affect two demographic variables, age and gender, and any moderating impact of anxiety, enjoyment, and/or peer pressure may have on computer usage. Based on our analysis of 352 knowledge workers, we identified no significant difference between men and women and/or young and old regarding their computer usage in the workplace. Therefore, the findings from this study do not seem to support earlier research regarding age and gender when determining computer usage. However, the moderating construct (anxiety) did appear to be significant in the employee's computer usage.

INTRODUCTION

The use of information technology (IT) within an organization can have a dramatic affect, not only on the success or failure of the organization, but also on the overall work life of its employees. There are at least two issues associated with organizations investing in information technology. The first issue is whether employees will accept the technology. The second issue is whether employees will be more productive with the new technology. While many studies have examined technology acceptance (Davis, 1989; Szjana, 1996; Gefen, 1997) and have attempted to focus on how particular variables impact technology acceptance, few have looked at the implications concerning the changing demographics (i.e. age, gender, education level, position, organizational training, and organizational pressure to use technology) in the U.S. workforce.

As the workforce has changed over the past decade, so has the use of computers (Igbaria, 1996), and the level of sophistication embedded in their software applications. However, only limited research has been conducted to examine how the changing demographics of the workforce have affected computer usage within the organization. As the number of women have increased in the workforce and the average age of workers have also increased (Census, 2000; Greco, 1998), earlier studies may no longer accurately reflect the current dynamics within the modern organization. With the proliferation of computers into the home, older employees may have become more comfortable with basic software packages (White et al, 1999). Therefore, by looking at the changes that have occurred in the workforce demographics and the current usage of information technology in the workplace, we should be able to develop a better understanding of what is currently affecting the usage of information technology within the modern organization.

The following study examines data collected using multiple validated instruments, compares the results to current literature, then attempts to show the affect of age and gender on the usage of technology, and the modifying effect of perceived pressure and enjoyment. The perceived pressure to use technology may be best explained as the social influences of encouragement by others, others use of IT, organizational support, and personal anxiety.

LITERATURE REVIEW

Traditionally, research in the Information Systems (IS) and/or Information Technology (IT) area has focused on the technology (the system) being implemented (Brown, 2001; Yang & Moore, 1995). Individual studies have looked at the user, regarding perceived satisfaction in the use of IT(Simmers, 2001, Robie et al, 1998), acceptance of technology (Davis, 1989), learner behavior (Brown, 2001), gender and discriminatory practices (Truman et al, 1994), gender and learning (Arbough, 2000), age and the use of the internet (White et al, 1999), previous computer experience (Thompson et al, 1994), and motivational factors to use computers (Armonk, 1996). While not all of the previously mentioned articles are exclusive to the IS/IT arena, they all hold relevance to the current research project, due to the findings which each previously mentioned study has provided.

Brown (2001) found, through a study of technical employees at a Fortune 500 manufacturing firm, that age is a factor affecting the speed at which computer training can be presented and in the quality of its retention. Older employees were found to exhibit less interest in and have a less positive attitude towards computers than younger employees. Additionally, Brown found older employees had lower learning outcomes than younger employees do. Brown concluded that an increase in age may be associated with greater resistance to computer usage. However, the Brown (2001) study does not use a control group, nor report separate findings for its male and female subjects.

Progressively over time the workforce has changed (a greater number of women, a higher average workforce age, and a higher level of education (Census, 2000)); the sophistication of IT has increased, as has the demand placed on the end user. Simmers (2001) found that age is an important factor in user satisfaction and that younger workers generally had higher satisfaction than older workers. Therefore, due to these findings by Simmers (2001), the limitations expressed by Brown (2001), and age emerging as a barrier to the placement of individuals who are looking for employment (Gibson et al, 1993), age is an important and viable variable for further research, i.e., to see if there is a correlation with computer usage.

Gender no longer seems to be a factor in job placement or level of placement (Truman & Baroudi, 1994), however, once placed into a position, gender differences can be noted in the social setting of the organization. Women may favor computer collaboration and networking, while men may see computers more as a tool to relate content (Gefen, 1997). Gefen (1997) also reports that gender could affect the diffusion of IT use in the workplace. This is based on findings from a study conducted by Gilroy and Desai in the mid 1980's and is presented as an extension of the Technology Acceptance Model (TAM) (Davis, 1989). The TAM however, attempts to predict and explain system and/or computer use by stating that perceived usefulness and ease of use are of primary relevance in computer acceptance behavior. In the original form, TAM defined the constructs of perceived usefulness as the degree to which a person believes that using a particular system would enhance

his or her job performance, and perceived ease of use as the degree to which a person believes that using a particular system would be effortless.

Attempts to explain the predictive powers of the Technology Acceptance Model have not specifically included age or gender. Attempts to describe demographics regarding end user computing (EUC) have concluded that women generally have less skill with computers and that women therefore may have restricted access to higher positions within an organization (Harrison & Rainer, 1992). However, considering the more equal representation in the workforce of men and women (Census 2000), the proliferation of computers into the home and the reduction of anxiety regarding computer usage (Thompson, 1994), the findings of Harrison (1992) may have to be revisited. Additionally, the 2000 Census estimated a 30% greater enrollment of women in higher education than men. This Census information is almost a reverse image from what was reported in the 1970 Census. Moreover, in 2000, there were almost 3% more women in the workforce holding a college degree than their counterparts (men). With the increase in college enrollment reported for women, and the current change in workforce demographics, organizations must re-consider what age and gender dynamics in their workplace are currently and how they may be changing in the future.

Organizations, as they attempt to implement new technologies into their work place, continually need to upgrade the computer skills of their employees and may have to invest in ongoing training programs for the workforce (Igbaria, 1996). This perceived need by organizations, to have a more computer literate workforce, may lead employees to feel pressure to use computers and/or to gain an acceptable computer knowledge. Additionally, this may affect older employees more than younger employees (Gibson et al, 1993). Gibson (1993) found that employers generally considered younger employees' training a better investment but that hiring older employees would allow more security for the organizations because older employees were more likely to have long tenure with the company. With this evident conflict in perceptions noted, clearly organizations, whether training young or older employees, are expecting a return on their training investment. This expected return on investment may be considered, or be perceived by the employee as a pressure to use the implemented technology (Bolt, 2001). Further, Caputo and Cianni (1997) found that the average age of women participants in On-The-Job training programs increased steadily between 1970 and 1991 and that older women more often completed training programs than their younger counterparts do.

We first propose a model, which shows the relationships between age and gender with computer usage, and the modifying affects of social influences. Secondly, we will develop a set of research questions to be tested. And third, we will analyze the survey data and discuss the results.

Figure 1: Proposed Research Model

The proposed model incorporates three research questions. RQ1 investigates the effect age has on computer usage. RQ2 asks the effect gender has on computer usage. RQ3 (a)(b)(c) tries to determine the moderating effect of social influence between age and computer usage, and gender and computer usage.

RESEARCH QUESTIONS

Literature contends that older workers find the use of computers more difficult than younger workers. The workforce has increased in average age and has been exposed to Information technology through the proliferation of computers into the home and workplace. For more than a decade, computer usage requirements by employers have also increased.

RQ1 *With the changing demographics in the workplace and proliferation of computers into the home, does age still affect computer usage?*

While in previous studies, gender was found to have an effect on computer usage, increased educational levels for women and the proliferation of computers into the home may have caused gender to have less of an affect on computer usage within the organization. Additionally, with the increasing number of women in the workforce, and the continued growth of computer usage required by employers, questions arise as to whether gender affects computer usage. Studies from the 1980's and 1990's have typically concluded that gender does affect computer usage.

RQ2 *With the changing demographic in the workplace and the proliferation of computers into the home, is gender still affecting computer usage?*

The workforce has increased in average age, changed its composition regarding men and women, and has been exposed to computer technology for many years, and computer usage may now be expected and/or required by employers (i.e. increased pressure). The workplace supplies an element of pressure that can be measured as a perceived social influence (Compeau, D., et al, 1999). Looking at three elements of social influence and how the workplace perceives these influences can be ascertained in three questions.

RQ3(a) *Does internal peer pressure moderate the impact of age and gender on computer usage?*

RQ3(b) *Does anxiety moderate the impact of age and gender on computer usage?*

RQ3(c) *Does enjoyment moderate the impact of age and gender on computer usage?*

RESEARCH METHOD
Subjects

The target population for this study was knowledge workers - specifically, individuals whose primary work involved the use of computer technology in their daily work activities. Representatives from twenty companies were identified and asked to participate in this study. The companies were large, multi-national organizations that represented a diverse group of industries including agriculture, oil refining, insurance, retail, consulting, transportation, and finance. Each representative was asked to distribute 20 questionnaires to a randomly selected group of knowledge workers throughout their organization. Individuals were identified for participation based on their job description and a short interview to determine the extent to which they utilized computer technology in their daily activities.
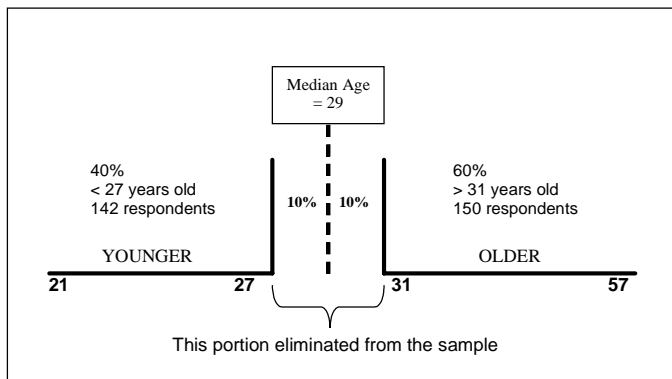
Instrument

The survey package contained a cover letter from the organization's representative, a letter from the researchers explaining the purpose of the study, and the questionnaire. All respondents were guaranteed confidentiality of their responses. This study utilized four sections of a multipart questionnaire - ten questions were included to solicit information about the respondent and their organization; eight questions to determine the extent of computer usage; five questions designed to measure the items that make up social influence in this study. As a follow-up, after two weeks the company representatives contacted those individuals who had not completed the survey instrument. A total
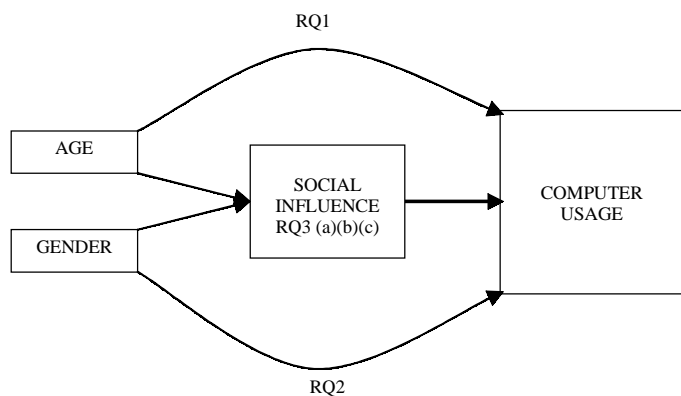
Figure 2: Elimination of respondents

of 352 individuals completed the survey instrument for a response rate of 88 percent (352/400).

RESULTS

A total of 352 subjects voluntarily participated in this study. Gender was split equally with fifty percent male and fifty percent female. Fifty-nine percent were college graduates with fifty-four percent citing business as their primary educational background. Seventy-one percent of the respondents were employed in a functional area other than information systems. Sixty-eight percent of the participants were either middle management, first line management or professionals. Almost all (99%) responded that they used a computer at their place of work several times a day. Obviously, the use of computers is an integral part of their jobs. In fact, ninety-two percent of the respondents reported that the use of a computer was required at their jobs. Therefore, the participants of this study were predominantly knowledge workers. A summary of the key demographic characteristics is presented in the Appendix 1.

Before starting the analysis, we decided that there might be issues that arise when separating young respondents from older respondents. Therefore, to eliminate any confusion regarding proximity to the median age, we decided not to include respondents that were between the 40th and 60th percentile for age. As seen in figure 2, this study produced a minimum age of 21, a maximum age of 57, and a median age of 29. Therefore, 60 respondents between the ages of 27 and 31 were removed from all calculations.

ANALYSIS

When addressing the research questions, we focused on the computer usage first, by age then by gender, and concluded with the moderating influence social pressures have on computer usage. Table 1 lists the pertinent descriptive statistics of our respondents.

Direct Predictors

To investigate further, a t-test was conducted on age as a predictor of the self-reported usage of computers. As shown in table 2, age is not a significant factor (t-score of 1.012) affecting computer usage. Although, research looks for significance, the lack of significance in this case is in itself very important. While past research has indicated that age may be an issue affecting computer usage (White, et al, 1999; Brown, 2001; Simmer, 2001), this study suggests that age is no longer a factor in computer usage. Therefore, according to these results, we suggest that age no longer has a significant affect on computer usage.

A t-test was also conducted on gender as a predictor of the self reported usage of computers. As shown in table 3, gender, male or female, is not a significant factor (t score=.949) affecting computer usage. As stated in the discussions leading to research question #1, research looks for significance; the lack of significance for gender in this study is again important. As with age, past research regarding gender has typically indicated that gender may be an issue affecting computer usage (Harrison & Rainer, 1992; Arbaugh, 2000; Truman, 1994; Gefen, 1997). This study finds that gender by and of itself is not a factor in computer usage.

Table 1: Descriptive Statistics for Sample

Younger Males (n = 79)	Min	Max	Mean	Std. Dev.	Younger Females (n = 63)	Min	Max	Mean	Std. Dev.
Age	21	27	24.65	1.68	Age	21	27	24.95	1.78
Hours of Use Per Day	1 hr	11 hr	5.63	1.86	Hours of Use Per Day	2 hrs	9 hrs	5.67	1.75
Peer Pressure			4.35	0.77	Peer Pressure			4.52	0.76
Management Pressure			4.43	0.76	Management Pressure			4.60	0.71
Anxiety			1.45	0.53	Anxiety			1.83	0.82
Enjoyment			3.89	0.69	Enjoyment			3.94	0.80

Older Males (n = 71)	Min	Max	Mean	Std. Dev.	Older Females (n = 79)	Min	Max	Mean	Std. Dev.
Age	31	56	35.32	6.00	Age	31	57	39.14	6.72
Hours of Use Per Day	0 hrs	8 hrs	5.22	2.02	Hours of Use Per Day	2 hrs	9 hrs	5.61	1.77
Peer Pressure			4.48	0.61	Peer Pressure			4.61	0.65
Management Pressure			4.44	0.63	Management Pressure			4.53	0.77
Anxiety			1.46	0.63	Anxiety			1.41	0.48
Enjoyment			4.07	0.69	Enjoyment			4.11	0.68

Table 2: Age as Predictor of Computer Usage

Age	N	Mean	Std. Dev.	Std. Error
Younger	142	5.65 hrs	1.808	0.152
Older	150	5.43 hrs	1.895	0.155
	t-test for equality of means			
Usage	t	df	Sig (2-tail)	Mean diff
Usage	1.012	290	0.312	0.22

Therefore, according to these results, we suggest that gender does not have significant affects on computer usage.

To analyze the data further, we separated the data into a simple matrix of younger employees, older employees, male, and female, as seen in figure 3. We found that younger females use computers only slightly more (5.67 hours) than the other groups. After conducting a sequential sum of the squares, we found F=.91 and that there is significance of only (.438) for the grouped sections with regard to computer usage. As stated previously, this is significant in and of itself because of the findings of past research stating there was a difference for age, gender, and computer usage. This provides a secondary evidence of non-significance regarding computer usage being affected by age and gender.

Moderators – Social Influence

The third research question, RQ3 (a)(b)(c), addresses the perceived social influences of peer pressure, anxiety, and enjoyment and any moderating affect they may have on computer usage. The measures for anxiety and enjoyment are constructs relying on multiple items derived from Compeau, Higgins and Huff (1999). The construct for anxiety has five questions and provides a standardized reliability alpha of .8014. The construct for enjoyment has four questions and provides a standardized reliability alpha of .8144.

To address RQ3(a) we looked at peer pressure. When examining figure 4, we see that older women perceive the strongest pressure to use computer, while younger men perceive slightly less pressure to use computers. Also clear is that women, in general feel more pressure to use computers than do men. These finding support Gibson et al (1993) that older employees feel greater pressure to use computers. However, peer pressure appears not to moderate the impact of age or gender on computer usage at a significant level.

When examining figure 5 and considering RQ3(b), older women in this study are found to have the lowest anxiety regarding computer use. Interestingly, the younger women have the highest levels of anxiety (relative to the other groups). The overall low anxiety level in this study supports the findings of Thompson (1994) which suggested that there has been a lowering of anxiety levels in the use of computers. Additionally, figure 5 shows that this research could support Gefen's (1997)

Table 3: Gender as Predictor of Computer Usage

Gender	N	Mean	Std. Dev.	Std. Error
Female	142	5.64 hrs	1.756	0.147
Male	150	5.44 hrs	1.941	0.159
t-test for equality of means				
Gender - Usage	t	df	Sig (2-tail)	Mean diff
Usage	0.949	290	0.344	0.21

Figure 3: Age and Gender relating to computer usage
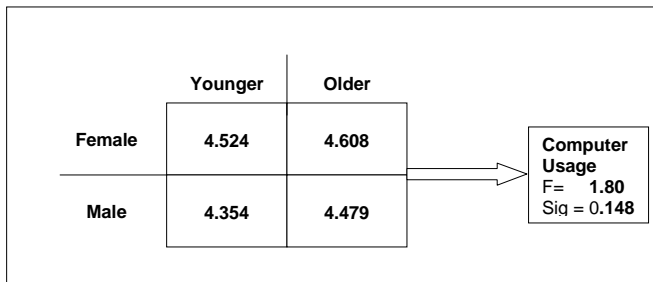

Figure 4: Peer Pressure as Moderated by Age and Gender

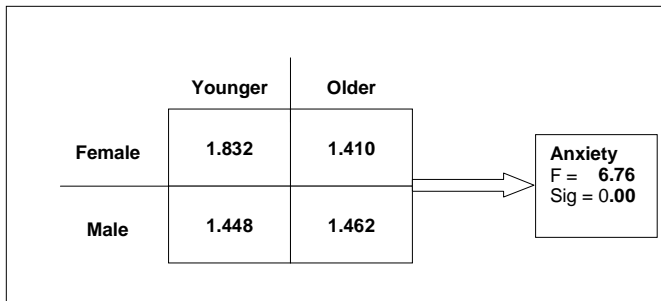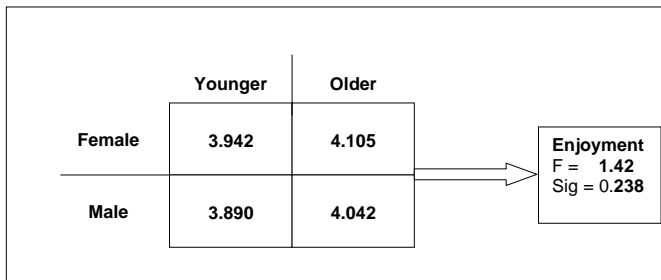*Figure 5: Anxiety as modified by Age and Gender*

Figure 6: Enjoyment as modified by Age and Gender

position that gender does play a role in computer usage. However, this support can only be applied when considering the modifying affects anxiety has on age and gender in computer usage.

The last research question RQ3(c), regarding enjoyment, also fails to provide significance at any level. However, in figure 6, it is interesting to see that older individuals in this study perceived greater levels of enjoyment from using the computers. This is contrary to what Simmers (2001) found. In this study, older women more strongly look forward to using computers on the job than any other group. While earlier studies may have found men and women significantly different in their computer use (Arbaugh, 2000; Truman, 1994; Gefen, 1997), we believe that the differences are no longer as dichotomous as they once were.

CONCLUSION

We went into this research project expecting that there would be limited, if any, change in the role that traditional usage predictors have on computer usage; namely, that age and gender would predict the acceptance and/or degree of usage of computers by employees. We expected that social influences (peer pressure, anxiety and enjoyment) would have significant impacts on computer usage amongst the different age/gender groups. These expectations were based partly on the limited published research that would predict or document a change in the acceptance or use of computers by different genders and age groups. Previous research would lead us to expect male and younger employees to more readily and more often use computers in the performance of their work. This has been an evident pattern for some time.

However, based on the results of this study, it now appears that age and gender no longer predict computer usage; i.e. gender and age are equally involved in the usage of computers. We found no significant difference between younger and older and/or between male and female in their usage of computers. Based on these findings, it would appear that computer skills and the accompanying usage of computers have reached a maturity in our domestic culture equivalent to an employees' ability to read and write; it is expected and therefore, any employable person has it.

If the moderating affect of peer pressure, anxiety, and enjoyment are examined – for effects on age and/or gender's computer usage – only anxiety moderates – i.e. causes changes in usage to be significant. It would appear that organizations should undertake programs that reduce or remove those elements of computer usage that can cause anxiety about computer usage within the organization. This may take the form of additional training or possibly allowing the work force alternative methods of completing certain computer-based tasks.

Perhaps the most important finding of this study is, when underlying conditions do change, it is necessary to reexamine the basis of our "generally accepted thoughts". We must determine if the changing conditions lead to changes in how people (employees) interact with their jobs and/or any dimension of their work life, such as the level of usage of technology that supports and leverages the efforts of the worker. We noted that there has been a great demographical change/shift in our workforce over the past couple of decades. Further research could/should be conducted to see if the demographic shift caused the new comfort level in computer usage or did a new emergent computer usage comfort level precede the demographic shift. Interesting question – however, its solution may be of limited value. Or is it? Knowledge of this quandary could help in the structuring of plans to draw lesser trained/ lesser employable people into better paying, more meaningful lines of work. This knowledge would guide organizations as to whether computer training is a prerequisite to employment or whether involvement in a job that uses computer is more useful pursuant to the computer training.

Future research should examine computer usage rates to see if those effects were caused by the changing workforce demographics itself or some precedent or posterior condition to the change in workforce involvement. Or possible opportunities emerging (arising) from the years of great economic growth, a large but unnoticed change agent to computer usage. Will these changes in computer usage be sustained in a lower (slower) economy? This must also be evaluated to uncover possible predictors and/or conditions that would enable predictors to influence computer usage.

REFERENCES

Arbaugh, J.B., 2000, "An exploratory study of the effect of gender on student learning and class participation in an Internet based MBA course", Management Learning, Vol. 31, No. 4, pp. 503-519

Bolt, M.A., Killough, L.N., Koh, H.C., 2001, "Testing the Interaction effects of Task Complexity in Computer Training Using the Social Cognitive Model", Decision Sciences Vol. 32, No 1, pp. 1-20

Brown, K., 2001, "Using computers to deliver training: Which Employees Learn and Why?", Personnel Psychology. Vol. 54, No. 2, pp. 271-296

Caputo, R, Cianni, M., 1997, "The Job Training Experiences of Black and White Women: 1970-1991", Human Resource Development Quarterly. Vol. 8, No 3, pp. 197-217.

Compeau, D., Higgins C., Huff, S., 1999, "Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study", MIS Quarterly, Vol. 23, No 2, pp. 145-158

Davis, F.D., 1989, "Perceived Usefulness, Perceived Easy of Use, and User Acceptance of Information Technology", MIS Quarterly. Vol.13, No 3, pp. 319-339

Davis, F.D, Bagozzi, R. P., and Warshaw P. R., 1998, "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models", Management Science, Vol. 35, No 8, pp. 982-1003

Gefen, D., Straub, D., 1997, "Gender differences in the perception and use of E-mail: An extension to the technology acceptance model", MIS Quarterly, Vol. 21, No 4, pp.389-400

Gibson, K. J., Zerbe, W.J., Franken, R.E., 1993, "Employers Perceptions of the Re-Employment Barriers Faced by Older Job Hunters", Relations Industrielles. Vol. 48 No 2, p. 321

Greco, J., 1998, "America's Changing Workforce", The journal of Business Strategy, Vol. 19 No 4, pp. 43-46

Harrison, A.W. and Rainer R.K., 1992, "The Influence of Individual Differences on Skill in End User Computing", Journal of Management Information Systems, Vol 9, No 1 pp. 93-111

Harrison, A.W. and Rainer R.K., "Gender differences in computing activities", Journal of Social Behavior and Personality, Vol. 12 No 4, pp. 849-868

Igbaria, M., Parasuraman, S., Baroudi, J. A, 1996, "Motivational Model of Microcomputer Usage", Journal of Management Information Systems, Vol. 13 No 1, p. 127

Melone, N., 1990, "A theoretical assessment of the user-satisfaction construct in information systems research", Management Science, Vol. 36 No 1, pp. 76-91

Robie, C., Ryan, A.M., Schmieder, R.A., Parra, L.F., Smith, P.C., 1998, "The Relation between Job Level and Job Satisfaction", Group & Organization Management, Vol. 23 No 4, pp. 470-495

Simmers, C., Anandarajan, M., 2001, "User Satisfaction in the Internet-Anchored Workplace: An Exploratory Study", Journal of Information Technology Theory and Application (JITTA), Vol. 3 No. 5, pp. 39-61

Smith, M., 2002, "Success Rates for Different Types of Organizational Change" Performance Improvement, Vol. 41, No 1, pp. 26-33

The Standish Group, (1995), "Sample Research Paper: CHAOS", The Standish Group International, Inc. Available: www.standishgroup.com

Statistical Abstract of the United States – 1990, Bureau of the Census, January, 1990

Statistical Abstract of the United States – 2001, Bureau of the Census, January, 2001

Szajna, B., 1996, "Empirical Evaluation of the Revisited Technology Acceptance Model", Management Science, Vol. 42, No 1, pp. 85-92

Thompson, R.L., Higgins, C.A., Howell, J.M., 1994, "Influence of experience on personal computer utilization: Testing a Conceptual Model", Journal of Management Information Systems, Vol. 11 No. 1, pp. 167-187

Truman, G. E., Baroudi, J.J., 1994, "Gender differences in the information systems managerial ranks: An assessment of potential discriminatory practices", MIS Quarterly, Vol. 18, No 2 pp. 129-145

White, H., McConnell, E., Clipp, E., Bynum, L., 1999, "Surfing the Net in Later Life: A Review of the Literature and Pilot Study of Computer Use and Quality of Life", Journal of Applied Gerontology, Vol. 18, No. 3, pp. 358-378

Yang, C., Moore, D.M., 1995, "Designing Hypermedia Systems for Instruction", Journal of Educational Technology Systems, Vol. 24 pp. 3-30

APPENDIX 1. SUMMARY OF KEY DEMOGRAPHICS

Functional area:	Information Systems	28.70%
	Accounting	21.00%
	Other Areas	25.20%
	Marketing and Sales	13.10%
	Human Resources	6.00%
	Management	6.00%
Position in the Organization:	Executive	3.10%
	Middle Management	17.90%
	First Line Management	21.60%
	Professional	31.30%
	Technical	12.80%
	Clerical	9.10%
	Other	7.40%
Gender:	Male	50.00%
	Female	50.00%
Educational Level:	Some high school or completed high school	12.50%
	Some College	10.50%
	College degree	58.80%
	Some graduate work	8.50%
	Graduate degree	9.70%
Educational Background:	Business	54.00%
	Other	46.00%

Related Content

Petri Nets Identification Techniques for Automated Modelling of Discrete Event Processes
Edelma Rodriguez-Perezand Ernesto Lopez-Mellado (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 7488-7502).*
www.irma-international.org/chapter/petri-nets-identification-techniques-for-automated-modelling-of-discrete-event-processes/184446

Performance Analysis of Hard and Soft Clustering Approaches For Gene Expression Data
P. K. Nizar Banuand S. Andrews (2015). *International Journal of Rough Sets and Data Analysis (pp. 58-69).*
www.irma-international.org/article/performance-analysis-of-hard-and-soft-clustering-approaches-for-gene-expression-data/122779

Design of an Integrated Project Management Information System for Large Scale Public Projects: Iranian Case Study
Mona Taghavi, Ahmed Pateland Hamed Taghavi (2013). *Interdisciplinary Advances in Information Technology Research (pp. 150-164).*
www.irma-international.org/chapter/design-integrated-project-management-information/74539

Positioning Methods and Technologies in Mobile and Pervasive Computing
Dragan Stojanovic, Billur Barshan, Apostolos Papadopoulos, Nico Van de Wegheand Christophe Claramunt (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 5713-5722).*
www.irma-international.org/chapter/positioning-methods-and-technologies-in-mobile-and-pervasive-computing/113026

Using Communities of Inquiry Online to Perform Tasks of Higher Order Learning
Ramon Tirado-Morueta, Pablo Maraver-Lópezand Ángel Hernando-Gómez (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 3976-3987).*
www.irma-international.org/chapter/using-communities-of-inquiry-online-to-perform-tasks-of-higher-order-learning/184105